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ECHIURA AND SIPUNCULA

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INTRODUCTION

The phyla Echiura and Sipuncula comprise soft-bodied and almost defenceless sedentary creatures, that always live in protected places and that are well adapted for living in burrows. They are found from temporarily exposed intertidal limits to great depths of the oceans. All are marine except for a few species that are adapted themselves to the estuarine environment and found in sand or mud where they sometimes live in U-shaped burrows.

The echiurans, usually called spoon-worms from the shape of their contracted proboscis, comprise 127 species under 32 genera in the world. Of these, 33 species under 9 genera are represented in the Indian coast and a couple of species are on record from West Bengal (Annandale & Kemp, 1915; Haldar, 1978).

The sipunculans, very often called peanut worms from the shape of their contracted trunk, comprise 144 species under 17 genera in the world, of which 37 species under 10 genera are known from the Indian coast and 3 species are on record from West Bengal (Haldar, 1989, 1991).

The present study is based on the material collected by the author from the Hooghly-Matla estuarine zone of 24 Parganas (South) district partly covering the Medinipur district and also the Digha coast of the latter during 1985-1989. The material is represented by 3 species of echiurans belonging to a single monotypic family and 3 species of sipunculans belonging to 3 genera under 2 families.

The diagnostic characters along with keys to the different taxa of the material examined have been provided. A general account of morphology and terminology, the method of narcotisation, preservation and distribution of all the species have been included.

MORPHOLOGY AND TERMINOLOGY

Echiurans : The body has two principal parts : proboscis and trunk. Proboscis, the anterior extension of the trunk near the mouth, is a highly sensitive and muscular food-gathering and respiratory organ, being highly developed or reduced and easily detachable in either case.

Trunk is a cylindrical or sausage-shaped sac very often highly muscular and filled with fluid being provided with hard bristle or hook-like structures of varying patterns : some, usually in pair, piercing the ventral wall posterior to mouth as ventral setae; some encircling posterior extremity in one or two ring-like fashion as anal setae, some surrounding the anal aperture as anal rosette found mainly in deep sea forms. Besides, wart-like or rounded, often prominent, tubercles are found; they

are almost uniform in size but usually largest towards anterior and posterior extremities and often associated with glandular cells.

The mouth lies at the base of proboscis. The alimentary canal, a very long and much coiled tube running from mouth to anus, is several times longer than the body. It consists of a long fore, mid-and hindgut. The foregut is differentiated into pharynx, oesophagus, gizzard and stomach. The midgut or intestine proper is longer than the foregut being accompanied by a collateral intestine or siphon. The hindgut or cloaca, smallest of all, in which open two usually large, tubular or sac-like vesicles, the wall of which are studded with minute ciliated funnels. The nephridia are thin-walled, elongated or sac-like vessels, varying from one to many (usually one to four pair) and with a basal nephrostome; the lips of nephrostomes are greatly prolonged and spirally twisted and open externally by nephridiopores which act as temporary outlet of eggs and sperms. The vascular system consists of a ventral, a neurointestinal and dorsal vessel in the trunk and a median and two lateral vessels in the proboscis. Nerve cord is a prominent unsegmented thread-like structure that runs ventrally along the coelomic wall of the body; anteriorly in the proboscis it is expanded into a large peripharyngeal ring. The innermost longitudinal layer and outermost circular layer of muscles in the body wall are frequently smooth and uniform but sometimes the former is often thickened into externally visible bundles.

Sipunculans : They have two principal parts : introvert and trunk. The introvert is usually shorter (in some species quite long) and slender than trunk, retractile in nature, generally lies along same axis of trunk but sometimes it is displaced ventrally. It is provided with terminal mouth usually surrounded by tentacles which are variable in the degree of development and complexity. Tentacular region follows a zone which may bear chitinous, posteriorly directed hooks either scattered or arranged in rings. The level of usually paired nephridiopores and anus or either of them, whichever is anterior, demarcates the introvert trunk junction.

The shape of the trunk may vary from almost globular to cylindrical, and sometimes retains spiral appearance for those inhabiting gastropod shells. Its anterior end is generally simple but in a few groups it is armed with varying shapes of calcareous cap and posterior end is blunt or pointed or acorn-like or provided with cap. Trunk bears papillae of various shapes and sizes being more dense at both ends than at the middle or localized regionally and sometimes modified as holdfast or totally absent.

The longitudinal and circular muscles of the bodywall are frequently arranged in smooth, uniform layers but sometimes these are gathered into bundles. Retractors, main muscles of the coelom, varying from 1-4 in numbers cross it as free longitudinal bands, being fixed anteriorly behind the oral disc and posteriorly at different levels of the trunkwall and control the introvert.

The major portion of coelom is occupied by digestive tract having a straight oesophagus, double helix (coiled) intestine and rectum with or without caecum. The anus is usually placed at the anterior end of trunk. In the coelom usually three types of gut muscles are found namely, spindle muscle, fixing muscles and wing muscles. Contractile vessel is a closed tubular sac-like structure connecting tentacular cavities and carries numerous villi. Nephridia, usually two in number, are simple, tubular or sac-like structure of variable length and serve as excretory sacs and gonoducts. Nephrostomes are discernible externally and lie on ventral side at the anterior end of trunk. Gonads, the transitory structures in the form of conspicuous fringe, develop at the base of retractor, usually at its ventral

pair when present. Sipunculans are dioecious and lack any sexual dimorphism. Fertilisation is external. Trochophore larva settle onto a suitable substratum and probably remain there throughout their lives.

METHOD OF COLLECTION, NARCOTIZATION AND PRESERVATION

Echiurans : The presence of an echiuran on sand or mud flat is often shown by the openings of its burrows or sometimes by catching sight of its proboscis. Such echiurans have to be removed by digging. The position of the worm can be marked by pushing a piece of rubber tube down the hole made by the proboscis. Careful digging on one side of the line connecting the ends of the burrow will ultimately expose the animal which is to be lift up by the trunk. Proboscis of this group is usually deciduous, so it should be collected, fixed and stored along with the trunk.

After collection the animal should be placed in plenty of cool water until it is to be narcotized. It is to be narcotized (i) by placing it in a shallow dish containing cool water on the top of which some crystals of menthol have been sprinkled, (ii) by placing them in a 7% sol. of magnesium chloride, (iii) by placing them in water to which is added very carefully a small quantity of 90% alcohol (drop by drop) or by immersing them in 1% sol. of propylene phenoxetol. The animal is to be left in the relaxing medium for 4-12 hours until it does not respond to touch. The worm is then transferred to 4% formaldehyde solution for fixation and finally to 70% ethyl alcohol for permanent preservation.

Sipunculans : As the sipunculans inhabit wide ranges of substrata the method of their collection varies according to their habitats. For the sand-and mud-dwelling forms, the most suitable way is to dig out the worm with a hand-shovel at low tide, but sometimes special technique is adopted for some species—a long pliant strip of fibre about 3 feet long, previously cut from the mid-rib of a coconut palm-leaf, is firmly, but gently, pressed into the burrow. The introvert of the worm is usually encountered about 6 to 12 inches inside the burrow, and is immediately recognised by touch. The retracting introvert guides the end of the cane inside the worm, while it is firmly pushed in. The cane is left in the burrow anchoring and the worm then located by digging the substratum with hand and it is to be lifted by pulling with a minimum effort.

After collection the worm is to be narcotized and preserved in the same manner as the echiurans.

SYSTEMATIC ACCOUNT

Phylum Echiura

Class Echiurida

Order Echiuroinea

Family Thalassematidae

Subfamily Thalassematinae

Genus ***Anelassorhynchus***

(1) ***Anelassorhynchus branchiorhynchus*** (Annandale & Kemp)

(2) ***Anelassorhynchus dendrorhynchus*** (Annandale & Kemp)

(3) ***Anelassorhynchus microrhynchus*** (Prashad)

Phylum Sipuncula
Class Sipunculidea
Order Sipunculiformes
Family Sipunculidae

Genus 1. ***Sipunculus***

(1) ***Sipunculus nudus*** Linnaeus

Genus 2. ***Siphonosoma***

(2) ***Siphonosoma australe*** (Keferstein)

Class Phascolosomatidea
Order Phascolosomatiformes
Family Phascolosomatidae

Genus 3. ***Phascolosoma***

(3) ***Phascolosoma arcuatum*** (Gray)

Family THALASSEMATIDAE

Diagnosis Gonoducts in pairs or paired groups; gonostome lateral; proboscis with coelomic spaces.

Subfamily THALASSEMATINAE

Diagnosis : Dermal longitudinal muscles not gathered into bands; gonostomal lips with or without spiral lobes; proboscis well developed, rudimentary or deciduous; gonostomal lips with or without spiral lobes; proboscis well developed, rudimentary or deciduous; presiphonal intestine long.

Remarks : This subfamily is represented in West Bengal by a single genus.

Genus ***Anelassorhynchus*** Annandale

1922. *Anelassorhynchus* Annandale, *Bijdr. Dierk.*, **22** : 148.

1946. *Anelassorhynchus* : Fisher, *Proc. U.S. natn. Mus.*, **96** : 222.

Diagnosis : Longitudinal muscle layer of uniform thickness and without specialized bands; nephrostomal lips prolonged and spirally coiled.

Distribution : India : West Bengal, Orissa, Gulf of Mannar, Lakshadweep; Japan; Amboina; Philippines; Australia; Indonesia; Mauritius; Spain; U.S.A.; Hawaii.

Remarks : The genus is represented in India by seven species, out of them only three species is so far known from West Bengal.

Key to species of ***Anelassorhynchus***

1. Proboscis well developed 2

Proboscis reduced to a small collar ..... ***A. microrhynchus***

2. Proboscis with conspicuous ridge between the dendritic outgrowths .....***A. branchiorhynchus***
   Proboscis without ridge.....***A. dendrorhynchus***

(1) ***Anelassorhynchus branchiorhynchus*** (Annandale & Kemp)

(Fig. 2)

1915. *Thalassema branchiorhynchus* Annandale & Kemp, *Mem.Indian Mus.*, **5** : 61-63, figs. 2 & 3.
1978. *Anelassorhynchus branchiorhynchus*: Haldar, *Bull. zool. Surv. India*, **1** (3) : 315.

Material examined : *South 24 Parganas* : 2 exs., Forest jetty, Gosaba, 17.x.1984; 6 exs., south of old jetty, Canning, 26.ix.1984; 6 exs., East Khati, Parghumti, 8.ix.1984; 2 exs., Goalbari khal, Bakkhali, 6.iii.1985; 2 exs., Harwood Point, Kakdwip, 8.iii.1985; 4 exs., Sajinatala, Basanti, 25.ii.1986; 9 exs., north of Kapilmuni temple, Gangasagar, 24.xii.1987; *Medinipur* : 4 exs., Terapekhya char in the river Haldi near Keshabpur, 9.iii.1985; 8 exs., same locality, 17.iv.1987 – Collector B. P. Haldar.

Diagnosis : Trunk of preserved and fully extended specimens 47-85 mm long and maximum width 10 mm near mid-trunk region, sausage-shaped, somewhat translucent in life with a deep reddish winous tinge and remaining translucent even in spirit, posterior extremity gradually narrowed down. Proboscis 15-26 mm long when fully stretched, about one-third as long as trunk; purplish pink coloured and dendritic outgrowths bright red coloured; dendritic outgrowths highly developed, having a gill-like appearance and confined to proximal third of the margin, distal part of which quite smooth; longitudinal ridges on proximal part of ventral surface quite conspicuous. Papillae covered the whole body and of two kinds, large and small; large ones being most numerous towards the two extremities; at the posterior end papillae conical and tend to be arranged in transverse rings and as a result there is no smooth circum-anal region. Ventral hooks golden yellow tipped with black and placed anterior to nephridiopores.

Longitudinal muscles form a continuous sheath. Nephridia two pair, opening behind the ventral hooks; nephrostomal lip provided with a pair of long, fine, less distinctly coiled filaments; vesicle narrow and finger-shaped, tapering to a blunt apex. Anal trees long and simple, about half the length of the body, thin-walled with slight brownish tinge and opening separately into intestine but irregularly coiled and attached to the body wall by numerous slender easily detachable muscular strands; considerable part of the canal closely packed with small oval pellets of mud.

Remarks : The animal lives in hard mud in a U-shaped burrow. In the same burrow some other forms like polychaete, *Gattyana fauveli* and an isopod, *Cirolana parva*, are found as commensals and they enjoy the same advantage that the host does.

Distribution : The species was described from estuarine belt but later on it was reported from marine habitat also. However, the species is endemic to India.

In India : West Bengal : South 24 Parganas, Medinipur; Orissa; Gujarat.

(2) ***Anelassorhynchus dendrorhynchus*** (Annandale & Kemp)

(Fig. 4)

1915. *Thalassema dendrorhynchus* Annandale and Kemp, *Mem. Indian Mus.*, **5** : 58-61, fig.1.
1978. *Anelassorhynchus dendrorhynchus* : Haldar, *Bull. zool. Surv. India*, **1** (3) : 316.

Material examined : *South 24 Parganas* : 3 exs., Sajinatala, Basanti, 25.ii.1986; 2 exs., Ajmalmari, 6.iii.1989; 2 exs., Prentice Island, 8.iii.1989; 1 ex., Dayapur, near Pakhirala, 14.iii.1989 – Collector B. P. Haldar.

Diagnosis : Trunk of preserved and fully expanded specimens 38 to 54 mm long and maximum breadth 8 mm at the middle of trunk, sausage-shaped, posterior extremity abruptly narrowed down to rounded tip, translucent in life with a pale vinous tinge but opaque is spirit in which colour completely lost. Proboscis 10 to 15 mm long, about one-fourth of the trunk length, shovel-shaped with distal extremity truncate; its ventral surface with inconspicuous ciliated groove but without longitudinal ridge; its margin distinctly serrated, the serrations towards proximal end taking the form of dendritic outgrowths; proboscis cream coloured, with free edges and dendritic outgrowths tinged with brown. Ventral hooks bright golden coloured, juxtaposed and placed close to proboscis base. Papillae covered the whole body but numerous towards the two extremities tending to be arranged in concentric rings; in general, papillae of posterior region larger than the anterior but absent in the circum-anal region which is surrounded in a more or less definite manner by several concentric folds, the most conspicuous one separates it from the densely papillate region immediately in front.

Longitudinal muscles form a continuous sheath. Nephridia two pair, nephrostomal lip with a pair of long, fine, spirally filaments; vesicle narrow and finger-shaped, tapering to a blunt apex. Anal trees short and simple, less than half the length of body, thin-walled with slight brownish tinge and opening separately into intestine close to anus. Alimentary canal similar to the former species.

Remarks : This species can be readily differentiated from the former one in the field by the nature of dendritic outgrowths at the proximal end of proboscis; these outgrowths are always shorter than half the width of the whole organ.

Distribution : This species is endemic to the east coast of India.

In India : West Bengal : South 24 Parganas including Sagar Island (Haldar, 1978); Orissa : Chilka Lake (Type locality – Annandale and Kemp, 1915); Tamil Nadu : Pamban (Haldar, 1978).

(3) ***Anelassorhynchus microrhynchus*** (Prasad)

(Fig. 3)

1919. *Thalassema microrhynchus* Prashad, *Rec. Indian Mus.*, **16** : 339-400, fig. 1.

Material examined : *South 24 Parganas* : 4 exs., Bakkhali, 7.iii.1985; 2 exs., Sajinatala, Basanti, 25.ii.1986; 3 exs., Goalbari Khal, Bakkhali, 1.iv.1987; 7 exs., Ajmalmari, 6.iii.1989; 3 exs., Panchamukhani, 6.iii.1989 – Collector B. P. Haldar.

Diagnosis : Trunk of preserved and fully narcotized specimens 15 to 33 mm long and greatest breadth 8 mm at the middle of trunk, elongated, slightly curved in life but greyish white in preserved state. Proboscis rudimentary, 1 to 2 mm long, creamy white, lateral margins being united ventrally at base and distal free end truncate; ventral surface with longitudinal furrows but without ciliated groove. Ventral hooks well developed, their free ends very broad and curved. Papillae covered the whole body but arranged in definite rings at two ends; distinct papillae present in the circum-anal region.

Longitudinal muscle form a continuous sheath. Nephridia two pair, nephrostomal lip drawn out into very long spiral lobes; vesicle bag-like elongate structure with free closed end pointing

backwards. Anal vesicle simple, about half the length of the body and provided with two rows of ciliated funnels on anterior half.

Remarks : The species was described from estuarine zone at Chandipore, Orissa in 1919. For a span of seven decades the species was not reported elsewhere until recently from South 24 Parganas, West Bengal.

Distribution : West Bengal : South 24 Pargonas; Orissa (Type locality – Prashad, 1919).

Family SIPUNCULIDAE

Diagnosis : Tentacles may form clusters or be arranged in meridonial rows; retractor muscles two pair.

Remarks : Amongst a total of five genera have so far been recorded from the Indian coast (Haldar, 1991). The said two genera are represented in West Bengal also.

Genus 1. *Sipunculus* Linnaeus

1766. *Sipunculus* Linnaeus, *Systema Naturae*, 12th edition : 1078.
1991. *Sipunculus* : Haldar, *Mem. zool. Surv. India*, **17**(4) : 9.

Diagnosis : Introvert shorter than and sharply differentiated from trunk, without hooks but covered with irregularly arranged triangular papillae; mouth surrounded by tentacles; contractile vessels two in number and both without villi; spindle muscle not attached posteriorly.

Remarks : In Indian coast this genus is represented by three species, out of them only one is reported from West Bengal.

(1) *Sipunculus nudus* Linnaeus

(Fig. 9)

1766. *Sipunculus nudus* Linnaeus, *Systema Naturae*, 12th ed. : 1078.
1991. *Sipunculus nudus* : Haldar, *Mem. zool. Surv. India*, **17** (4) : 12-15.

Material examined : *Medinipur* : 3 exs., Digha, West Bengal, 15.x.1964, Collector A. K. Datta.

Diagnosis : Trunk 70-90 mm long and 17-22 mm wide, pink or pinkish-white in colour with irridescent cuticle; thick-skinned and opaque; almost cylindrical with bulbous posterior end. Introvert 25-30 mm long, much narrower than trunk and bearing numerous, subtriangular, posteriorly directed scale-like papillae. Tentacular membrane divided into 4-5 lappets.

Longitudinal muscle layer divided into 25-30 non-anastomosing prominent muscle bands usually splitting into two in the glans region while circular muscle layer continuous there. Retractor muscles two pair, equally strong and arising from the same level; ventral spanning 2 to 6 while dorsal 3 to 6 muscle bands. Oesophagus with characteristic "post-oesophageal" loop; intestinal coils 22-24 in number; rectum short and bearing a rectal caecum – an extraordinarily long, white, narrow tube; anal opening on 13th muscle band. Racemose glands single pair. Spindle muscle arising ahead of anus, running posteriorly and terminating on 4th-5th intestinal coil. Contractile vessel simple and paired, thin-walled and convoluted, extending up to base of retractor muscles. Nephridia one-sixth to one-

eighth of trunk length, dark tan coloured and opening in front of anus. Brain with a number of short digitate processes along its anterio-dorsal margin.

Remarks : This species is used by the anglers as an interesting bait in Amboina and natives of the Palau Island eat it as food.

Distribution : West Bengal : Medinipur. This species is a cosmopolitan inhabitant of shallow, temperate, tropical and subtropical waters. It has been recorded from Andaman Sea, Arabian Sea and Lakshadweep area.

Outside India : Africa; Red Sea: Thailand; China; South Australia; Philippines; Japan; Korea; Panama; Costa Rica; U.S.A.; West Indies; Cuba; Brazil; Ireland; British Islands; France; Spain; Adriatic Sea.

Genus 2. ***Siphonosoma*** Spengel

1912. *Siphonosoma* Spengel, *Verh. dt. zool. Ges.*, **22** : 264.
1991. *Siphonosoma* : Haldar, *Mem. zool. Surv. India*, **17**(4) : 21-22.

Diagnosis : Introvert shorter than trunk having papillae and sometimes hooks arranged around mouth; coelomic canal in the bodywall; contractile vessel single and with or without villi; spindle muscle attached both anteriorly and posteriorly.

Remarks : In the Indian coast this genus is represented by four species, of which only one is known from West Bengal.

(2) ***Siphonosoma australe*** (Keferstein)

(Figs. 13-15)

1865. *Phascolosoma australe* Keferstein, *Nachr. Ges. Wiss. Gottingen*, No. 7 : 197-198.
1991. *Siphonosoma australe* : Haldar, *Mem. zool. Surv. India*, **17** (4) : 22-24.

Material examined : *Medinipur* : 1 ex., Digha, West Bengal, "from sandy mud", 15.ii.1964, Collector A. K. Datta.

Diagnosis : Trunk 154 mm long with prominent annular rings posteriorly, thick, opaque-skinned, brown in colour. Introvert 72 mm long, armed with 38 rows of hooks; hook large, slightly curved, more or less pointed, dark brown in colour. Tentacles 96, long and slender. Papillae uniformly distributed over the body, smaller and circular in mid-trunk region but more prominent and dome-shaped at posterior end; in between hook rows papillae very small and circular.

Longitudinal muscles in 14-19 bands, anastomosing occasionally. Circular muscles also separated into anastomosing bands. Retractor muscles two pair (dorsal and ventral) – ventral pair from anterior fourth of trunk from muscles 1-3 while dorsal from anterior tenth of trunk from muscles 4-6. Intestinal tract having 62 coils, rectum long and with a small oblong caecum but without accessory caeca; anal aperture behind nephridiopores. Contractile vessel simple, running up to first intestinal coil. Spindle muscle arising anteriorly by three roots and anchoring intestinal coil posteriorly. Fixing muscle single, originating by two roots. Nephridia brown coloured, about one-fourth as long as trunk and attached anteriorly. Coelomic papillae and 'Keferstein bodies' present but without any transverse dissepiment.

Remarks : This species may be readily distinguished from other Indian species of this genus by the presence of rather long, dark brown hooks, simple contractile vessel and by the absence "accessory rectal caeca"

Collection method of this species is quite different from others; special technique is adopted and that is already dealt under "Method of Collection"

Distribution : This is a warm water but generally shallow water species of the Indian and West Pacific Ocean.

India : West Bengal : Digha; Andhra Pradesh : Visakhapatnam Harbour; Tamil Nadu : Gulf of Mannar and Rameswaram; Andamans : Long Island.

Outside India : Africa; Malay; Philippines; Formosa; Japan; New Zealand; New South Wales; South Pacific Islands.

Family PHASCOLOSOMATIDAE

Diagnosis : Longitudinal muscle layer of body wall either divided into bands or continuous; papillae usually most closely placed at posterior end of trunk.

Remarks : This family includes three genera, all are represented in the Indian coast but only one genus is reported from West Bengal.

Genus 3. ***Phascolosoma*** Leuckart

1828. *Phascolosoma* Leuckart, *Breves animalium quorandam maxima ex parte marinorum descriptiones. Heidelberg* : 22, fig. 52.

1991. *Phascolosoma* : Haldar, *Mem. zool. Surv. India*, **17** (4) : 47.

Diagnosis : Hooks recurved and arranged in numerous rings; tentacles arranged around nuchal organ and placed dorsal to mouth; longitudinal muscle layer divided into separate, anastomosing bands; contractile vessel lacking villi; spindle muscle attached posteriorly.

Remarks : Out of ten species under this genus reported from the Indian coast only one is found in West Bengal.

(3) ***Phascolosoma arcuatum*** (Gray)

(Figs. 8, 10-12)

1828. *Sipunculus arcuatus* Gray, *Spicilegia Zoologica*, Lond., (1) : 8.

1991. *Phascolosoma arcuatum* : Haldar, *Mem. zool. Surv. India*, **17**(4) : 54-56.

Material examined : *South 24 Parganas* : 8 exs., Sagar Island, Chemaguri, 6.xi.1979; 11 exs., Gangasagar, Sagar Island, 3.iii.1980; 20 exs., Canning; 21 exs., 19.ix.1984 Jharkhali, Sunderban, 22.ix.1984; 15 exs., Bakkhali, 5.iii.1985 – Collector B.P. Haldar.

Diagnosis : Trunk 35-65 mm long and 15-32 mm wide, stout and about uniformly cylindrical; pale brown to brown in colour but anterior and posterior extremities dark brown. Introvert slender, 40-102 mm long. Tentacles 8-10, finger-shaped, arranged in a horseshoe-shape and placed dorsal to mouth. Collar white, lies behind tentacular crown, followed by closely set 58-65 complete rows of hooks on introvert; hook with sharply bent apex, clear central streak running from base to apex and lacking a separate triangular area. Papillae distributed all over the body; mid-trunk papillae brown in

colour and sparsely distributed whereas papillae at two extremities comparatively larger, densely aggregated and blackish brown.

Circular and longitudinal muscle layers grouped into bands – former narrow, numerous and closely placed whereas latter divided into 18-22 separate, stout and less anastomosing bands. Retractor muscles two pair, originating more or less at the same level from posterior fifth or sixth of trunk; both the pair uniting shortly after their origin. Intestinal coils 42-72. Spindle muscle stout being attached to posterior extremity of trunk and anteriorly in front of anus. Contractile vessel simple and without villi. Fixing muscle absent but broad and well developed wing muscle present. Nephridia brown coloured, tubular and one-third as long as trunk; nephrostomes small and funnel-shaped.

Remarks : The species can thrive well in semiterrestrial habitat and found in the intertidal zone from mean high water spring tide to mean low water spring tide levels, being exposed to a marked degree of varying salinity ranging from 5% to 25% in the mangrove belt of West Bengal.

Distribution : This is a Indo-West Pacific species found in tropical shallow water.

India : West Bengal : South 24 Parganas.

Outside India : Bangladesh; Singapore; Malay; Philippines; China; Western Australia; Queensland.

TABLE

Distribution of Echiura and Sipuncula in India and Elsewhere

	West Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Gujarat	Laksha-dweep	Andaman & Nicober Is.	Indian Ocean	Pacific Ocean	Atlantic Ocean
ECHIURA										
1. *Anelassorhynchus branchiorhynchus*	+	+			+					
2. *Anelassorhynchus dendrorhynchus*	+	+		+						
3. *Anelassorhynchus microrhynchus*	+	+								
SIPUNCULA										
1. *Sipunculus nudus*	+			+		+	+	+	+	+
2. *Siphonosoma australe*	+		+	+			+	+	+	
3. *Phascolosoma arcuatum*	+						+	+	+	

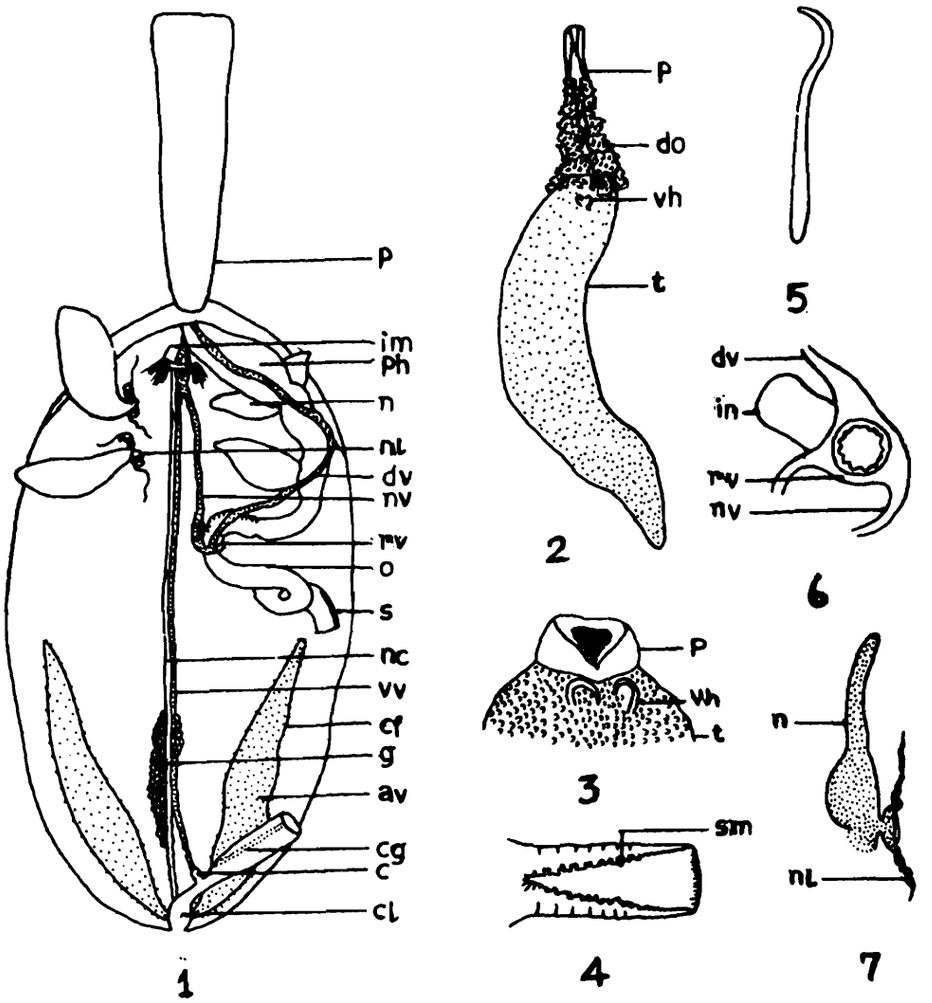


Fig. 1. A generalized diagram of an echiurid (a species of the family Thalassematidae) to show some of the anatomy of an echiuran; dorsal view.

Fig. 2. External morphology of *Anelassorhynchus branchiorhynchus* (Annandale & Kemp).

Fig. 3. Anterior part of *Anelassorhynchus microrhynchus* (Prashad) to show proboscis (highly deduced) and position of ventral hooks.

Fig. 4. A portion of proboscis of *Anelassorhynchus dendrorhynchus* (Annandale & Kemp) to show the serrated margins, the serrations towards the proximal end gradually take the form of dendritic outgrowths.

Fig. 5. A hook of an echiuran.

Fig. 6. Ring vessel surrounding end of foregut of *Anelassorhynchus.*

Fig. 7. A nephridium of *Anelassorhynchus.*

Abbreviations :

av, anal vesicle; c, caecum; cf, ciliated funnel; cg, ciliated groove; cl, cloaca; do, dendritic outgrowths; dv, dorsal vessel; g, gonad; im, interbasal muscle; in, intestine; n, nephridium; nc, nerve cord; nl, nephrostomal lips; nv, neuro-intestinal vessel; o, oesophagus; p, proboscis; ph, pharynx; rv, ring vessel; s, siphon; sm, serrated margin; t, trunk; vh, ventral hook; vv, ventral vessel.

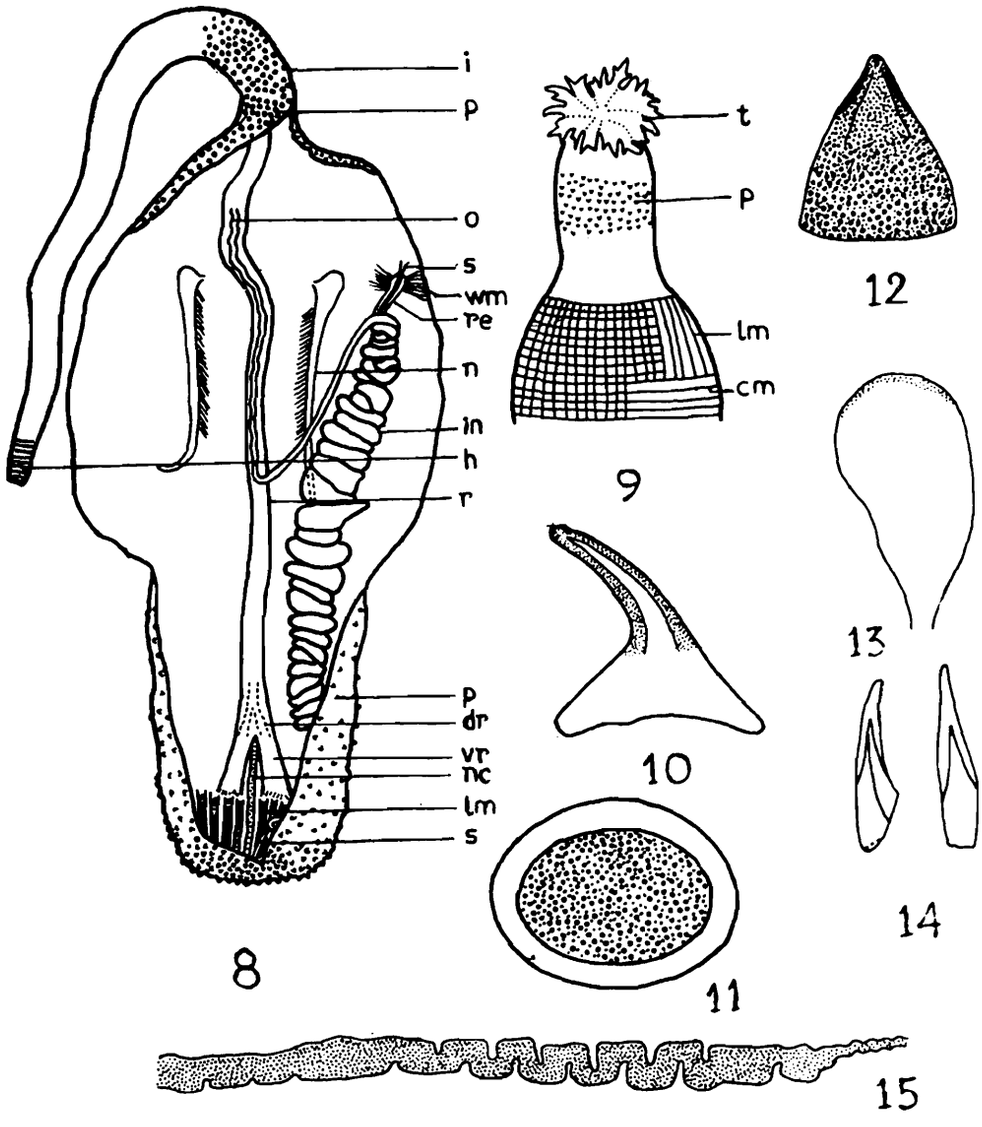


Fig. 8. Partly dissected sipunculan, *Phascolosoma arcuatum* (Gray) to show some of the anatomy; dorsal view.

Fig. 9. Anterior region of introvert of *Sipunculus nudus* Linnaeus.

Fig. 10. An introvert hook of *Phascolosoma arcuatum* (Gray).

Fig. 11. Papilla of introvert from rows of hooks of the same.

Fig. 12. Papilla from posterior end of trunk of the same.

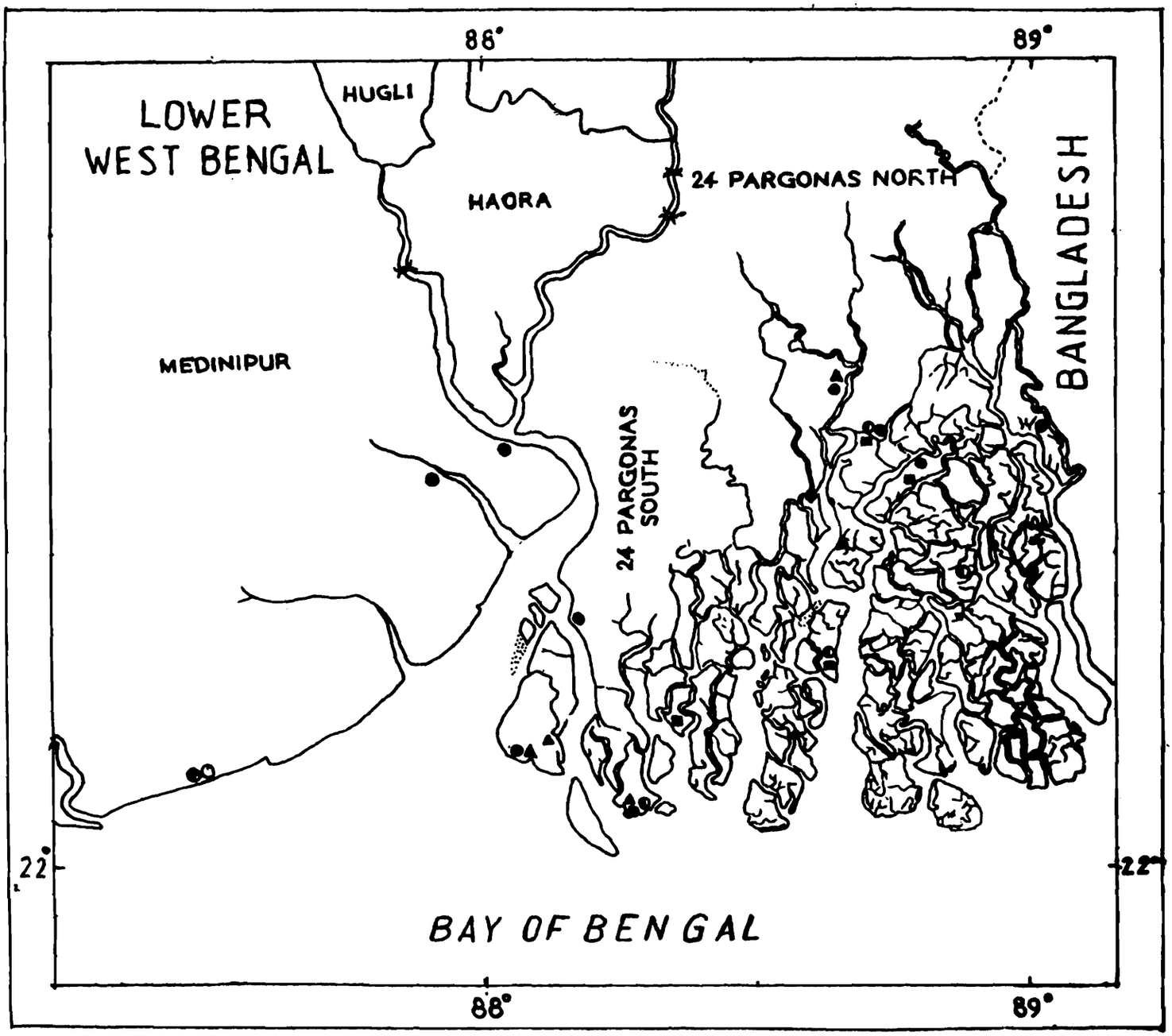
Fig. 13. Coelomic papilla in the vicinity of nephridiopore of *Siphonosoma australe* (Keferstein).

Fig. 14. Introvert hooks of the same.

Fig. 15. Dorsal view of contractile vessel of the same.

Abbreviations :

cm, circular muscle; dr, dorsal retractor; h, hook rows; i, introvert; in, intestine; lm, longitudinal muscle; n, nephridia; nc, nerve cord; o, oesophagus; p, papilla; r, united retractor muscle; re, rectum; rv, ring vessel; s, spindle muscle; t, tentacular crown; vr, ventral retractor muscle; wm, wing muscle.



Map showing distribution of Echiura and Sipuncula

● *Anelassorhynchus branchiorhynchus* ■ *A. dendrorhynchus* ◐ *A. microrhynchus*

○ *Sipunculus nudus* ⊕ *Siphonosoma australe* ▲ *Phascolosoma arcuatum*

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SUMMARY

The paper deals with a comprehensive account of echiuran and sipunculan fauna of West Bengal, the former is represented by 3 species under a single genus while the latter by 3 species under 3 genera and 2 families. All the species have been keyed and described for easy identification. Diagnostic characters are provided for all the families as well as genera occurring in the state. In addition, the state-wise distribution in India as well global distribution is summarised in a table.A general account of morphology and terminology, method of collection, narcotisation and preservation is added. Out of three species of Echiura one, *Anelassorhynchus microrhynchus* is new to West Bengal but all of them are found in estuarine habitat. Out of three species of Sipuncula only *Phascolosoma arcuatum* is found in estuarine zone of West Bengal.

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ANNELIDA : OLIGOCHAETA : EARTHWORMS

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INTRODUCTION

Aristotle described some small creatures as "the intestine of earth" These are earthworms the elongated soft bodied segmented invertebrates. Darwin in 1881 realized that the earthworms play an important role on the fertility of the soil. They burrow under the earth, leave the castings outside and help in mixing and churning of the soil. The burrows increase drainage and aeration. Moreover, the castings accumulated on hill slopes are carried to the sea by the rivers and streams to form the fertile continents. So they are called the friends of the farmers.

Juliana de Berners in 1496 wrote about various kinds of earthworms in her book "Fyshynge with an Angle" Izaac Walton in 1653 in his book "Compleat Anglers" mentioned several earthworms useful as fish baits. But before nineteenth century the earthworms were observed and studied by none excepting Linnaeus who erected the genus *Lumbricus* in 1758. Later, scientists from different parts of the world became interested to study them. The history of earthworm taxonomy can not be completed without mentioning the following names : Bahl, Baird, Beddard, Benham, Brinkhurst, Cernosvitov, Chen, Cognetti de Martis, Easton, Eisen, Fedarb, Fletcher, Gates, Grube, Hatai, Horst, Jamieson, Julka, Kinberg, Kobayashi, Lee, Michaelsen, Ohfuchi, Omodeo, Orley, Perrier, Pickford, Rosa, Savigny, Schmarda, Stephenson, Templeton, Ude and Vaillant.

Out of about 3900 global species some 380 species were reported from India. Of these, 55 species were known to occur in West Bengal. The first report of an earthworm species *Perichaeta houlleti* from West Bengal was made by Perrier (1872). Afterwards Beddard (1883, 1885, 1900, 1901, 1902), Michaelsen (1907, 1910) and Stephenson (1916, 1917, 1920) had major contributions on the taxonomy of earthworms from West Bengal before the publication of "Fauna of British India, Oligochaeta" by Stephenson (1923). Later a considerable work has been done by Gates (1937, 1938a, 1938b, 1951, 1958, 1960), Halder & Julka (1967), Julka (1975) and Soota & Halder (1977, 1981).

In order to know the present state of earthworm fauna of West Bengal systematic field surveys were undertaken in the unexplored and little explored districts under the Mopping Survey Programme from April, 1983 to March, 1987. Simultaneously the material collected from all the seventeen districts of West Bengal along with the unnamed collections in the General Non-chordata Section of the department were worked out. While working on 3492 specimens of these earthworms, the author came across 30 species belonging to 16 genera and 7 families. As a result of the present study the total number of species from West Bengal has increased from 55 included in 21 genera and 6 families to 63 under 26 genera and 8 families. One genus represented by one species is newly recorded from India. Six species have been recorded for the first time from West Bengal and many others as new records from different districts. In addition, the representatives of 4 genera and 2 families are also being recorded for the first time from West Bengal. The present study also reports an interesting parthenogenetic morph of one species *Metaphire houlleti* (Perrier) being recorded for the first time from India. For the sake of uniformity in the work and also to provide all the informations on the earthworm fauna of West Bengal the synonymy, diagnostic characters,

distribution, etc. of other already known species from West Bengal have been included in this paper. Under the species only the unpublished material studied is included and not the already reported material though available in the collections and examined for the preparation of this report.

Of the 63 species dealt with 30 spp. are widely distributed whereas 34 are endemic to Oriental Region of which 17 are endemic to West Bengal and 8 more to India. As per origination, 5 spp. are of Ethiopian origin, 13 of Palearctic, 44 are Oriental and one is Neotropical. The keys for identification, the diagnostic characters and distribution of the families, genera and species of earthworms of this state have been provided. In addition, Table-I shows their district-wise distribution in West Bengal, Table-II state-wise distribution in India and Table-III endemicity in Oriental Region and global distribution with origin. Each of the genera and species is provided with synonymy along with type localities and repositories of types. Economic importance, habitats and castings of as many species as possible have also been included. A general account of morphology and terminology as well as the method of narcotization and preservation of earthworms has also been added. The classification proposed by Brinkhurst & Jamieson (1971) has been followed. For details of synonymy, description, origin, distribution and economic importance Stephenson (1923), Gates (1938a, 1972) and Julka & Senapati (1987) may be consulted.

MORPHOLOGY AND TERMINOLOGY

External characters

The body of the earthworm is elongated. It is divided into many segments by circular grooves. The anterior most segment is called the *peristomium* and the posterior most segment is known as the *periproct*. The protuberance on the anterior and dorsal side of the peristomium is called the *prostomium*. There are six types of prostomium such as zygolobous, prolobous, epilobous, proepilobous, tanylobous and combined pro and epilobous. The *mouth* a crescentic aperture is located beneath the prostomium, on the ventral surface of the first segment. The *anus* is an opening situated at the posterior end of periproct.

In most of the earthworms there are some minute pores in the intersegmental grooves along the mid-dorsal line. These are called the *dorsal pores* which begin some distance behind the anterior end. To keep the body moist and slimy the earthworms discharge coelomic fluid through these pores. These are lacking in Moniligastridae.

The *setae* are minute peg-like needles formed by the secretions produced by the invaginated ectodermal cells. In most of the earthworms setae are situated in each segment excepting the first and the last ones. The arrangement of setae is of two types viz. *lumbricine* and *perichaetine*. In the former eight setae are arranged in four pairs on the ventral surface of each segment as in the families Lumbricidae, Moniligastridae, Octochaetidae, etc., while in the later the numerous setae are arranged in the form of a ring around each segment as in the genera *Amynthas*, *Megascolex*, *Metaphire*, *Perionyx Polypheretima*, etc. These setae help the worms in locomotion. There are some setae which are modified to from *copulatory setae* located near spermathecal pores as in the genera *Lennogaster*, *Octochaetona*, etc. and *penial setae* located near male pores as in the genera *Eutyphoeus*, *Lampito*, etc. These setae help the worms in reproduction.

In the anterior part of mature worms there is an area of some segments thickened and swollen by the tumescence of epidermal cells. This area is called the *clitellum*. The gland cells of clitellum secrete mucous for copulation, material to form cocoon and albumin in which eggs are deposited within the cocoon.

There are genital apertures such as *spermathecal pores, female pores, male pores* and *prostatic pores* located on the ventral side of the anterior part of the body. The external openings of the *spermathecae* are called the *spermathecal pores*. These are situated in front of the clitellum. The external openings of the male ducts, the female ducts and the prostatic ducts are called the *male pores*, the *female pores* and the *prostatic pores* respectively. The male pores are always of one pair but the prostatic pores may be of one pair or two pairs. The female pore may be single or of one pair. The location of male pores may be in front of female pores as in Alluroididae, Haplotaxidae, etc., or behind the female pores as in Acanthodrilidae, Megascolecidae, Ocnerodrilidae, Octochaetidae, etc. In *Acanthodrilin* form the paired prostatic pores are in XVII and XIX, and male pores in XVIII — all pores often in seminal grooves of furrows between eq/XVII and eq/XIX. In *balantin* forms the prostatic and male pores are in XIX. In *microscolecin* form a pair of tubular prostates open to the exterior in XVII along side or together with sperm ducts. In *megascolecin* form a pair of tubular or recemose prostates open to the exterior in XVIII along side or together with spermducts.

There are also some minute pores called *nephropores*. These are the external openings of nephiridial ducts. These pores are situated in the ventro-lateral surface of each segment. The waste products formed in the coelom are removed through these pores.

In many mature worms the *genital markings* are present on the anterior ventral surface of the body. These are variable in number and location.

B. *Body wall*

The *body wall* is composed of an outer *cuticle*, an ectoderm layer, muscular layers and an inner coelomic epithelium. The *cuticle* is formed by the hardening of the secretions produced by the cells of the ectoderm layer. The cuticle has numerous pores through which the secretions produced by the gland cells of the ectoderm layer come out to the exterior. The *ectoderm* at certain points is pushed inward to form little sacs in which the setae are implanted. These sacs are provided with protractor and retractor muscles by the action of which the setae can be protruded and retracted. The *muscular layer* consists of a layer of circular muscles and a layer of lingitudinal muscles. The layer of circular muscles is situated below the ectoderm layer while the layer of longitudinal muscles lies beneath the layer of circular muscles. The body becomes elongated and shortened by the contraction of circular and longitudinal muscles respectively. The *coelomic epithelium* a thin membrane consisting of flat cells is situated just below the layer of longitudinal muscles.

C. *Internal characters*

The *coelom* is the large cavity which extends from one end of the body to the other. It contains digestive, circulatory, excretory, sensory and reproductive organs. In the coelom there are transverse partitions called septa which are placed between successive segments. On the *septa* there are perporations surrounded by rings of muscles by the contraction of which the apertures are closed. The milky white fluid filled in the coelom is called the coelomic fluid which contains numerous nucleated cells of variable shape and size.

(a) *Digestive system* :

The straight *alimentary canal* runs from mouth to anus. The anterior portion of the tract is concerned with ingestion and digestion of food while the posterior portion deals with further elaboration of food and absorption of soluble products. The anterior portion consists of buccal cavity, pharynx and oesophagus, and the posterior portion is composed of intestine.

The mouth leads into a small cavity called the *buccal cavity*. The buccal cavity opens into a more spacious pear-shaped structure called the *pharynx* which acts as a pump. The pharynx is connected with the body-wall by muscle fibres. The dorsal wall of the pharynx contains a thick mass of gland cells which help in digestion by pouring its salivary secretions into the pharynx. The pharyx opens into a long narrow tubular portion called the *oesophagus* which may be modified at different levels to form a *stomach*, a *crop* and a *gizzard*. In Megascolecidae the crop and the gizzard are in the anterior part of the oesophagus shortly behind the pharynx. In Lumbricidae the crop and the gizzard are present at the posterior part of oesophagus. In Moniligastridae there are two to ten gizzards at the anterior part of intestine. The crop is thin walled and acts as a storage of food. The gizzard is lined with hard cuticle and is very muscular. It is used for grinding food particles into finer ones. In some earthworms there are lateral or dorsal glandular swellings of the posterior wall of oesophagus. These are called the *calciferous glands* which relieve the body of excess calcium taken up from food and maintain a constant pH in blood and coelomic fluid. The triturated food then passes into the *intestine* which is the main part of the alimentary tract for digestion and absorption of food. The intestine is wider than oesophagus. In most earthworms, there is a longitudinal fold called the *typhlosole* which projects from mid-dorsal wall of intestine. There is also a pair of conical outgrowths of intestine. These are called the *intestinal caeca*. The posterior region of the intestine is called the *rectum* which collects faecal matter to be expelled through the anus.

The alimentary tract is composed of a layer of endodermal cells surrounded by circular and longitudinal muscles. The endoderm contains the glandular cells the secretions of which effect in the chemical changes of food and the tall columner cells which absorb the prepared food.

(b) *Circulatory System*

Blood of earthworm is a nutritive fluid composed of liquid plasma and tiny nucleated corpuscles. It is reddish in colour due to the presence of haemoglobin dissolved in plasma.

The tubes through which blood flows from one part of the body to the other are called the *blood vessels*. The narrow vessels called the *capillaries* form a network around tissues and organs. Blood passes from capillaries to tissues and cells, and flows back into capillaries from tissues and cells. The flow of blood within the blood vessels is due to the rhythmic pressure on the trunk vessels produced by the contraction and elongation of the body. Some of the vessels which can contract and expand independently and act as pumps for driving blood are called the *hearts*.

There are three large *trunk vessels* running along the length of the body. One of them is the *dorsal vessel* which is placed above the alimentary canal, the other is the *ventral vessel* which runs below the alimentary canal, and the third one is the *subneural vessel* which is located below the nerve cord. There are two short longitudinal vessels also-one is the *supra-oesophageal vessel* which runs forward along the left side of the oesophagus, and the other is the extra-oesophageal vessel which is placed above the oesophagus. The *hearts* opening into the dorsal and the ventral vessel are called the *lateral hearts*; those opening into the supra-oesophageal and the ventral vessel are called the *oesophageal hearts*; those joining the ventral vessel but bifurcating above the oesophagus, with one branch to the supra-oesophageal vessel and the other to the dorsal vessel, are called the *latero-oesophageal hearts*.

The blood of the intestinal wall absorbs nutrient material. This blood passes into the dorsal vessel which distributes blood to the ventral vessel as well as to the anterior region of the body through its branches. The ventral vessel also distributes blood to different parts of the body through its branches. The sub-neural vessel is a collecting vessel through which blood passes to the dorsal vessel by cross-branches in the posterior region of the body.

(c) *Excretory System*

Nephridia are the excretory organs in the earthworms. A nephridium is a long and narrow tubule, the middle portion of which is a tangled mass of ciliated tracts. It has a short straight lobe and a long spirally twisted lobe. The opening of the tubule into the coelom dilates to form a ciliated funnel called the *nephrostome*. The external opening of the duct of nephridium is called the *nephropore* through which urea is excreted to outside. Nephridia are located on both sides of each segment excepting the first two.

The nephridia which occur as a single pair in each segment and open into the coelom by nephrostome are called the *holonephridia* or *meganephridia*. Another type of nephridia occur in more than one pair in each segment. These are called the *meronephridia*. Both the types of nephridia may be either *stomate* when the nephrostomes are open, or *astomate* when the nephrostomes are closed. In the *exonephric* condition the nephridia open to the exterior but in the *enteronephric* condition the nephridia open to the alimentary canal. The meronephridia are generally small in size occurring in clusters and these are called the *micromeronephridia*. The meronephria may be enlarged and these are then termed as *megameronephridia*.

There are also three types of *tufted nephridia* such as (1) the holonephridia which are incompletely branched into a number of meronephridium-like lobes with a singl duct, with or without a funnel, (2) the meronephridia in which the terminal canals run together in a sheaf and (3) similar to (2) but with terminal ducts secondarily united to form a single duct.

(d) *Reproductive System*

The earthworm is hermaphrodite due to the presence of both male and female reproductive organs in the same individual.

The male reproductive organs are testis, testis sacs in confluence with seminal vesicles, vasadeferentia, prostate glands, accessory glands and genital apertures. There is a median pouch lying above the ventral nerve cord on the lower part of the anterior region of the body, enclosing a pair of *testes* and a pair of *seminal funnels*. This pouch is formed by the fusion of a pair of testis sacs. The testes are digitate or finger-like processes. The seminal funnel is a rosette-shaped enlargement of ental end of *vasa deferentia* with central aperture through which sperms pass to the duct. This is placed opposite the testis. The median pouch is enlarged on either side to form sacs called *seminal vesicles* in which sperms become matured. Seminal vesicles are lacking in Moniligastridae. In *holandry* there are paired testes in both X and XI, in *metandry* there are paired testes in XI only and in *proandry* there are paired testes in X only. The ducts that carry sperms from seminal funnel to the exterior, are called *vasa deferentia* or *sperm ducts*. In holandric from two sperm ducts of each side, one from the anterior pouch and the other from the posterior one, run side by side in the posterior direction to open into the *male genital aperture* or *male pore* of that side. In proandric and metandric form the single sperm duct of each side opens into the male pore of the corresponding side. There are some gland tissues commonly associated with sperm ducts on either

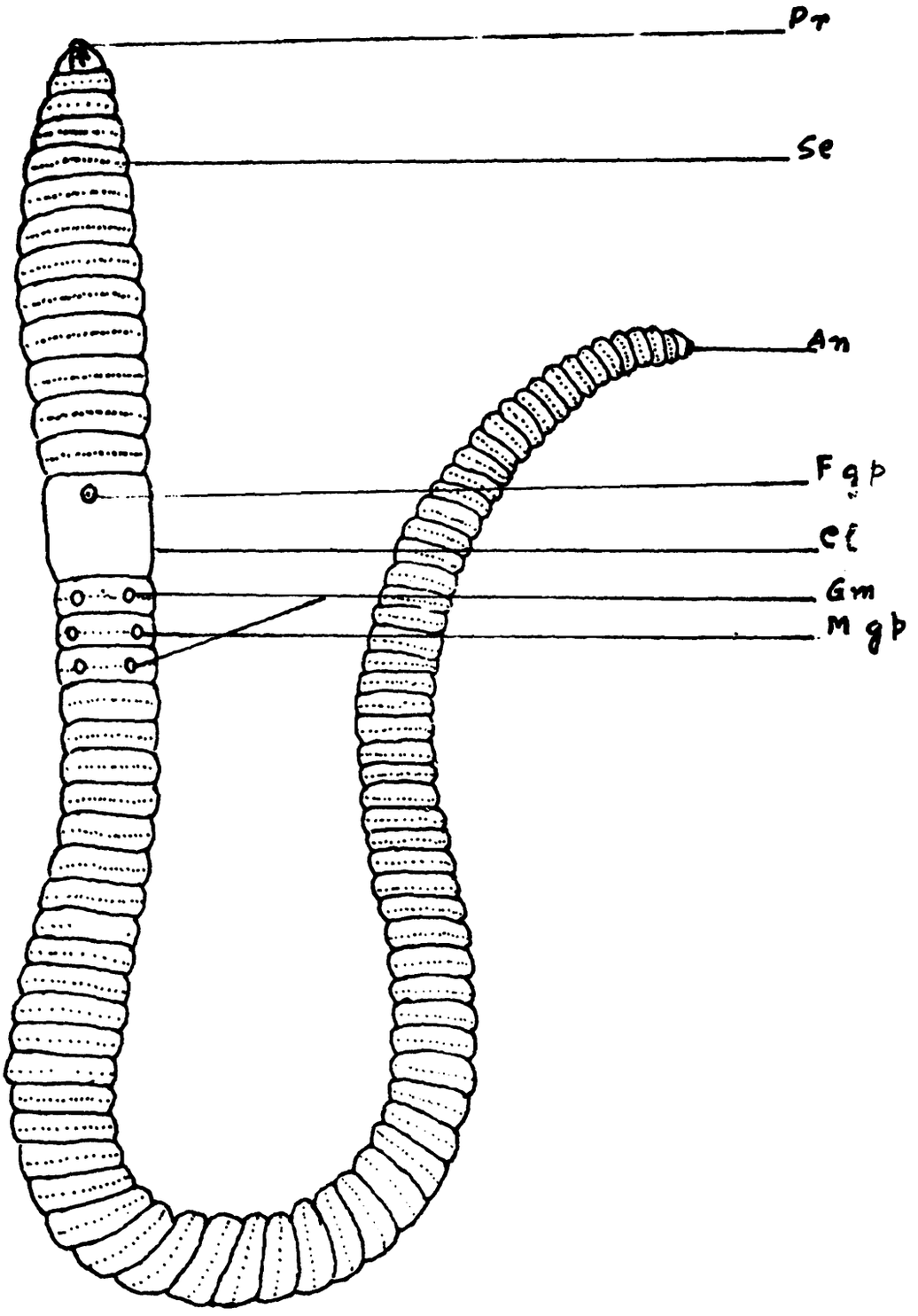


Fig. 1.

Fig. 1 Ventral view of earthworm. Pr, Prostomium; Se, Setae; an, annus; Fgp, female genital pore; cl, clitellum; Gm, Genital markings; Mgp, male genital pore.

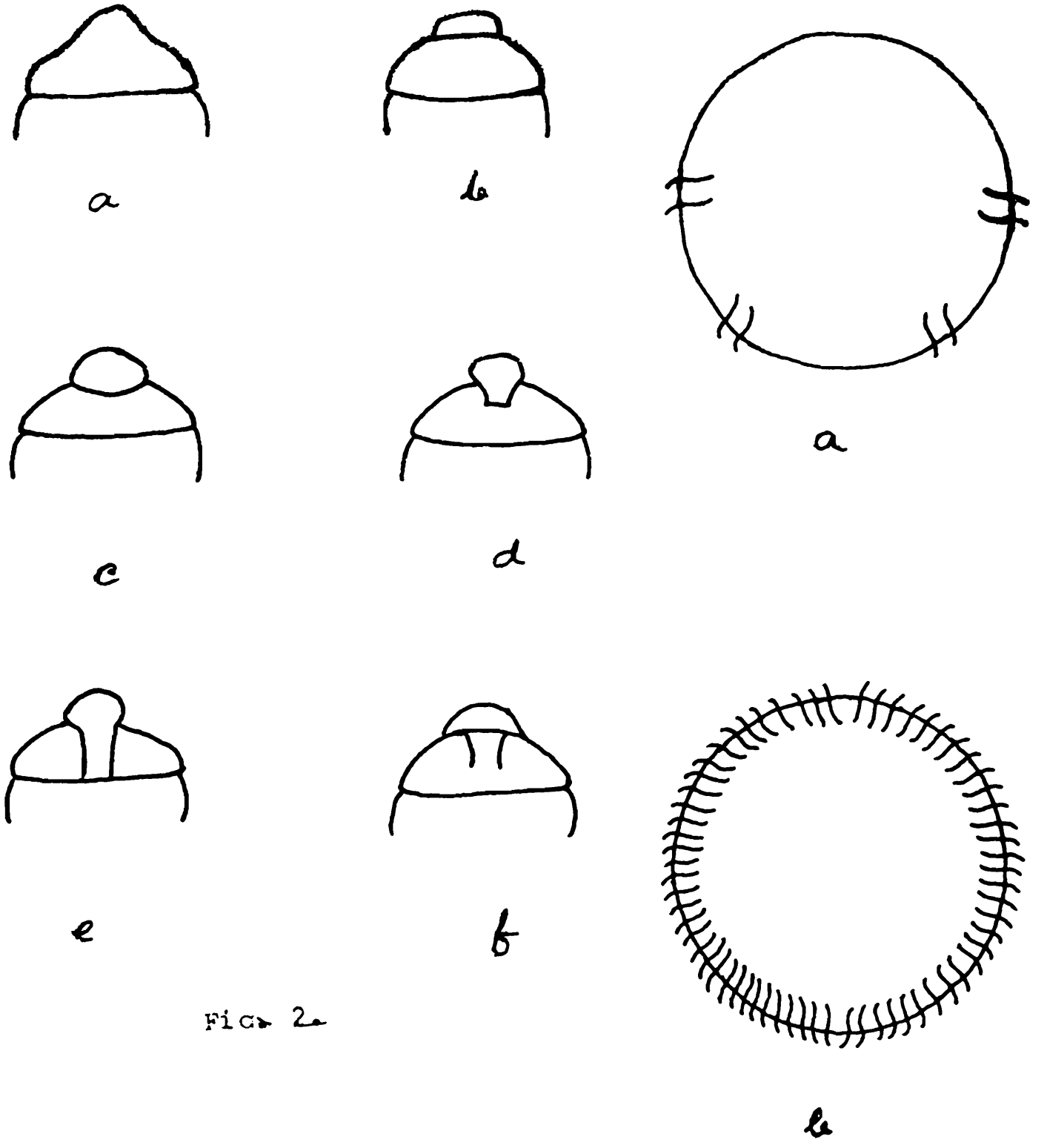


Fig. 2. Different types of postomium of earthworms. a, Zygolobous; b, Prolobous; c, Proepilobous; d, epilobous; e, tanylobous; f, combined pro-and epilobous.

Fig. 3. Arrangements of Setae. a, lumbricin; b, perichaetin.

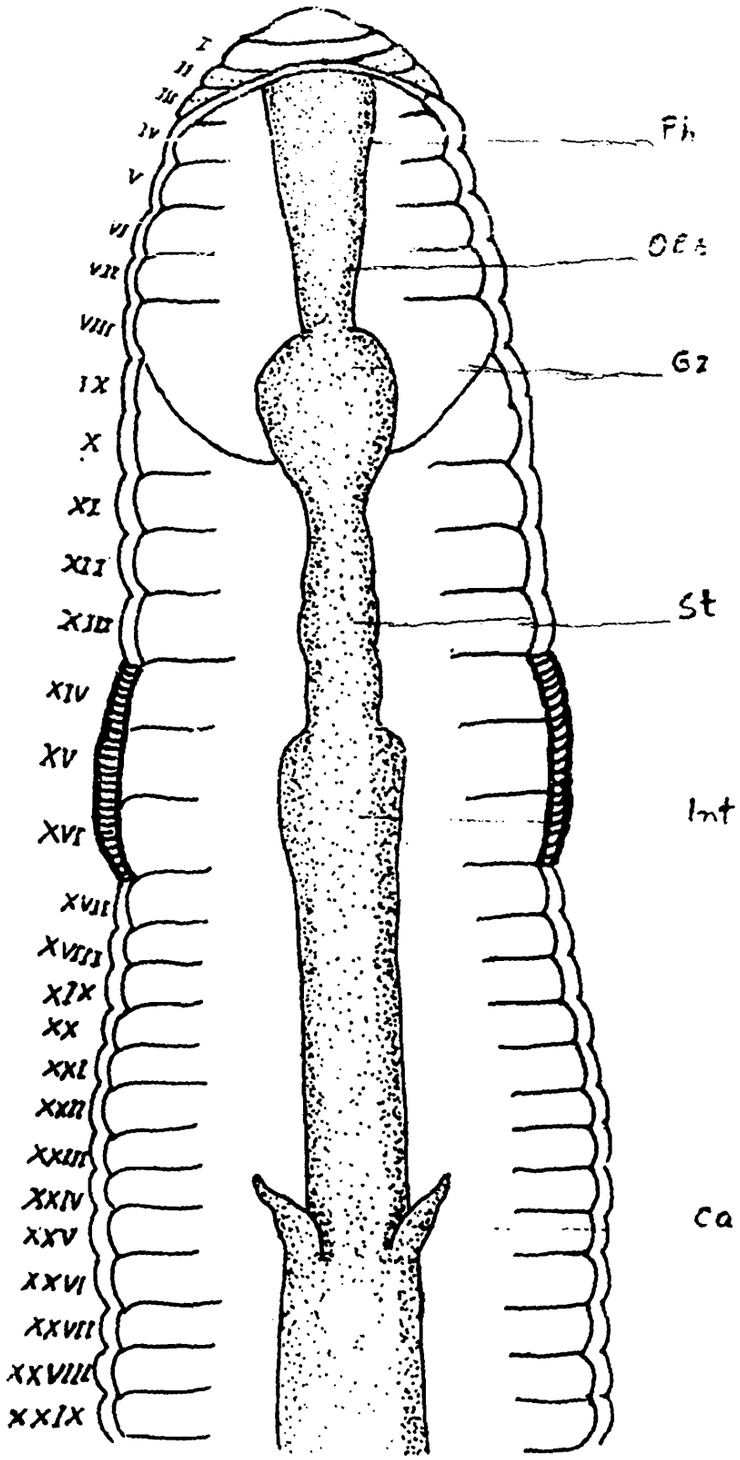


Fig. 4.

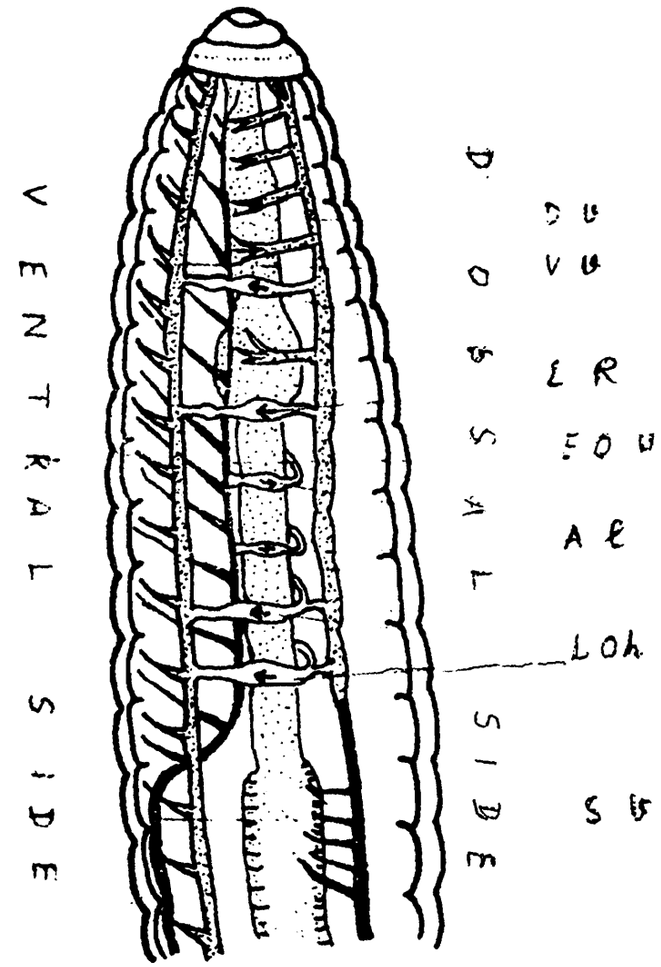


Fig. 5.

Fig. 4. Digestive system of earthworm. Ph, pharynx; Oes, Oesophagus; gz, gizzard; st, stomach; int, intestine; ca, caecum.

Fig. 5. Circulatory system of earthworm. dv, dorsal vessel; vv, ventral vessel; lh, lateral hearts; eov, extra oesophageal vessel; al, anterior loops; loh, lateral oesophageal hearts; sv, subneural vessel.

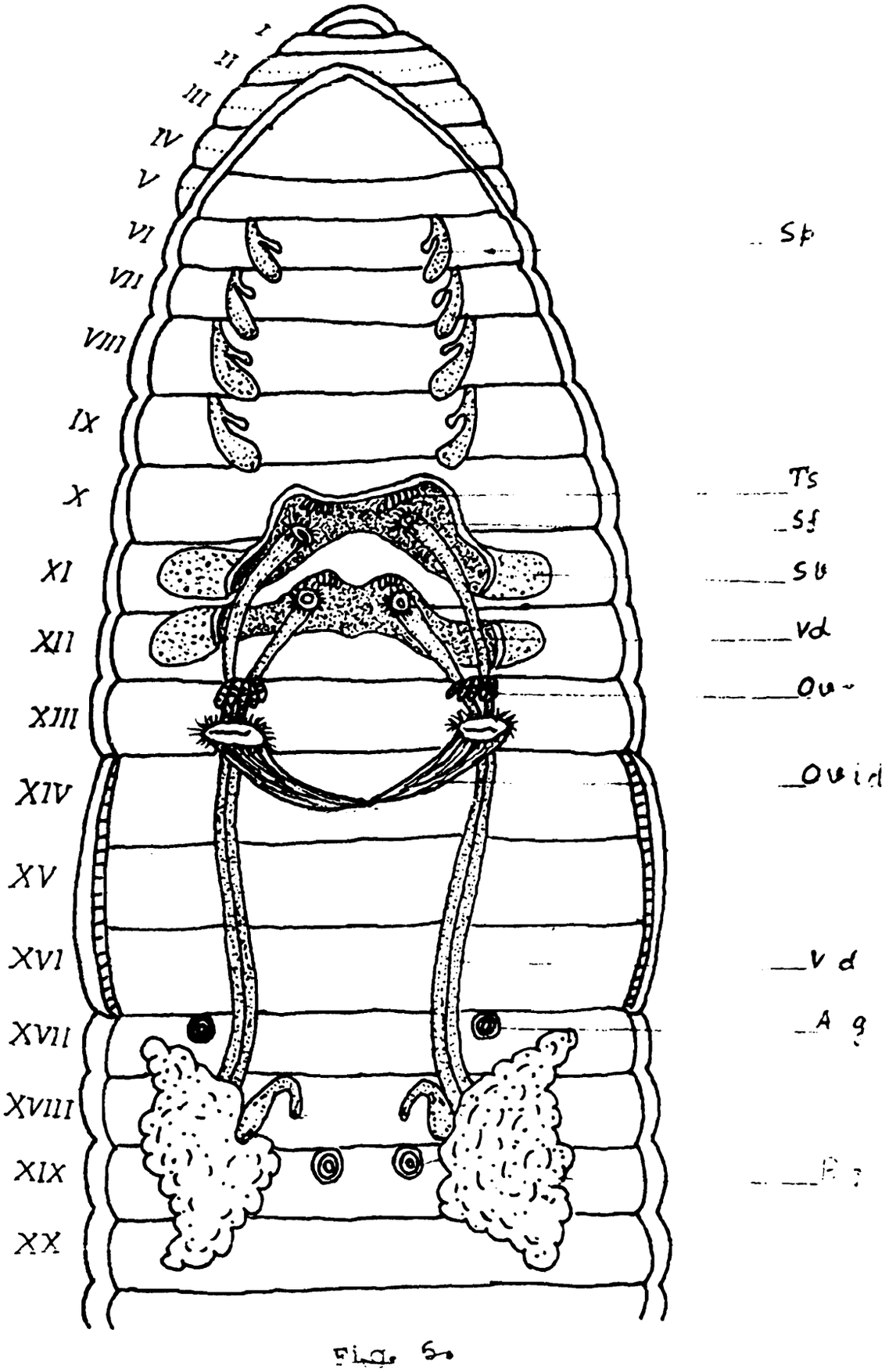


Fig. 6. Reproductive system of earthworm. sp, spermatheca; ts, testis; sf, seminal funnel; sv, seminal vesicle; vd, vasa deferentia; ov, ovary; ovid, oviduct; ag, accessary glands; pg, prostate gland.

side. These are called the *prostate glands*. In Acanthodrilidae, Ocnerodrilidae and Octochaetidae prostates are tubular and the prostatic duct opens to the exterior by the side of male pore. In Megascolecidae the prostate is racemose, and the gland duct and sperm duct open into the male pore. The capsular prostates in Moniligastridae and 'euprostates' of Eudrilidae are not associated with sperm ducts. There are also some accessory glands, whose secretions come out through minute pores of genital papillae located on the ventral surface of the anterior part of the body.

The female reproductive organs are spermathecae, ovaries, oviducts and genital apertures. In the anterior region and ventral side of the body there are paired pouches in which sperms received from a copulatory partner during mating are stored for fertilization of eggs. These pouches are called the spermathecae. The external opening of the *spermathecal duct* is called the spermathecal pore. There may be a *diverticulum* which is an outgrowth of the spermathecal duct. In two moniligastrid genera *Drawida* and *Moniligaster* the diverticulum is characterized as *atrium*. Paired *ovaries* enclosed in paired *ovisacs* are generally situtated below the testes segments. The duct that carries ova from the ovary is called the *oviduct*. The oviduct are simpler and shorter than sperm ducts. Anteriorly the oviduct of each side forms a funnel called *oviducal funnel* which faces the ovary of the corresponding side. The oviduct of each side runs in the posterior direction to open into the *female genital aperture* or *female pore*. Occasionally the two oviducts unite posteriorly to form a *common oviduct* and open in a single female pore. In *hologyny* there are paired ovaries in both XII and XIII while in *metagyny* there are paired ovaries in XIII only.

The changes in reproductive organs lead to mutational explosions which results in the production of parthenogenetic polymorphism. Gates (1956) recognized several morphs in the Megascolecine genus *Pheretima*. Among these, common morps are 'A morph' lacking spermathecae, 'R morph' lacking male terminalia, 'AR morph' lacking spermathecae and male terminalia, 'Z morph' lacking testis, 'ARZ morph' lacking spermathecae, male terminalia and testis, 'H morph' a hermaphroditic parthano-genetic morph in which spermathecae, seminal vesicles, testis and prostates remain juvenile. There are also some intermediate morphs called 'I morphs' which show intermediate stages of anatomical degradation or modification. These are 'I_1', intermediate between 'H' and 'A morphs', 'I_2' intermediate between 'H' and 'R morphs', 'I_3' intermediate between 'R' and 'AR morphs', 'I_4' intermediate between 'H' and 'AR morphs' and 'I_5' intermediate between 'A' and 'AR morphs'

METHODS OF NARCOTIZATION AND PRESERVATION

The living worms are dropped in a vessel containing fresh water and anaesthetized by adding alcohol (about 70%) drop by drop to the water, gradually at intervals until and worms cease to move. Care should be taken to add not more than a tenth of alcohol of the total volume of freshwater. Otherwise, the worms will be killed before narcotization. After narcotization, the worms are taken out and straitened in a tray and covered with a thin layer of cotton. Then, 5-10% formalin is added slowly and kept soaked in it for 10-12 hours. Afterwards, the worms are washed in fresh water and preserved in 70-90% alcohol.

ABBREVIATIONS

a, the first setae from mV on each side of a segment; *A*, a meridian of longitude passing anteroposteriorly along *a* setal follicles; *A A*, median space ventrally between the two *A* meridians; *A B*, median space ventrally between *A* and *B* meridians; *b*, the second seta from mV on each side of a segment; *B*, a meridian of longitude passing anteroposteriorly along *b* setal follicles; *B C*, median

space ventrally between *B* and *C* meridians; *c*, the third seta from mV on each side of a segment; *C*, a meridian of longitude passing anteroposteriorly along *c* setal follicles; *C*, circumference; *C D*, median space ventrally between *C* and *D* meridians; d, the fourth seta from mV on each side of a segment; *D*, a meridian of longitude passing anteroposteriorly along *d* setal follicles; *D D*, median space dorsally between the two *D* meridians; e, the fifth seta from mV on each side of a segment; eq., equatorial; GM, genital marking; I, II, III, IV, etc., the first segment, the second segment; the third segment, the fourth segment, etc. respectively; ibid., ibidem, in the same place; m, mid; m *B C*, at the middle of *BC*; m *D*, mid-dorsal; mL mid-lateral; mm, millimeters;mV, mid-ventral; n, a fraction or position of a segment.

SYSTEMATIC ACCOUNT

The taxa new to India are marked ** and those new to West Bengal *

I. Family ACANTHODRILIDAE

1. Genus ***Plutellus*** Perrier

   (1) *Plutellus ghumensis* Julka

   (2) *Plutellus sikkimensis* Michaelsen

2. Genus ***Pontodrilus*** Perrier

   (3) *Pontodrilus bermudensis* Beddard

* II. Family GLOSSOSCOLECIDAE

*3. Genus ***Pontoscolex*** Schmarda

   (4) *Pontoscolex corethrurus* (Muller)

III. Family LUMBRICIDAE

4. Genus ***Aporrectodea*** Orley

   (5) *Aporrectodea rosea* (Savigny)

5. Genus ***Bimastos*** Moore

   (6) *Bimastos parvus* (Eisen)

6. Genus ***Dendrobaena*** Eisen

   (7) *Dendrobaena rubida* (Savigny)

7. Genus ***Eisenia*** Malm

   (8) *Eisenia foetida* (Savigny)

   (9) *Eisenia hortensis* (Michaelsen)

8. Genus ***Eiseniella*** Michaelsen

   (10) *Eiseniella tetraedra* (Savigny)

9. Genus ***Octolasion*** Orley

   (11) *Octolasion cyanium* (Savigny)

(12) *Octolasion tyrtaeum* (Savigny)

IV. Family MEGASCOLECIDAE

10. Genus ***Amynthas*** Kinberg

(13) *Amynthas alexandri* Beddard

(14) *Amynthas diffringens* (Baird)

(15) *Amynthas hawayanus* (Rosa)

(16) *Amynthas morrisi* (Beddard)

(17) *Amynthas robustus* (Perrier)

11. Genus ***Lampito*** Kinberg

(18) *Lampito mauritii* Kinberg

12. Genus ***Metaphire*** Sims & Easton

(19) *Metaphire anomala* (Michaelsen)

(20) *Metaphire californica* (Kinberg)

(21) *Metaphire houlleti* (Perrier)

(22) *Metaphire peguana* (Rosa)

(23) *Metaphire planata* (Gates)

(24) *Metaphire posthuma* (Vaillant)

13. Genus ***Perionyx*** Perrier

(25) *Perionyx alatus* Stephenson

(26) *Perionyx annandalei* (Michaelsen)

(27) *Perionyx excavatus* Perrier

(28) *Perionyx gravelyi* Stephenson

(29) *Perionyx heterochaetus* (Stephenson)

(30) *Perionyx himalayanus* Michaelsen

(31) *Perionyx inornatus* Stephenson

(32) *Perionyx jorpokriensis* Julka

(33) *Perionyx macintoshi* Beddard

(34) *Perionyx nanus* Stephenson

(35) *Perionyx pallidus* Stephenson

(36) *Perionyx pincerna* Stephenson

(37) *Perionyx pokhrianus* Stephenson

(37a) *Perionyx pokhrianus* var affinis Stephenson

(38) *Perionyx pulvinatus* Stephenson

(39) *Perionyx rimatus* Stephenson

(40) *Perionyx sikkimensis* (Michaelsen)

(41) *Perionyx variegatus* (Michaelsen)

14. Genus ***Polyphertima*** Michaelsen

(42) *Polypheretima elongata* (Perrier)

15. Genus ***Tonoscolex*** Gates

(43)* *Tonoscolex horai* (Stephenson)

(44) *Tonoscolex monorchis* (Stephenson)

V. Family ALMIDAE

16. Genus ***Glyphidrilus*** Horst

(45) *Glyphidrilus tuberosus* Stephenson

VI. Family MONILIGASTRIDAE

17. Genus ***Drawida*** Michaelsen

(46) *Drawida nepalensis* Michaelsen

*VII. Family OCNERODRILIDAE

* 18. Genus ***Gordiodrilus*** Beddard

(47)* *Gordiodrilus elegans* morph. *paski* Stephenson

** 19. Genus ***Nematogenia*** Eisen

(48)** *Nematogenia panamaensis* (Eisen)

VIII. Family OCTOCHAETIDAE

20. Genus ***Dichogaster*** Beddard

(49) *Dichogaster bolaui* (Michaelsen)

(50) *Dichogaste modiglianii* (Rosa)

(51) *Dichogaster saliens* (Beddard)

21. Genus ***Eutyphoeus*** Michaelsen

(52) *Eutyphoeus gammiei* (Beddard)

(53) *Eutyphoeus incommodus* (Beddard)

(54) *Eutyphoeus nicholsoni* (Beddard)

(55) *Eutyphoeus orientalis* (Beddard)

(56) *Eutyphoeus quadripapillatus* Michaelsen

(57) *Eutyphoeus waltoni* Michaelsen

* 22. Genus ***Lennogaster*** Gates

(58)* *Lennogaster pusillus* (Stephenson)

23. Genus ***Octochaetona*** Gates

(59) *Octochaetona beatrix* (Beddard)

(60)* *Octochaetona compta* (Gates)

24. Genus ***Pellogaster*** Gates

(61) *Pellogaster bengalensis* (Michaelsen)

* 25. Genus ***Ramiella*** Stephenson

(62)* *Ramiella bishambari* (Stephenson)

26. Genus ***Scolioscolides*** Gates

(63) *Scolioscolides bergtheili* (Michaelsen)

KEY TO FAMILIES

1.	Male pores in region of 10/11-12/13.	–	*Moniligastridae*
	— Male pores behind 12/13.	–	2
2.	Prostates present.	–	3
	— Prostates absent.	–	6
3.	Last hearts in XI.	–	*Ocnerodrilidae*
	— Last hearts behind XI.	–	4
4.	Prostates recemose.	–	*Megascolecidae*
	— Prostates tubular.	–	5
5.	Nephridia holoic.	–	*Acanthodrilidae*
	— Nephridia meroic.	–	*Octochaetidae*
6.	Dorsal pores present.	–	*Lumbricidae*
	— Dorsal pores absent.	–	7
7.	Extramural calciferous glands present. *Glossoscolecidae*	–	
	— Extramural calciferous glands absent.	–	*Almidae*

I. Family ACANTHODRILIDAE

Diagnosis : Body cylindrical. Dorsal pores present or absent. Male pores behind XVI. Intestinal origin behind XIII. Last pair of hearts behind XI. Holonephric, nephridia absent in preclitellar segments. Spermathecae diverticulate; prostates tubular.

Distribution : South Africa, Madagascar; India, Sri Lanka, Burma; Australia, Tasmania, New Caledonia, New Zealand, Auckland, Chatham and subantarctic islands; U.S.A., Mexico; Central America.

Remarks : The family is represented in West Bengal by two genera *Plutellus* and *Pontodrilus*.

KEY TO GENERA

Nephridia present in some preclitellar segments; not littoral.	_	*Plutellus*
Nephridia absent in preclitellar segments; littoral.	_	*Pontodrilus*

Genus 1. ***Plutellus*** Perrier

1873. *Plutellus* Perrier, *Arch. Zool. Exp. Gen.*, **2** : 250. (Type species, *Plutellus heteroporus* Perrier, 1873.)

1972. Plutellus : Gates, *Trans. Am. phil. Soc.*, **62**(7) : 37.

Diagnosis : Setae lumbricine. Oesophagus with a single gizzard in region of V-VII. Biprostatic. Metagynous.

Distribution : India, Sri Lanka, Burma; Australia, Tasmenia, New Caledonia, New Zealand, Stewart and Auckland Islands; Queen Charlotte Island and the Pacific coastal strip of U.S.A.; Central America and northern South America.

Remarks : The genus is represented in West Bengal by two species *P. ghumensis* and *P. sikkimensis*.

KEY TO SPECIES

Two pairs of spermathecal pores.	_	*P. ghumensis*
Five pairs of spermathecal pores.	_	*P. sikkimensis*

1. ***Plutellus ghumensis*** Julka.

1975. *Plutellus ghumensis* Julka, *Mitt. zool. Mus. Berlin*, **51**(1) : 24. (Type loc. Ghum Bhanjang, Darjeeling Dist., W. Bengal; types in Zoological Survey of India, Calcutta.)

Diagnosis : Length 27-54 mm; diameter 1-1.5 mm. Segments 61-109. Prostomium epilobic, tongue open. Clitellum yellowish brown, saddle-shaped, 1/2 XIII 17/18, intersegmental furrows and dorsal pores lacking, setae retained. Setae behind XXVI, *A B C D B C A A, D D* $^{1}/_{2}$ C. Genital markings small, nearly circular, in transversely placed rows of 2-5, in some of 8/9-9/10, 11/12-12/13, 14/15-17/18, 19/20, 21/22-23/24. Spermathecal pores 2 pairs, at or slightly median to *C*, in 7/8 and 8/9. Female pores paired, in line with *A*, on XIV. Male pores minute, at centre of conspicuously raised porophores in *A B*, on XVIII.

Gizzard in V; intestinal origin in XV; typhlosole lacking. Last pair of hearts in XII. Holandric; male funnels apparently free; seminal vesicles in XI and XII. Prostates coiled, exending from XVIII to XIX, XX, XXI; duct short, slender, nearly straight, sperm duct in XVII passes into anterior face of prostatic duct just ental to parietes. Penial setae. 464.532 mm long and .012 mm thick; shaft slightly bow-shaped with a notch at the tip; ornamentation of 8-12 circles of fine rather triangualr teeth. Quadrithecal; ampulla ovoid; duct about as long as ampulla, straight, thick and slightly

tapering before entering the parietes; bidiverticulate; diverticulum lateral and mesial, slenderly club-shaped, as long as or slightly longer than spermathecal duct. Ovisacs in XIV.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

2. ***Plutellus sikkimensis*** Michaelsen

1907. *Plutellus sikkimensis* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 147. (Type loc. Sandakphu, Darjeeling Dist., W. Bengal; types in Zoological Survey of India, Calcutta and the Hamburg Museum.)

1972. *Plutellus sikkimensis* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 45.

Diagnosis : Length 42 mm; diameter 1 mm. Segments 90. Prostomium epilobic, tongue open. Setae widely spaced, *D D* $^1/_2$ C, *a*, *b*/XVIII penial. Genital markings paired, transversely elliptical, in *A B*, across 12/13. First dorsal pore at 6/7. Spermathecal pores 5 pairs, just median to *B*, in 4/5-8/9. Male pores paired, on XVIII, at *B*, within a median field that reaches into XVII and XIX.

Gizzard small, in V; intestinal origin in XIV. Last pair of hearts in XII. Holandric; seminal vesicles apparently in IX, XI and XII. Penial setae *ca*.0.33 mm long and 9 μ thick at middle; ectal portion of shaft bent at an obtuse angle, tip sharply pointed, slightly recurved, slender; ornamentation of nine oblique circlets each of about nine very large teeth.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

Genus 2. ***Pontodrilus*** Perrier

1874. *Pontodrilus* Perrier, *Compt. Rend. Acad. Sci. Paris*, **78** : 1582 (Type species, *Pontodrilus marionis* Perrier, 1874.)

1972. *Pontodrilus* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 47.

1987. *Pontodrilus* : Julka & Senapati, Rec. zool. Surv. India, Occ. Paper No. 92 : 7.

Diagnosis : Setae lumbricine. Spermathecal pores at 7/8-8/9. Male pores (combined with prostatic pores) paired on XVIII. Female pores paired on XIV. Calciferous and supra-intestinal glands, intestinal caeca and typhlosoles lacking; intestinal origin behind XIII. Biprostatic. Metagynous.

Distribution : Circumglobal, on seashores in the tropics and warmer parts of temperate zone in both hemispheres.

Remarks : The genus is represented in West Bengal by a single species *P. bermudensis*.

3. ***Pontodrilus bermudensis*** Beddard

1891. *Pontodrilus bermudensis* Beddard, *Ann. Mag. nat. Hist.* (ser. 6), **7** : 96 (Type loc. Bermuda, West Indies; typus amissus).

1987. *Pontodrilus bermudensis* : Julka & Senapati, *Rec. zool. Surv. India. Occ. paper* No. 92 : 7.

Diagnosis : Length 32-120 mm; diameter 2-4 mm. Segments 78-125. Prostomium epilobic, tongue open. Clitellum saddle-shaped, XIII-XVII, XVIII. Genital markings transversely oval, unpaired, median, usually in 19/20, occasionally in 12/13, 13/14.

Gizzard absent; intestinal origin in XVII. Last pair of hearts in XIII. Holandric; testes and male funnels free in X and XI; seminal vesicles in XI and XII. Penial setae absent. Spermathecae paired in VIII and IX, each with an ectal digitiform to club-shaped diverticulum. Genital marking glands absent.

Habitats : Mud with large content of organic matter and salt on seashore and margins of estuaries and brackish water lakes.

Distribution : INDIA : West Bengal 24 Parganas (South) district; Andaman and Nicobar Islands; Andhra Pradesh; Goa; Kerala; Laccadive Islands; Maharashtra; Orissa; Tamil Nadu. Outside India : Africa, Madagascar; Sri Lanka, Maldives, Burma, Vietnam, Indonesia; Australia, some islands in the Pacific Ocean; U.S.A.; West Indies, South America.

II. Family GLOSSOSCOLECIDAE

Diagnosis : Setae sigmoid, simply pointed. Dorsal pores lacking. Digestive system with one oesophageal gizzard in VI, paired extramural calciferous glands in some of VII-XIV. Nephridia macroic, in intestinal region holoic. Spermathecae adiverticulate, testes and male funnels not intraseptal; male pores behind female pores; prostates absent.

Distribution : Central and South America, West Indies.One species has been widely transported.

Remarks : This family is recorded here for the first time from West Bengal and is represented by a single genus *Pontoscolex.*

Genus 3. ***Pontoscolex*** Schmarda

1861. *Pontoscolex* Schmarda, *Neue wirbellose Thiere, Leipzig*, **1** (2) : 11. (Type species, *Pontoscolex arenicola* Schmarda, 1861.)

1972. *Pontoscolex* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 53.

Diagnosis : Male pores and tubercula pubertatis cliain clitellar region. Septa all present at least from 5/6. Digestive system with paired solid calciferous glands in VII-IX, well-developed typhlosole but without intestinal caeca and supra-intestinal glands. Metandric; seminal vesicles long, extending from XII back through several segments. Metagynous.

Distribution : Surinum, Guyana, Guatemala. One species has been widely transported.

Remarks : The genus is represented in West Bengal by a single species *Pontoscolex corethrurus* which is widely distributed throughout the world by transportation.

4. ***Pontoscolex corethrurus*** (Muller)

1856. *Lumbricus corethrurus* Muller, *Abhandl. Naturgesch. Ges. Halle*, **4** : 26. (Type loc. Itajahy, Brazil; typus amissus.)

1897. *Pontoscolex corethrurus* : Michaelsen, *Mitt. Mus. Hamburg*, **14** : 247.

1982. *Pontoscolex corethrurus* : Julka, *Rec. zool. Surv. India*, **80** : 130.

Material : (1) Coochbehar Dist. 21 exs., Dinhata, 15.iv.1987; 21 exs., Mathabhanga, 16.iv.1987; 4 exs., Toofanganj, 18.iv.1987; Coll. K. R. Halder. (2) Darjeeling Dist. 8 exs., Siliguri, 10.iv.1987, Coll. K. R. Halder. (3) Jalpaiguri Dist. 79 exs., Jayanti (Buxa Tiger Reserve), 13.xii.1984; 26 exs., Kartick (Buxa Tiger Reserve), 21.xii.1984; 5 exs., Jalpaiguri town, 9.iv.1987; 8

exs., New Jalpaiguri, 10.iv.1987; 6 exs., Lataguri (Duars), 11.iv.1987; 2 exs., Hasimara (Duars), 12.iv.1987; 8 exs., Mohitnagar (Duars), 13.iv.1987; 2 exs., Alipurduar (Duars), 17.iv.1987; Coll. K. R. Halder. (4) Midnapur Dist. - 32 exs., Midnapur town, 26.iii.1986; 26 exs., Ghatal, 28.iii.1986; 31 exs., Gopiballavpur, 30.iii.1986; Coll. K. R. Halder. (5) West Dinajpur Dist. - 36 exs., Raiganj, 7.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 48-120 mm; diameter 2-6 mm. Segments 60-232. Prostomium lacking. Clitellum saddle-shaped, XV, XVI XXI, XXII, XXIII; tubercula pubertatis between *B C* on XVIII, XIX XX, XXI, XXII. Setae lumbricine, on I-II closely paired, from III widely paired but with "quincunx" arrangement at hinder end of body. Nephropores about at *C*. Spermathecal pores 3 pairs, minute at *C* on 6/7-8/9. Male pores minute, probably on 20/21. Female pore minute, on left side at *A B*, slightly in front of 14/15.

Intestinal origin in XIV or XV; typhlosole lamelliform. Last pair of hearts in XI. Male funnels large; sperm ducts slender; seminal vesicles one pair in XII, rudimentary or small or large, extending back through 8-10 segments. Ovaries small under testis sacs. Spermathecae club-shaped; ducts slender. Tubercula pubertatis glands tripartite, in XVIII bigger in size.

Habitats : Manure and compost heaps. Humus and sandy soil. Red and black earths. Gardens, coconut plantations. Under barks of trees. Under rotting tree trunks. In rotting plantain trunks. Under stones.

Economic Importance : This species was ragarded as a pest when the friable and loose soil in plant benches of green houses in U.S.A. was found to become hard caused by the infestation of *Pontoscolex corethrurus*. In Karnataka this species was reported to make the soil compact, hard and cloddy.

Distribution : INDIA : West Bengal Coochbehar, Darjeeling, Jalpaiguri, Midnapur and West Dinajpur districts; Andaman and Nicobar Islands; Andhra Pradesh; Gujarat; Karnataka; Kerala; Maharashtra; Tamil Nadu. *Outside India* : Africa, Madagascar and its adjacent islands; Iran, Pakistan; Sri Lanka, Burma, Thailand, Kampuchia, Malay Peninsula, Indonesia, Philippines, Hong Kong; Australia, some islands in the Pacific ocean; U.S.A., Mexico; West Indies, South America.

Remarks : This species is most widely distributed. Though the original home of this species is South America, it has successfully colonized in the Indian Peninsular region.

III. Family LUMBRICIDAE

Diagnosis : Setae sigmoid, four pairs per segment. Dorsal pores present. Digestive system with an intramural calciferous gland, an intestine beginning with a crop followed by a gizzard but without intestinal caeca and supra-intestinal glands. Last pair of hearts anterior to XII. Nephridia holoic, vesiculate. Reproductive apertures minute; ovaries band-shaped in XIII; ovisacs in XIV; prostates absent.

Distribution : Africa; Europe below the southern glaciation, eastern U.S.S.R., Asia Minor, Syria, Palestine, China, Japan; India, Burma; Australia, Tasmania, New Zealand; U.S.A., Mexico; South America.

KEY TO GENERA

1.	Male pores on XIII.	_	*Eiseniella*
	— Male pores behind XIII.	_	2
2.	Athecal.	_	*Bimastos*
	— Thecal.	_	3
3.	Spermathecal pores near mid-dorsal line.	_	*Eisenia*
	— Spermathecal pores in or near *C D*.	_	4
4.	Setae closely paired.	_	*Aporrectodea*
	— Setae widely paired.	_	5
5.	Seminal vesicles 3 pairs in IX, XI and XII.	_	*Dendrobaena*
	— Seminal vesicles 4 pairs in IX-XII.	_	*Octolasion*

Genus 4. *Apprrectodea* Orley

1885. *Aporrectodea* Orley, *Ert. Term. Kor.* **15** : 1-34

Diagnosis : Setae closely paired. Spermathecal pores in or near *C D*. Female pores equatorial on XIV. Gizzard mainly in XVII. Hearts in VI-XI. Holandric: seminal vesicles in IX-XII.

Distribution : Africa; Europe, Eastern U.S.S.R., Israel, Lebanon, Turkey, Iran, Afghanistan, Pakistan, China, Korea; India; Australia; New Zealand; U.S.A., Mexico; South America.

Remarks : The genus is represented in West Bengal by a single species *A. rosea*.

5. *Aporrectodea rosea* (Savigny)

1826. *Enterion roseum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** : 182. (Type loc. Paris; types in Museum National d' Histoire Naturelle, Paris.)

1981. *Aporrectodea rosea* : Soota & Halder, *Rec. zool. Surv. India*, **79** : 233.

Diagnosis : Length 23-90 mm; diameter 2.5-5 mm. Segments 112-176. Prostomium epilobic, tongue open. Clitellum saddle-shaped, in 7-11 segments, beginning in region XXII-XXVII and ending in region XXXI-XXXIII; tubercula pubertatis lateral to *B*, XXVIII, XXIX-XXX, XXXI. Setae *A B* > *C D*, *B C* < *A A* < *D D*, *D D ca.* = or < $^1/_2$ C. First dorsal pore usually at 4/5, colour oliverosy or grayish and with orange or red clitellum.

Gizzard mostly in XVII; intestinal origin in XV. Hearts in VI-XI. Seminal vesicles 4 pairs in IX-XII. Spermathecae in X and XI; ampulla spheroidal to ovoidal or ellipsoidal; duct slender, as long as ampulla.

Habitat : Earth of plant beds; rich organic soil; bank of streams; chicken yard; earth with kitchen drainage; manure.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh; Kashmir; Sikkim; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa; Europe, eastern U.S.S.R., Israel, Lebanon, Turkey, Iran, Afghanistan, Pakistan, Korea; Australia, New Zealand; U.S.A., Mexico; South America.

Genus 5. ***Bimastos*** Moore

1893. *Bimastos* Moore, *Zool. Anz.*, **16** : 333.

1895. *Bimastos* : Moore, *Jour. Morph.*, **10** : 473. (Type species, *Bimastos palustris* Moore, 1895.)

1972. *Bimastos* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 86.

Diagnosis : Prostomium epilobic. Setae closely paired. Dorsal pores present from region of 5/6. Pigment red. Male pores equatorial in XV. Female pores equatorial in XIV. Gizzard mainly in XVII; calciferous glands without marked widening in XI-XII, opening into gut in X through paired ventral sacs. Hearts in VII-XI. Holandric; seminal vesicles in XI-XII. Spermathecae lacking.

Distribution : Africa, Mauritus; Europe, eastern U.S.S.R., Afghanistan, Pakistan, China, Korea, Japan; India, Burma, Indonesia; Australia, New Zealand; U.S.A., Mexico; Central America, South America.

Remarks : The genus is represented in West Bengal by a single species *B. parvus*.

6. ***Bimastos parvus*** (Eisen)

1874. *Allolobophora parva* Eisen, *Ofvers, K. Vetens. Akad. Forhandl. Stockholm*, **31**, 2 : 46. (Type loc. Mount Lebanan, New York - New England; types in the U.S. National Museum.)

1900. *Helodrilus (Bimastus) parvus* : Michaelsen, *Das Tierreich*, **10** : 502.

1930. *Bimastus parvus* : Gates, *Rec. Indian Mus.*, **32** : 352.

1961. *Bimastus parvus* : Gates, *Burma Res. Soc. 50th Anniv. Publ.* No. 1 : 57.

1980. *Bimastos parvus* : Soota & Halder, *Rec. zool. Surv. India*, **76** : 202.

Diagnosis : Length 23-46 mm; diameter 2-3 mm. Segments 85-124. Tongue open. Clitellum saddle-shaped, XXIV-XXX; tubercula pubertatis XXV, XXVI-XXIX, XXX. Setae *A B* slightly > *C D*, *A A* somewhat > *B C*, *D D* ca = or slightly > $^1/_2$C.

Typhlosole simply lamelliform. Seminal vesicles small.

Habitat : Soil receiving waste effluents from human habitations, near water, of wooded areas, gardens, fields. Under logs and decaying grass. Humus, moss, manure, dumps.

Castings : Small, usually spheroidal to spindle-shaped.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh; Kashmir; Rajasthan; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa, Mauritus; Europe, eastern U.S.S.R., Afghanistan, Pakistan, China, Korea, Japan; Burma, Indonesia; Australia; U.S.A., Mexico; Central America, South America.

Genus 6. ***Dendrobaena*** Eisen

1874. *Dendrobaena* Eisen, *Ofvers. K. Vetens. Akad. Forhandl. Stockholm*, **30**, 8 : 53. (Type species, *Dendrobaena Boeckii* Eisen, 1874.)

1972. *Dendrobaena* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 88.

Diagnosis : Pigment red. Setae widely paired, spermathecal pores in or near *C D*. Gizzard mainly in XVII; calciferous glands without sacs opening into gut at vicinity of 10/11, markedly moniliform in XI-XII. Hearts in VII-IX. Holandric, testes free; seminal vesicles three pairs in IX, XI and XII.

Distribution : Africa, Madagascar; Europe, eastern U.S.S.R., Turkey, Pakistan, China, Korea, Japan; India; Australia, New Zealand, some islands in the Pacific Ocean; Canada, U.S.A., Mexico; South America.

Remarks : The genus is represented in West Bengal by a single species *D. rubida.*

7. ***Dendrobaena rubida*** (Savigny)

1826. *Enterion rubidum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** : 182. (Type loc. Paris; types in Museum d' Histoire Naturelle, Paris.)

1900. *Helodrilus (Dendrobaena) rubidus* : Michaelsen, *Das Tierreich*, **10** : 490.

1958. *Dendrobaena rubida* : Gates, *Breviora, Mus. Comp. Zool. Cambridge*, No. 91 : 6.

1982. *Dendrobaena rubida* : Julka, *Rec. zool. Surv. India, Occ. Paper* No. 26 : 35.

Diagnosis : Length 15-50 mm; diameter 1.5-5 mm. Segment 74-110. Prostomium epilobic, tongue open. Clitellum saddle-shaped, XXV, XXVI-XXXI, XXXII; tubercula pubertatis just lateral to *B*, XXVIII-XXX. Setae *A B ca.* = or *<C D < B C <* or = *A A < D D <* $^1/_2$C. First dorsal pore usually at 5/6, rarely at 4/5 or 6/7. Spermathecal pores paired at or near *C* at 9/10 and 10/11. Male pores at bottom of equatorial clefts at or near m *B C* on XV. Female pores equatorial just lateral to *B* on XIV.

Intestinal origin in XV. Quadrithecal, spermathecae usually in IX and X; ampulla medium sized and nearly spheroidal or ovoidal, large and vertically ellipsoidal; duct slender and shorter than ampulla.

Habitats : Under stones, barks of standing and fallen trees. In rotting wood and straws, manure, compost, moss mats, dumps, saw dust, humus and black soil.

Distribution : INDIA : West Bengal Darjeeling district; Arunachal Pradesh; Himachal Pradesh; Kashmir; Sikkim; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa, Europe, eastern U.S.S.R., Turkey, Pakistan, China, Korea, Japan; Australia, New Zealand, some islands in the Pacific Ocean; Canada, U.S.A., Mexico; South America.

Genus 7. ***Eisenia*** Malm

1877. *Eisenia* Malm, *Ofvers. Sallsk. Hortikult. Vann. Forh. Gotebarg*, **1** : 45. (Type species, none designated.)

1972. *Eisenia* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 96.

Diagnosis : Pigment red. Gizzard mostly in XVII; calciferous gland without sacs. Hearts in VI-XI. Nephridial bladders sausage-shaped or digitiform, transversely placed; nephropores in two ranks on each side. Holandric.

Distribution : Africa; Europe, eastern U.S.S.R., Israel, Lebanon, Turkey, Iran, Afghanistan, Pakistan; India; Australia, New Zealand, some islands in the Pacific Ocean; U.S.A., Mexico; Central and South America.

Remarks : The genus is represented in West Bengal by two species *E. foetida* and *E. hortensis.*

KEY TO SPECIES

Seminal vesicles 4 pairs in IX XII.	_	*E. foetida*
Seminal vesicles 3 paris in IX, XI, XII.	_	*E. hortensis*

8. *Eisenia foetida* (Savigny)

1826. *Enterion foetidum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** : 182. (Type loc. Paris; types in Museum d' Histoire Naturelle, Paris.)

1891. *Allolobophora foetida* : Rosa, *Ann. Hofmus. Wien*, **6** : 381.

1900. *Eisenia foetida* : Michaelsen, *Das Tierreich*, **10** : 475.

1981. *Eisenia foetida* : Julka, *Rec. zool. Surv. India*, **80** : 132.

Material : Darjeeling Dist. 23 exs., Manibhanjang, 17.v.1975, Coll. T. D. Soota.

Diagnosis : Length 27-125 mm; diameter 3-5 mm. Segments 80-131. Prostomium epilobic, tongue open. Clitellum saddle-shaped, 6-8 segments, beginning in one of XXIV-XXVII and ending in one of XXXI-XXXIV; tubercula pubertatis just lateral to *B*, 3-6 segments, XXVII, XXVIII-XXX, XXXI, XXXII. Setae closely paired, *A B* = or > *C D*, *B C* < *A A* < *D D* posteriorly < $^1/_2$C. First dorsal pore at 4/5 or 5/6. Colour red, purple or brownish, usually in transverse mid-segmental bands alternating with white or yellowish band in intersegmental furrows. Spermathecal pores, paired, slightly lateral to m D, in 9/10 and 10/11. Female pores just lateral to *B* at eq/XIV. Male pores paired at or near m *B C* on XV.

Oesophagus widened in XII; gizzard in XVII; intestinal origin in XV. Holandric; seminal vesicles 4 pairs in IX-XII. Quadrithecal, spermathecae in IX and X; duct slender, short and confined to *parietes*.

Habitats : In axils of plantain leaves. Between outer leaves of cabbage and letuce. In debris within treetrunk cavities. In decaying fallen logs. Under barks of rotten stumps. Under fermenting vegetable matter, leaf mould, compost, manure, coarse gravel in bed of raw sewage stream.

Economic Importance : This species is very much used by the anglers as an interesting bait. Their castings are also known to be very useful as a good fertilizer. They are being cultured in several parts of the world in vermicomposting.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh; Kerala; Nicobar Islands; Sikkim; Tamil Nadu. *Outside India* : Europe, Lebanon, Turkey, Afghanistan, Korea, Japan; Australia, New Zealand; North America; West Indies, South America, some islands in the Atlantic Ocean.

Remarks : This is a species of European origian. This species is common in the Himalayas and other high altitude regions of India. In West Bengal it occurs only from the hilly areas of Darjeeling district.

9. *Eisenia hortensis* (Michaelsen)

1890. *Allolobophora subrubicunda* f. *hortensis* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **7** : 15. (Type loc. Hamburg, W. Germany; types in the Hamburg Museum.)

1975. *Eisenia hortensis* : Julka, *Mitt. zool. Mus. Berlin*, **51** (1) : 26.

Diagnosis : Length 22-50 mm; diameter 1.5-3 mm. Segments 42-130. Prostomium epilobic, tongue open. Clitellum saddle-shaped, down to or nearly to *B*, XXVII, XXVIII-XXXII, XXXIII; tubercula pubertatis just lateral to *B*, XXX-XXXI. Setae widely paired, *C D* = or slightly < *A B* < *B C* < *A A* < *D D*, *D D* < $^1/_2$C. First dorsal pore at 5/6. Spermathecal pores close to mD, at 9/10 and 10/11. Male pores paired near m *B C* in a slight equatorial cleft on XV. Female pores paired just above *B* on XIV. Colour reddish.

Pigment red in circular muscular layer. Calciferous gland opening into gut in XI midway between insertion of 10/11 and 11/12; typhlosole simply lamelliform beginning in region of XX-XXV and ending in region LXXX-XC. Hearts in VII-XI. Seminal vesicles in IX, XI and XII. Quadrithecal; spermathecae usually in IX and X; duct slender and coelomic.

Habitats : Rich organic soil. Bank of stream. Chickenyard, earth receiving kitchen drainage, manure, friable black soil saturated with septic tank effluvium.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh. *Outside India* : South Africa; Europe; U.S.A.; South America.

Genus 8. *Eiseniella* Michaelsen

1900. *Eiseniella* Michaelsen, *Das Tierreich*, **10** : 471. (Type species, *Enterion tetraedrum* Savigny, 1826.)

1972. *Eiseniella* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 108.

Diagnosis : Setae widely paried. Nephropores inconspicuous, behind XV alternating irregularly and with asymmetry between a level just above *B* and one above *D*. Gizzard in XVII; calciferous sacs in X, digitiform, opening posteriorly into gut ventrally in region of insertion of 10/11; intestinal origin in XV; typhlosole simply lamelliform. Hearts in VII-XI.

Distribution : Africa; Europe, eastern U.S.S.R., Israel, Lebanon, Turkey; India; Australia, New Zealand, some islands in the Pacific Ocean; Canada, U.S.A., Mexico; South America.

Remarks : The genus is represented in West Bengal by a single species *E. tetraedra*.

10. *Eiseniella tetraedra* (Savigny)

1826. *Enterion tetraedrum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** : 184. (Type loc. Paris, types in Museum d' Histoire Naturelle, Paris.)

1937. *Eiseniella tetraedra* f. *typica* : Cernosvitov, *Rec. Indian Mus.*, **39** : 107.

1972. *Eiseniella tetraedra* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 108.

1981. *Eiseniella tetraedra* : Soota & Halder, *Rec. zool. Surv. India*, **79** : 233.

Diagnosis : Length 30-58 mm; diameter 2-4 mm. Segments 50-92. Prostomium epilobic, tongue open. Clitellum saddle-shaped, XXII, XXIII-XXVI, XXVII, XXVIII; tubercula pubertatis between eq/XXIII and eq/XXVI. Setae *A B* ca. = *C D*, *B C* < *A A*, *D D* < $^1/_2$ C. Spermathecal pores paired, at one or several levels in *D D*, at 9/10 and 10/11. Female pore median to *A* on XIV. Male pores paired, at or somewhat below *C* on XV. First dorsal pore generally in the region 3/4-5/6, occasionally more posteriorly. Colour brownish, brown, yellowish, reddish brown, golden yellow, some times with golden tinge.

Typhlosole beginning in region XX-XXII and ending in region LXVIII-LXXVIII. Holandric; seminal vesicles in XI, XII. Quadrithecal; spermathecae with short coelomic stalk.

Habitats : Banks of hill side rills, ditches, brooks, streams, canals, rivers, pools, ponds, lakes. Under stones and mosses in running water. Under rotting vegetation. Under wet rubbish, slime, highly organic mud, moist sand, wet gravel, damp clay soil, compost, old cow dung.

Distribution : INDIA : West Bengal Darjeeling district; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa; Europe, eastern U.S.S.R., Isreal, Lebanon, Syria, Turkey; Australia, New Zealand; Canada, U.S.A., Mexico; South America.

Genus 9. ***Octolasion*** Orley

1885. *Octolasion* Orley, *Ert. Term. Kor.*, **15** : 13. (Type species, *Octolasion lacteum* Orley, 1885.)

1972. *Octolasion* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 123.

Diagnosis : Setae widely paired. Nephropores obvious, behind XV in one regular rank on each side just above *B*. Gizzard mostly in XVII; calciferous sacs in X, large, lateral; intestinal orign in XV. Hearts in VI-XI. Seminal vesicles four pairs in IX-XII.

Distribution : Europe, eastern U.S.S.R., Iran, Pakistan, China; India; Australia, New Zealand, some islands in the Pacific Ocean; Canada, U.S.A.; South America.

Remarks : The genus is represented in West Bengal by two species *O. cyanium* and *O. tyrtaeum*.

KEY TO SPECIES

Clitellum XXIX-XXXIV; tubercula pubertatis XXX-XXXIII.	_	*O. cyneum*
Clitellum XXX-XXXV; tubercula pubertatis XXXI-XXXIV.	_	*O. tyrtaeum*

11. ***Octolasion cyaneum*** (Savigny)

1826. *Enterion cyaneum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** (Hist. Acct.) : 181. (Type loc.-Pairs; types in Museum d'Histoire Naturelle, Paris.)

1958. *Octolasium cyaneum* : Gates, *Breviora, Mus. Comp. Zool. Harvard*, No. 91 : 8.

1972. *Octolasion cyaneum* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 123.

1980. *Octolasion cyaneum* : Soota & Halder, *Rec. zool. Surv. India*, **76** : 203.

Diagnosis : Length 52-220 mm; diameter 5-8 mm. Segments 100-159. Prostomium epilobic, tongue open. Clitellum saddle-shaped, six segments, XXIX-XXXIV; tubercula pubertatis uniterrupted longitudinal bands, lateral to *B*, XXX-XXXIII, often reaching XXIX and XXXIV. Setae *A B* < *B C* > *C D* or *C D* < *A B* < *B C* < *A A* < *D D*, *D D* < $^1/_2$ C, *a*, *b*/XV enlarged. First dorsal pore in region of 9/10-13/14, usually at 11/12. Spermathecal pores 2 pairs, at or slightly above *C*, in 9/10-10/11. Female pores just lateral to *B*, at eq/XIV. Male pores nearer to *C* than *B*, on XV; male tumescences nearly reach *B* and *C*, in XV, often dislocating 14/15 and 15/16.

Holandric. Spermathecae sessile on parietes, usually in X-XI.

Habitats : Under stones in water. In moss. Banks of brooks; other limnic habitats.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh; Uttar Pradesh. *Outside India* : Europe, Pakistan; Australia, New Zealand; Canada, U.S.A., Azore Island; South America.

12. ***Octolasion tyrtaeum*** (Savigny)

1826. *Enterion tyrtaeum* Savigny, *Mem. Acad. Sci. Inst. Fr.*, **5** (Hist. Acct.) : 180. (Type loc. - Paris; typus amissus.)

1958. *Octolasium lacteum* : Gates, *Breviora, Mus. Comp. Zool. Harvard* No.91 : 9.

1972. *Octolasion tyrtaeum* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 125.

1980. *Octolasion tyrtaeum* : Soota & Halder, *Rec. zool. Surv. India*, **76** : 203.

Diagnosis : Length 30-160 mm; diameter 2.5-8 mm. Segments 76-136. Prostomium epilobic, tongue open. Clitellum saddle-shaped, inter segmental furrows obliterated, dorsal pores occluded, setae retained, six segments, XXX-XXXV; tubercula pubertatis uninterrupted longitudinal bands,

just lateral to *B*, in XXXI-XXXIV but usually reaching eq/XXX, XXXIV. Setae *a,b*/xv displaced mesially. First dorsal pore in region of 8/9-14/15, usually at 10/11. Spermathecal pores 2 pairs, in 9/10-10/11, at or above *C* but within *C D*. Female pores just lateral to *B*, at eq/XIV. Male pores nearer to *C*, on XV; male tumescences of variable shape, obliterating 14/15 and 15/16, reaching equators of XIV and XVI.

Holandric; spermathecae usually in X-XI, sessile, ducts confined to parietes.

Habitats : Under stones, logs. In woody peat, leaf mold compost, decaying wood, forest litter of various kinds, debris of different sorts, hillside detritus.

Distribution : INDIA : West Bengal Darjeeling district; Himachal Pradesh; Kashmir; Sikkim; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa; Europe, Pakistan; Australia; Canada, U.S.A., Mexico, some islands in the Atlantic ocean; South America.

IV. Family MEGASCOLECIDAE

Diagnosis : Setae sigmoid with simply pointed tip. Clitellum multilayered. Male pores behind female pores. Dorsal pores present. Intestinal origin behind ovarian segment. Nephridia holoic or meroic. Last pair of hearts behind XI. Seminal vesicles trabeculate; prostates recemose without central canals; spermathecae diverticulate, in front of gonadal segments; ovaries in XIII, fan-shaped.

Distribution : Eastern U.S.S.R., Korea, Japan, southern China to Australasia.

Remarks : For nomenclature and taxonomy of pheretimoid earthworms Sims & Easton (1972) was followed.

KEY TO GENERA

1.	Nephridia stomate.	_	*Perionyx*
	— Nephridia astomate, at least in some parts of body.	_	2
2.	Gizzard in front of 7/8.	_	3
	— Gizzard behind 7/8.	_	4
3.	Female pores in XIII, male pores in XVII.	_	*Tonoscolex*
	— Female pores in XIV, male pores in XVIII.	_	*Lampito*
4.	Intestinal caeca present.	_	5
	— Intestinal caeca absent.	_	*Polypheretima*
5.	Copulatory pouches present.	_	*Metaphire*
	— Copulatory pouches absent	_	*Amynthas*

Genus 10. ***Amynthas*** Kinberg

1867. *Amynthas* Kinberg, *Öfvers. K. Vetens. Acad. Förhandl. Stockholm*, **23** : 97. (Type species, *Amynthas aeruginosus* Kinberg, 1867.)

1972. *Amynthas* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 211.

Diagnosis : Body cylindrical. Setae numerous, regularly arranged around each segment. Clitellum annular, XIV-XVI, rarely beginning on XIII. Spermathecal pores paired, occasionally

numerous or single, between 4/5 and 8/9. Female pore single, rarely pired, on XIV. Male pores paired on XVIII. Gizzard between 7/8 and 9/10; oesophageal pouches absent; intestinal caeca present. Meronephridial, nephridia stomate in some part of the body. Holandric or metandric. Coupulatory pouches absent.

Distribution : Oriental region, Australasian region and introduced into Oceania.

KEY TO SPECIES

1.	Spermathecal pores four pairs.	–	2
	—Spermathecal pores less than four pairs.	–	3
2.	Preclitellar genital markings present.	–	*A. diffringens*
	—Preclitellar genital markings absent.	–	*A. alexandri*
3.	Spermathecal pores three pairs.	–	*A. hawayanus*
	—Spermathecal pores two pairs.	–	4
4.	Spermathecal pores at 5/6-6/7.	–	*A. morrisi*
	—Spermathecal pores at 7/8-8/9.	–	*A. robustus*

13. *Amynthas alexandri* Beddard

1900. *Amyntas alexandri* Beddard, *Proc. zool. Soc. Lond.*, **1900** : 988. (Type loc.-supposedly Calcutta, West Bengal, India; type in Brit. Mus. (Nat. Hist.), London.)

1909. *Pheretima alexandri* : Michaelsen, *Mem. Indian Mus.*, **1** : 109.

1914. *Pheretima lignicola* Stephenson, *Rec. Indian Mus.*, **8** : 399. (Type loc.-Dibrugarh, Assam, India; type in Zoological Survey of India, Calcutta.)

1972. *Amynthas alexandri alexandri, a. gracilor* : Sims and Easton, *Biol. J. Linn. Soc.*, **4** (3) : 234.

1982. *Amynthas alexandri* : Julka, *Rec. zool. Surv. India*, **80** : 135.

Material : (1) Calcutta 1 ex., Kakurgachi, 29.vii.1963, Coll. Soil Zool. Unit, Z.S.I., Calcutta. (2) Darjeeling Dist. 1 ex., Reang, 6.vii.1974, Coll. T. D. Soota. (3) Jalpaiguri Dist. 1 ex., Jayanti (Buxa Tiger Reserve), 13.xii.1984, Coll. K. R. Halder.

Diagnosis : Length 105-290 mm; diameter 4-9 mm. Segments 90-141. Prostomium rudimentary. Clitellum XIV-XVI, occasionally reaching XVII. Setae 40-50 on VIII, 58-76 on XX, 9-22 between spermathecal pores and 9-28 between male pores. First dorsal pore at 12/13. Genital markings absent. Spermathecal pores 4 pairs, minute, superficial, in 5/6-8/9. Female pore midventral. Male pores minute, superficial, on XVIII, each in a rather circular disc.

Septa 8/9-9/10 lacking. Intestinal origin in XV; intestinal caeca paired, simple, extending forward to XX. Last pair of hearts in XIII. Holandric; seminal vesicles paired, in XI and XII. Prostates XVI-XXII; ducts muscular and looped. Octothecal; ampulla inverted pear-shaped, duct markedly narrowed in parietes; unidiverticulate; diverticulum longer than combined lengths of duct and ampulla, arising from median face and ectal end of duct, with a slender stalk and a variously looped wider portion entally.

Habitats : Soil of gardens, lawns, open fields, bamboo groves and deciduous jungles, rain forests. Under logs.

Distribution : INDIA : West Bengal Calcutta, Darjeeling and Jalpaiguri districts; Andaman and Nicobar Islands; Assam; Madhya Pradesh; Maharashtra; Uttar Pradesh. *Outside India* : Burma, Thailand.

Remarks : This species was originated from south east Asia and is endemic to Oriental Region. The type was believed to have come from Calcutta but there was some doubt about its occurrence in this area. Its existence in Calcutta as well as in West Bengal is now confirmed.

14. *Amynthas diffringens* (Baird)

1809. *Megascolex diffringens* Baird, *Proc. zool. Soc. Lond.*, **1869** : 40. (Type loc. Plas Machynlleth, North Wales; types in Brit. Mus. (Nat. Hist.), London.)

1887. *Perichaeta mirabilis* Bourne, *ibid.*, **1886** : 668. (Type loc. Naduvatum, Nilgiris, Tamil Nadu, India; typus amissus.)

1909. *Pheretima heterochaeta* : Michaelsen. *Mem. Indian Mus.*, **1** : 189.

1912. *Pheretima divergens* var. *yunnanensis* Stephenson, *Rec. Indian Mus.*, **7** : 274. (Type loc. Tengyueh, China; type in Zoological Survey of India, Calcutta.)

1936. *Pheretima diffringens* : Gates, *ibid.*, **38** : 412.

1972. *Amynthas diffringens* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 235.

1981. *Amynthas diffringens* : Julka, *Rec. zool. Surv. India, Occ. Paper* No.26 : 16.

Material : (1) Darjeeling Dist. 4 exs., Pedong, 28.x.1939; 1 ex., Kurseong, 23.ix.1941; Coll. H. A. Hafiz. 2 exs., Resium forest, 1.i.1974, Coll. G. K. Srivastava and P. K. Maity. 5 exs., Dhobikhola, Kurseong, 9.v.1975; 1 ex., Manikhola, Manibhanjang, 17.v.1975; Coll. T. D. Soota.

(2) Jalpaiguri Dist. 2 exs., Jaldapara Wild-Life Sanctuary (Duars), 24.viii.1983, Coll. A. K. Mandal.

Diagnosis : Length 45-170 mm; diameter 3-6 mm. Segments 79–121. Prostomium epilobic, tongue open. Clitellum XIV-XVI. Setae 26-46 on VIII, 39-54 on XX, 6-16 between spermathecal pores and 8-16 between male pores. Genital markings small, cricular to shortly elliptical discs, paired–presetal, just median to the line of spermathecal pores in some or all or VI-IX; post setal, just in front of spermathecal pores in some or all of V-VIII, occasionally one or more near each male porophore on XVIII. First dorsal pore usually at 11/12. Spermathecal pores 4 pairs, minute, superficial, each in a small circular to transversely elliptical disc in 5/6-8/9. Female pore midventral.

Septa 8/9-9/10 lacking. Gizzard large, somewhat conical, narrow in front; intestinal origin usually in XVI; typhlosole lamelliform; intestinal caeca simple extending forward to XXII. Last pair of hearts in XIII. Holandric; testis sacs unpaired and ventral; seminal vesicles in XI and XII. Prostates XVI-XXII; ducts muscular *ca.* 6 mm long and looped. Octothecal; ampulla inverted pear-shaped, duct shorter than ampulla; unidiverticulate; diverticulum arises from anterior face of duct, with a long stalk and a small, spheroidal to ellipsoidal seminal chamber. Genital marking glands stalked and coelomic.

Habitats : Soil of jungles, potato fields and open places under stones and logs. In rotten wood, manure, compost, rubbish. In axils of plantain leaves.

Economic Importance : Presence of this species in earth with potted plants is known to be disadvantageous as the worms can choke the drainage pits.

Distribution : INDIA : West Bengal Darjeeling and Jalpaiguri districts; Arunachal Pradesh; Assam; Himachal Pradesh; Jammu & Kashmir; Karnataka; Manipur; Meghalaya; Sikkim; Tamil

Nadu; Uttar Pradesh. *Outside India* : Africa, Madagascar and its adjacent islands; Europe, China, Korea, Japan; Sri Lanka, Nepal, Bhutan, Bangla Desh, Burma, Indonesia, Philippines, Hainan, Hong King, Taiwan; Australia, New Zealand, some islands in the Pacific Ocean; U.S.A.; Central America, West Indies, South America.

Remarks : Though this species was originated from China, it has successfully colonized in the Himalayas and other high altitude regions of India. This is a very common species in the hilly areas of Darjeeling district. Now it is recorded from Jalpaiguri district also.

15. ***Amynthas hawayanus*** (Rosa)

1891. *Perichaeta hawayana* Rosa, *Ann. Hofumus. Wein*, **6** : 396. (Type loc.- Hawaii; type in the Vienna Museum.)

1909. *Pheretima hawayana f. typica* : Michaelsen, *Mem. Indian Mus.*, **1** : 110,187.

1912. *Pheretima hawayana* : Stephenson, *Rec. Indian Mus.*, **7** : 276.

1972. *Pheretima hawayana* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 189.

1972. *Amynthas hawayanus* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 235.

1981. *Amynthas hawayanus* : Soota & Halder, *Rec. zool. Surv. India*, **79** : 232.

Diagnosis : Length 56-156 mm; diameter 3-6 mm. Segments 70-101. Prostomium epilobic, tongue wide and open. Clitellum XIV-XVI, dorsal pores occluded, intersegmental furrows obliterated; setae usually present ventrally on XVI. Setae 36-40 on VII, 48-56 on XX, 4-15 between spermathecal pores and 10-16 between male pores. Genital markings small discs, paired; postsetal in some of VI-IX and slightly median to spermathecal pore lines; on XVIII, in or just behind the setal circle and just median to male pore lines. First dorsal pore at 10/11. Spermathecal pores 3 pairs, minute, superficial, ca. $^1/_4$ $^1/_3$ C apart, in 5/6-7/8. Female pore, usually single, mid-ventral. Male pores minute, superficial, ca.$^1/_4$ C apart, each in a small transversely elliptical disc.

Septa 8/9-9/10 aborted. Gizzard bell-shaped; intestinal origin in XV; intestinal caeca simple but with several short lobes, extending forward to XXIV. Last pair of hearts in XIII. Holandric; testis sacs usually unpaired and ventral; seminal vesicles paired, in XI, XII. Prostates through some or all of XVI-XXIV; duct 3-5 mm long and muscular. Sexthecal; ampulla circular or oval; duct usually shorter than ampulla, slender but narrowed in parietes; unidiverticulate; diverticulum shorter than combined length of duct and ampulla, slender and slightly asymmetrically widened entally. Genital marking glands stalked, coelomic, composite.

Habitats : Soil of open fields, gardens. Under stones. Drainage area for sewage.

Distribution : INDIA : West Bengal Darjeeling district; Manipur; Meghalaya; Rajasthan; Sikkim; Uttar Pradesh. *Outside India* : Mauritus; Europe, Egypt, Pakistan, China; Sri Lanka, Bangla Desh, Burma, Thailand, Malay Peninsula, Indonesia, Hongkong; U.S.A., some islands in the Pacific and Atlantic ocean; West Indies, South America.

Remarks : The original home of this species is believed to be somewhere in China. In West Bengal it occurs from Darjeeling district only.

16. ***Amynthas morrisi*** (Beddard)

1892 *Perichaeta morrisi* Beddard, *Proc. zool. Soc. Lond.*, **1892** : 166. (Type loc.- Penang, Malay; type in Brit. Mus. (Nat. Hist.), London.)

1898. *Perichaeta cupilifera* Fedarb, *ibid.*, **1898** : 445. (Type loc.- Dehra Dun, Uttar Pradesh, India; types probably in Brit. Mus. (Nat. Hist.), London.)

1926. *Pheretima hawayana* var. *lineata* Gates. *Rec. Indian Mus.*, **28** : 154. (Type loc.- Taungyi, Burma; typus amissus.)

1936. *Pheretima morrisi* : Gates, *ibid.*, **38** : 437.

1972. *Amynthas morrisi* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 236.

1980. *Amynthas morrise* : Soota & Halder, *Rec. zool. Surv. India*, **76** : 197.

Material : Calcutta - 26 exs., Indian Museum compound, 10.iv.1978, Coll. K. R. Halder.

Diagnosis : Length 40-150 mm; diameter 2.5-6 mm. Segments 75-102. Prostomium epilobic, tongue open. Clitellum XIV-XVI. Setae 45-51 on VIII, 46-59 on XX,16-28 between spermathecal pores and 10-17 between male pores. Genital markings small discs; presetal - unpaired and median in some or all of V-VIII or VI-IX, XVIII; paired just median to spermathecal pore line in some of VI-IX; paired - presetal and postsetal, just median to each male porophore. First dorsal pore at 10/11. Spermathecal pores 2 pairs, minute and superficial, in 5/6 and 6/7. Female pore midventral. Male pores minute and superficial.

Septa 8/9-9/10 lacking. Intestinal origin in XV; typhlosole quite rudimentary or lacking; intestinal caeca simple extending forward to XXIV. Last pair of hearts in XIII. Holandric; testis sacs paired and ventral; seminal vesicles in XI and XII. Prostates XVII-XXIII; ducts 2-3 mm long. Quadrithecal; spermathecae large; duct slender, shorter than ampulla; unidiverticulate; diverticulum arises from anterior face of duct, with short stalk and slenderly club-shaped seminal chamber. Genital marking glands stalked and coelomic.

Habitats : Soil of gardens, lawns, open areas and jungles. Soil under bamboos and banyan trees.

Distribution : INDIA : West Bengal - Calcutta and Darjeeling districts; Maharashtra; Rajasthan; Uttar Pradesh. *Outside India* : Europe, Pakistan, China; Burma, Thailand, Malay Peninsula, Indonesia, Hong Kong, Taiwan; Hawaii, U.S.A., Mexico; South America.

Remarks : The original home of this species is China. In West Bengal it was reported to occur from Darjeeling district only. Now it is recorded here from Calcutta also.

17. *Amynthas robustus* (Perrier)

1872. *Perichaeta robusta* Perrier, *Nouv. Arch. Mus. Hist. nat. Paris*, **8** : 112. (Type loc.- Mauritus or Manila; types in Museum National d'Histoire, Paris.)

1925. *Pheretima himalayana* Stephenson, *Proc. zool. Soc. Lond.*, **1925** : 893. (Type loc.- Darjeeling, West Bengal, India; types in Brit. Mus. (Nat. Hist.), London.)

1929. *Pheretima ornata* Gates, *Proc. U. S. Natl. Mus.*, **75** (10) : 20. (Type loc - Lashio, Burma, types in Zoological Survey of India, Calcutta.)

1934. *Pheretima robusta* : Gates, *Rec. Indian Mus.*, **36** : 264.

1972. *Amynthas robustus* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 234.

Material : Darjeeling district - 1 ex., Darjeeling town, Dec., 1976, Coll. Devika Pradhan.

Diagnosis : Length 33-180 mm; diameter 2-9 mm. Segments 79-136. Prostomium epilobic, tongue open. Clitellum XIV-XVI. Setae 40-54 on VIII, 46-72 on XX, 19-31 between spermathecal pores and 10-25 between male pores. Genital markings small, circular to elliptical, usually in some or all of VII, VIII and XVIII. First dorsal pore at 11/12. Spermathecal pores 2 pairs, minute and superficial, *ca.* $^1/_2$ C apart, in 7/8 and 8/9. Female pore mid-ventral. Male pores minute and superficial.

Septa 8/9-10/11 lacking. Intestinal origin in XV, occasionally in XVI; typhlosole simply lamelliform; intestinal caeca simple, extending forward to XXII. Last pair of heart in XIII.

Holandric; testis sacs usually unpaired and ventral; seminal vesicles large, in XI and XII. Prostates XVI-XXI; duct long and looped or coiled. Quadrithecal; duct shorter than ampulla; unidiverticulate; diverticulum arises from anterior face of duct, with slender but muscular stalk and shorter, spheroidal to ellipsoidal seminal chamber. Genital marking glands stalked and coelomic.

Habitats : Fertile soil in gardens. Humus soil in jungles. Rocky soil.

Distribution : INDIA : West Bengal - Darjeeling district. *Outside India* : China, Korea, Japan; Burma, Hong Kong, Taiwan.

Remarks : This species is thought to be originated from China. In India it occurs only from the hilly regions of Darjeeling district because of the fact that *A. robustus* is a temperate zone species.

Genus 11. *Lampito* Kinberg

1867. *Lampito* Kinberg, *Öfvers. K. Vetens. Akad. Förhandl. Stockholm*, **23** : 103. (Type species, *Lampito mauritii* Kinberg, 1867.)

1987. *Lmpito* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No.**92** : 8.

Diagnosis : Clitellum annular. Dorsal pores present. Biprostatic. Male pores (combined with prostatic pores) paired on XVIII. Female pores paired on XIV. Septa all present from 4/5. Digestive system with a single oesopagial gizzard in V; longitudinal calciferous lamellae in X-XIII; an intestinal origin in region of XV-XVI and a typhlosole but without intestinal caeca and supra-intestinal glands. Last pair of hearts in XIII. Meronephric. Spermathecae bidiverticulate, diverticulum digitiform arising from lateral and median face of duct. Ovaries in XIII, fan-shaped, with several eggstrings.

Distribution : INDIA : Palni and Cardomon Hills in South India. One species, *Lampito mauritii* is widely distributed throughout India and also to other parts of the world probably due to transportation.

Remarks : The genus is represented in West Bengal by a single species *L. mauritii.*

18. *Lampito mauritii* Kinberg

1867. *Lampito mauritii* Kinberg, *Öfvers. K. Vetens. Akad. Förhandl. Stockholm*, **23** : 103. (Type loc. - Mauritus; types in Naturhistoriska Riksmuseet, Stockholm.)

1883. *Perichaeta armata* Beddard, *Ann. Mag. nat. Hist.*, (ser. 5), **12** : 216. (Type loc.-Calcutta, West Bengal, India; typus amissus.)

1887. *Perichaeta bivaginata* Bourne, *Proc. zool. Soc. Lond.*, **1886** : 666. (Type loc.-Salem, Tamil Nadu, India; typus amissus.)

1887. *Perichaeta salettensis* Bourne, *ibid.*, **1886** : 669. (Type loc.-Salem, Tamil Nadu, India; typus amissus.)

1891. *Perichaeta madagascariensis* Michaelsen, *Arch. Naturgesch*, **57** (1) : 227. (Type loc. Madagascar; types in Brit. Mus. (Nat. Hist.), London.)

1899. *Megascolex mauritii* · Michaelsen, *Ofvers. K. Vetens. Akad. Förhandl. Stockholm*, **56** : 441.

1909. *Lampito mauritii* : Michaelsen, *Mem. Indian Mus.*, **1** : 179.

1914. *Lampito trilobata* Stephenson, *Rec. Indian Mus.*, **10** : 340. (Type loc. Baroda, Gujarat, India; types in Zoological Survey of India, Calcutta.).

1938. *Lampito mauritii* : Gates, *ibid.*, **40** : 413.

1987. *Lampito mauritii* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 9.

Material : (1) Bankura Dist. 13 exs., Aral Bansi near Bankura town, 4.iii.1985; 14 exs., Sonamukhi, 5.iii.1985; Coll. A. Chatterjee. (2) Birbhum Dist. - 49 exs., in and around Nalhati, 27.ix.1983; 4 exs., in and around Sainthia, 28.ix.1983; 125 exs., in and around Bolpur, 29.ix.1983; 137 exs., in and aroud Rampurhat, 30.ix.1983; Coll. K. R. Halder. (3) Burdwan Dist. 1 ex., Panagarh, 7.iii.1985, Coll. A. Chatterjee. (4) Calcutta - 10 exs., Paik Para, 11.i.1963, Coll. D. K. Thakur. 5 exs., Indian Museum compound, 21.vii.1978; 2 exs., Chetla Park, 29.iii.1978; 5 exs., Ultadanga, 22.i.1979; Coll. K. R. Halder. (5) Coochbehar Dist. 2 exs., Atiamochar, 31.vii.1983, Coll. A. K. Mandal. 5 exs., Dinhata, 5.iv.1987, Coll. K. R. Halder. (6) Howrah Dist. 6 exs., Domjur, 5.iv.1986; 5 exs., Mourigram and 2 exs., Amta, 6.iv.1986; 5 exs., Bagnan and 6 exs., Shyampur, 7.iv.1986; Coll. K. R. Halder. (7) Jalpaiguri Dist. - 12 exs., Jalpaiguri town, 9.iv.1987, Coll. K. R. Halder. (8) Malda Dist. - 10 exs., Piasbari, 11 exs., Baiki and 4 exs., Gour. 16.iii.1984; 4 exs., Iho, 18.iii.1984; 7 exs., Tulshibari and 8 exs., Harishchandrapur, 19.iii.1984; Coll. A. K. Das. (9) Midnapur Dist. - 26 es., Tamluk, 27.v.1985, Coll. B. P. Haldar. 1 ex., Naradari near Tamluk, 13.xi.1985, Coll. J. Pattanayak. 3 exs., Belda, 25.iii.1986; 12 exs., in and around Midnapur town, 26.iii.1986; 4 exs., Garbeta, 27.iii.1986; 1 ex., Ghatal, 28.iii.1986; 3 exs., Kolaghat, 29.iii.1986; 2 exs., Gopiballavpur, 30.iii.1986; Coll. K. R. Halder. (10) Murshidabad Dist. 42 exs., in and around Berhampur and 38 exs., Lalbagh, 21.ix.1983; 63 exs., in and around Farakka, 22.ix.1983; 113 exs., in and around Kandi, 23.ix.1983; 43 exs., in and around Raghunathganj and 22 exs., Jangipur, 24.ix.1983; Coll. K. R. Halder. 13 exs., Beldanga and 7 exs., Jangipur, Coll. A. Chatterjee. (11) Nadia Dist. - 26 exs., in and around Krishnanagar, 16.ix.1983; 15 exs., Nabadwipdham, 11 exs., Nabadwipghat and 13 exs., Champta, 17.ix.1983; 16 exs., Goalapara, 18 exs., Beledanga and 12 exs., Kursi, 18.ix.1983; 27 exs., in and around Kalyani, 19.ix.1983; 63 exs., in and around Plassy, 25.ix.1983; Coll. K. R. Halder. (12) Purulia Dist. - 1 ex., Manbajar, 2.iv.1986, Coll. K. R. Halder. (13) 24-Parganas (North) 6 exs., Barrackpore, 20.ii.1979, Coll. G. C. Ghosh. 30 exs., Dakshineswar, 6.x.1980, Coll. K. R. Halder. (14) 24-Parganas (South) 17 exs., Sagar Island, 31.vii.1974, Coll. A. Misra. 6 exs., Kamdohari and 3 exs., Boral, 22.viii.1979; 40 exs., Kurebhanga, 11.xi.1979; 40 exs., Amtala, 10.xii.1979; Coll. K. R. Halder. 30 exs., Kakdwip, 11.ix.1979; 3 exs., Sagar Island, 8.vii.1980; 1 ex., South Parghumti, 9.ix.1984; 2 exs., Chhoto Mollakhali, 13.ix.1984; 2 exs., Sajnakhali, 16.ix.1984; 4 exs., Falta, 27.iii.1985; Coll. B. P. Haldar. (15) West Dinajpur Dist 9 exs., Bangar, 4.iv.1987; 4 exs., Jordighi, 5.iv.1987; Coll. K. R. Halder.

Diagnosis : Length 95-155 mm; diamter 3-6 mm. Segments 157-201. Prostomium prolobic. Clitellum from 13/14 or a post setal portion of XIII - 17/18. Setae perichaetine, 40-51 on VIII, 30-43 on XX, 10-16 between spermathecal pores and none between male pores. Genital markings absent. First dorsal pore at 10/11-12/13. Spermathecal pores 3 paris, large, in *E G*, in 6/7-8/9. Female pores closely paired. Male pores paired, at or lateral to *B*.

Intestinal origin in XV. Holandric; testes free in X and XI; seminal vesicles in XI and XII. Prostates in XVIII; duct straight. Penial setae with horseshoe-shaped or scoop-shaped tips, ornamentation of closely set circles of triangular teeth. Sexthecal; ampulla elongate; duct barrel-shapped.

Habitats : Sandy loam, loam, laterite soil in gardens, grass lands, lawns, crop fields, forests. Under manure and compost heaps. Abundant in soil with high organic matter.

Castings : Castings are deposited on the surface of soil in the form of small heaps of spheroidal or nearly globular pellets.

Economic Importance : These worms may be utilized as waste conditioners and as biological agents for controlling plant parasites.

Distribution : INDIA : West Bengal - Bankura, Birbhum, Burdwan, Calcutta, Coochbehar, Darjeeling, Howrah, Jalpaiguri, Malda, Midnapur, Murshidabad, Nadia, Purulia, 24-Parganas (North), 24-Parganas (South) and West Dinajpur districts; Andaman and Nicobar Islands; Andhra Pradesh; Bihar; Gujarat; Karnataka; Kerala; Laccadive and Minicoy Islands; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Tamil Nadu; Uttar Pradesh. *Outside India* : Zanzibr, Comoro Is., Madagascar, Seychelles Is., Mauritus; Pakistan, China; Maldives, Sri Lanka, Bangla Desh, Burma, Thailand, Malay Peninsula, Indonesia, Philippines, Hong Kong; New Caledonia.

Remarks : Though the original home of this species is assumed to be Peninsular India, it is widely distributed throughout India. In West Bengal this species was previously recorded from Burdwan, Calcutta and Darjeeling districts. Now it extends here its distributional range to all other districts excepting Hooghly.

Genus 12. ***Metaphire*** Sims & Easton

1972. *Metaphire* Sims & Easton, *Biol. J. Linn. Soc.*, 4 (3) : 215. (Type species, *Rhodopis javanica* Kinberg, 1867.)

1987. *Metaphire* : Julka & Senapati, *Rec. zool. Surv. India*, Occ. Paper, No. 92 : 10.

Diagnosis : Body cylindrical. Setae numerous, regularly arranged around each segment. Clitellum annular, XIV-XVI. Spermathecal pores usually large transverse slits, rarely small, paired, occasionally singe or multiple, between 4/5 and 9/10. Female pore sigle, rarely paired. Male pores (combined with prostatic pores) paired, within copulatory pouches on XVIII, rarely on XIX or XX. Oesophageal pouches absent; gizzard between 7/8 and 9/10; intestinal caeca present, originating in or near XVII. Meronephric. Holandric, rarely proandric or metandric. Copulatory pouches present, often with stalked glands.

Distribution : Oriental region, southwards through the Indo-Australasian Archipelago to the rain forests of Australasia through Oceania.

KEY TO SPECIES

1.	Male pores on XX.	_	*M. anomala*
	— Male pores on XVIII.	_	2
2.	Spermathecal pores four pairs.	_	*M. posthuma*
	— Spermathecal pores less than four pairs.	_	3
3.	Two pairs of spermathecal pores.	_	4
	— Three pairs of spermathecal pores.	_	5
4.	Spermathecal pores at 6/7-7/8.	_	*M. planata*
	— Spermathecal pores at 7/8-8/9.	_	*M. californica*
5.	Genital markings two pairs across 17/18 and 18/19.	_	*M. peguana*
	— Genital markings, when present, in the vicinity of spermathecal pores.	_	*M. houlleti*

19. ***Metaphire anomala*** (Michaelsen)

1907. *Pheretima anomala* Michaelsen, *Mitt. Naturh. Mus. Hamb.*, 24 : 167. (Type loc. Shibpur, West Bengal, India; types in Zoologisches Institute und Zoologisches Museum Universitat, Hamburg.)

1925. *Pheretima insolita* Gates, *Ann. Mag. nat. Hist.*, (ser. 9), **16** : 568. (Type loc.- Rangoon, Burma; types in U.S. National Museum, Washington.)

1930. *Pheretima anomala, a. centralis, a. insolita* : Stephenson, *Rec. Indian Mus.*, **31** : 234, 236.

1972. *Pheretima anomala* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 166.

1972. *Metaphire anomala anomala, a. centralis, insolita* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 237

Diagnosis : Length 80-200 mm; diameter 3-7 mm. Segments 119-130. Prostomium epilobic. Setae 90-96 on VIII, 61-70 on XX, 17-25 between spermathecal pores and 15-21 between male pores. Genital markings paired, small, disc-like, equatorial on XVII-XIX. First dorsal pore at 12/13. Spermathecal pores when present, 3 pairs, minute and invaginate, in 5/6-8/9. Female pore single, mid-ventral, on XIV. Male pores minute and invaginate, each pore at the centre of a transversely elliptical tubercle on the roof of a slight parietal invagination in the setal circle of XX.

Septa 8/9 and 9/10 lacking. Gizzard large in VIII; intestinal origin in XV; intestinal caeca simple, originating in XXVII and extending forward to XXI. Last pair of hearts in XIII. Holandric; testis sacs unpaired and ventral; seminal vesicles large, in XI and XII. Prostates in some or all of XVI-XXIII; ducts 4-7 mm long, muscular and looped. Sexthecal; spermathecal duct slender and as long as ampulla; unidiverticulate; diverticulum arises from anterior face of duct, with short, slender stalk and a club-shaped seminal chamber. Genital marking glands mushroom-shaped, stalked and coelomic.

Distribution : India, Burma, Thailand.

Remarks : Gates (1972) recognized three major morphs viz. H, A and R morphs along with minor intermediate morphs within *anomala* complex. But only A morph was recorded from West Bengal. This species complex was originated from Burma and is endemic to Oriental region.

19a. ***Metaphire anomala*** A morphs (Gates)

1972. *Pheretima anomala* A morphs : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 168.

Material : Darjeeling Dist. - 1 ex., Kalimpong, 22.x.1939, Coll. H. A. Hafiz. 22 exs., Reang, 6.vii.1974, Coll. T. D. Soota.

Diagnosis : Genital markings in some or all of XVII-XIX, XXI-XXIV. Spermathecal pores lacking. Male pores on XX.

Testes and male funnels in some or all of V-XII, in X-XI usually in small chambers unlike the H testis sacs, in other segments free; seminal vesicles lacking or rudimentary. Athecal.

Habitats : Soil in jungles. Rotting leaves. Under logs. Manure.

Distribution : INDIA : West Bengal - Darjeeling and Howrah districts; Madhya Pradesh; Uttar Pradesh. *Outside India* : Burma, Thailand.

Remarks : This species is rare in India. In West Bengal it was reported to occur from Shibpur (Howrah Dist.) and Pashok (Darjeeling Dist.) only. Now it is recorded here from two other localities of Darjeeling Dist. also.

20. ***Metaphire californica*** (Kinberg)

1866. *Pheretima californica* Kinberg, *Öfvers. K. Vetens. Akad. Förhandl. Stockholm*, **23** : 102. (Type loc.- Sansolita Bay, Californnia, U.S.A., type and paratyps in Stockholm Museum.)

1912. *Pheretima browni* Stephenson, *Rec. Indian Mus.*, **7** : 274. (Type loc.- Tengyueh, Burma; types in Zoological Survey of India, Calcutta and Brit. Mus. (Nat. Hist.), London.)

1927. *Pheretima modesta* Michaelsen, *Boll. Lab. Zool. Portici*, **21** : 88. (Type loc. - Yi Leang, Burma; types ?)

1932. *Pheretima molesta* Gates, *Rec. Indian Mus.*, **34** : 420. (Type loc. - Kutkai; typus amissus.)

1972. *Pheretima californica* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 174.

1972. *Metaphire californica* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) 238.

1977. *Metaphire californica* : Soota & Halder, *Newsl. zool. Surv. India*, **3** (3) : 129.

Diagnosis : Length 50-132 mm; diameter 3-5 mm. Segments 85-115. Prostomium epilobic, tongue open. Clitellum XIV-XVI, occasionally reaching into XIII. Setae 30-48 on VIII, 40-61 on XX, 12-20 between spermathecal pores and 9-18 between male pores. Genital marking absent. First dorsal pore at 11/12. Spermathecal pores 2 pairs, minute superficial, *ca.* $^1/_3$ C or more apart, in 7/8-8/9. Female pore single and mid-ventral. Male pores minute, each on a very small tubercle.

Septa 8/9-9/10 aborted. Intestinal origin in XV; intestinal caeca simple, without or with short lobes, extending forward to XXII; typhlosole low but lamelliform. Last pair of hearts in XIII. Holandric; testis sacs ventral, usually unpaired; seminal vesicles paired, in XI, XII. Prostates in XVI-XXII; duct muscular, 1.5-3 mm long, much narrowed ectally Quadrithecal; spermathecae small to medium-sized; duct shorter than ampulla, much narrowed in parietes; unidiverticulate; diverticulum arising from anterior face of duct near parietes, longer than combined lengths of duct and ampulla, with a short, slender stalk and a long as wider seminal chamber that is variously looped.

Distribution : INDIA : West Bengal - Darjeeling district. *Outside India* : South Africa; Greece, Egypt, Lebanon, China, Japan; Burma, Malay Peninsula, Indonesia, Hong Kong; Australia; U.S.A., Mexico, some islands in the Pacific and Atlantic Ocean; South America.

Remarks : The original home of this species is thought to be somewhere in China. In India it occurs only from Darjeeling district of West Bengal.

21. ***Metaphire houlleti*** (Perrier)

1872. *Perichaeta houlleti* Perrier, *Nouv. Arch. Mus. Hist. nat. Paris*, **8** : 99. (Type loc. Calcutta, West Bengal, India; types in Museum National d' Histoire Naturelle, Paris.)

1890. *Perichaeta campanulata* Rosa, *Ann. Mus. Civ. Sto. Nat. Genova*. **30** : 115. (Type loc.-Palon; types in the Genoa Museum.)

1898. *Perichaeta travancorensis* Fedarb, *J. Bombay nat. Hist. Soc.*, **11** : 435. (Type loc. Travancore, Kerala, India; types in Brit. Mus. (Nat. Hist.), London.)

1898. *Perichaeta crescentica* Fedarb, *Proc. zool. Soc. Lond.*, **1898** : 447. (Type loc. Dehra Dun, Uttar Pradesh, India; types probably in Brit. Mus. (Nat. Hist.) London.)

1916. *Pheretima trivandrana* Stephenson, *Rec. Indian Mus.*, **12** : 335 (Type loc. Trivandrum, Kerala, India; type in Zoological Survey of India, Calcutta.)

1925. *Pheretima wimberleyana* Stephenson, *ibid.*, **27** : 62. (Type loc. Wimberleyganj, Andamans, India; types in Zoological Survey of India, Calcutta.)

1926. *Pheretima houlleti* var. *tortuosa*, var. *rugosa* Gates, *Ann. Mag. nat. Hist.* (ser. 9), **17** : 454, 459. (Type loc. of both the species, Rangoon, Burma; typus amissus.)

1932. *Pheretima campanulata* var. *meridiana* Gates, *Rec. Indian Mus.*, **34** : 457. (Type loc. Myittha, Burma; typus amissus.)

1972. *Pheretima houlleti* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 190.

1972. *Metaphire houlleti houlleti, h. rugosa; campanulata campanulata, c. meridiana, c. penitralis; wimberleyana* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 238.

1982. *Metaphire houlleti* : Julka, *Rec. zool. Surv. India*, **80** : 142.

Diagnosis : Length 40-200 mm; diameter 3-8 mm. Segmnts 90-140. Prostomium epilobic, tongue open. Setae often present in clitellar segments, 30-55 on VIII, 48-62 on XX, 11-26 between spermathecal pores and 4-16 between male pores. Genital markings present or lacking externally. First dorsal pore in region of 7/8-11/12. Spermathecal pores 3 pairs, minute, *ca.* 1/2 C apart, in 6/7-8/9. Female pore single, mid-ventral, on XIV. Male pores minute, on XVIII, each pore on a penial body.

Septa 8/9-9/10 lacking. Intestinal origin in XV; intestinal caeca paired, simple, originating in XXVII and extending forward to XXII. Last pair of hearts in XIII. Holandric; testis sacs unpaired and ventral in X and XI; seminal vesicle in XI and XII. Sexthecal; spermatheca unidiverticulate; diverticulum arises from ectal end of duct, with a short stalk and an elongate, variously looped seminal chamber. Genital marking glands stalked.

Distribution : Sierra Leone, Pakistan, China; India, Sri Lanka, Burma, Thailand, Malay Peninsula, Indonesia, Philippines; Florida (U.S.A.); Salvador, Cuba, Bahamas.

Remarks : The original home of this species complex is believed to be somewhere in south east Asia. Gates (1972) recognized seven morphs within *houlleti* complex. The specimens of *houlleti* hitherto known from West bengal belong to H morph, larger Hp morph and smaller Hp morph.

(i) *Metaphire houlleti* H morph (Gates)

1972 *Pheretima houlleti* H morph : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 191.

Diagnosis : Length 92-100 mm; diameter 4-7 mm. Segments 92-140. Genital markigs, when present externally, in vicinity of spermathecal pores and near 6/7-8/9. First dorsal pore at 11/12. Seminal vesicles well-developed. Prostates in XVI-XXI; ducts 5-10 mm long, each in a C- or U-shaped loop. Penial body columner with trilobed tip, male pore on middle lobe. Penial setae 1-3 in copulatory pouches; 0.47-0.9 mm long; shaft almost straight; tip bifid; sparsely ornamented ectally with small teeth. Internal genital markings, one on each of two lateral lobes at tip of penial body, others at or near base of penial body or elsewhere on wall of copulatory pouch, one on anterior and one on posterior wall of each spermathecal invagination.

Habitat : In soil of gardens, lawns, open fields, bamboo and deciduous jungles, rain forests. Under logs and barks of trees. In rotting logs and leaves.

Distribution : INDIA : West Bengal Darjeeling district; Andaman & Nicobar Islands. *Outside India* : Burma, Indonesia, Malay Peninsula.

(ii) *Metaphire houlleti* larger Hp morph (Gates)

1972. *Pheretima houlleti* larger Hp morph : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 193.

Material . (1) Bankura *Dist.* 1 ex., Aral Bansi near Bankura town, 4.iii.1985, Coll. A. Chatterjee. (2) Birbhum *Dist.* 1 ex., Nishchintapur near Rampurhat, 30.ix.1983, Coll. K. R. Halder. (3) Calcutta 2 exs., St. paul's Cathedral compound, 3.ix.1963, Coll. S. B. Roy. 1 ex., Calcutta Maidan, 21.vii.1978; 6 exs., Rabindra Sarobar, 23.xi.1978; Coll. K. R. Halder. (4) Howrah *Dist.* 1 ex., Shyampur, 7.iv.1986, Coll. K. R. Halder. (5) Murshidabad *Dist.* 10 exs., in and around Berhampur, 21.ix.1983, Coll. K. R. Halder. (6) 24-Parganas (North) 2 exs., Kadampukur,

26.xi.1962, Coll. J. C. Naskar. (7) 24-Parganas (South) 1 ex., Purba Sridharpur near Raidighi, 18.xii.1962; 13 exs., Kamdohari, 22.vii.1979; Coll. K. R. Halder. 3 exs., Haltu, 26.ix.1967; Coll. J. M. Julka and K. R. Halder.

Diagnosis : Length 110-200 mm; diameter 3-8 mm. Segments 119-131. Setae none in copulatory chambers, 30-40 on VIII, 48-60 on XX, 11-26 between spermathecal pores and 10-16 between male pores. Genital markings usually lacking externally. First dorsal pore at 11/12.

Seminal vesicles juvenile. Prostates in XVI-XXI; ducts each in a C-shaped loop. Copulatory chamber with 1-3 genital marking glands on anterior faces. Penial body with bilobed tip. Penial setae absent. Internal genital markigns : one at tip of penial body, one on median wall of copulatory chamber, one on anterior and one on posterior wall of each spermathecal invagination.

Habitats : Soil, under grass, in bamboo groves and rain forest.

Distribution : INDIA : West Bengal - Bankura, Birbhum, Calcutta, Howrah, Murshidabad, 24-Parganas (North) and 24-Parganas (South) district. *Outside India* : Burma; Bahamas.

Remarks : The present occurrence of larger Hp morph of this species is of considerable importance becuase of its record for the first time in India.

(iii) ***Metaphire houlleti*** smaller Hp morph (Gates)

1972. *Pheretima houlleti* smaller Hp morph : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 194.

Diagnosis : Length 40-130 mm; diameter 3-5 mm. Segments 90-120. First dorsal proe in region of 7/8-11/12. Genital markings none externally. Seminal vesicles juvenile. Prostates in XVI-XXIII; ducts variously looped. Penial body slenderly conical with a male pore at distal end. Penial setae absent. Spermathecae well-developed. Internal genital markings, one on median wall of each copulatory pouch, 1-3 on or near base of penial body, one on anterior wall of each spermathecal invagination.

Habitats : In soil of gardens, lawns, open fields, bamboo groves, jungles, rain forests. Marshy soil around wells, at banks of tanks, ponds, streams, rivers and lakes. Under barks of trees. Under stones. In earth around potted plants.

Castings : *Castings* are deposited on soil surface in the form of cords, scattered or low piles.

Distribution : INDIA : West Bengal Burdwan and Calcutta districts; Andaman & Nicobar Islands; Meghalaya; Uttar Pradesh. *Outside India* : West Indies; Central America.

22. ***Metaphire peguana*** (Rosa)

1890. *Perichaeta peguana* Rosa, *Ann. Mus. Civ. Sto. Nat. Genova*, **30** : 113. (Type loc. Rangoon, Burma; type in the Genoa Museum.)

1903. *Pheretima peguana* : Michaelsen, *Die geographische Verbreitung der Oligochaeten* (Berlin) : 98.

1957. *Pheretima saigonensis* Omodeo, *Mem. Mus. Sto. Nat. Verona*, **5** : 327. (Type loc. - Saigon, Vietnam; type probably in the Verona Museum.)

1961. *Pheretima peguana* : Gates, *American Midland Nat.*, **66** : 62.

1972. *Pheretima peguana* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 207.

1972. *Metaphire peguana, M. saigonensis* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 239.

1980. *Metaphire peguana* : Soota & Halder, *Rec. zool. Surv. India*, **77** : 3.

Material : (1) Calcutta - 3 exs., St. Paul's Cathedral compound, 13.xi.1967, Coll. J. M. Julka and K. R. Halder. 1 ex., Indian Museum compound, 29.vii.1981., Coll. A. Panda. (2) Jalpaiguri *Dist.* - 13 exs., Jayanti (Buxa Tiger Reserve), 13.xii.1984; 1 ex., Bhutia Basti near Jayanti (Buxa Tiger Reserve), 18.xii.1984; Coll. K. R. Halder.

Diagnosis : Length 140-240 mm; diameter 5-8 mm. Segments 97-124. Prostomium epilobic, tongue open. Clitellum XIV-XVI. Setae 45-55 on VIII, 55-65 on XX, 15-24 between spermathecal pores and 6-14 between male pores. Genital markings 2 pairs, transversely elliptical, with firm glistening surface and obvious central aperture, across 17/18 and 18/19. First dorsal pore at 12/13. Spermathecal pores 3 pairs, minute and superficial, *ca.*2/7 C apart, in 6/7-8/9. Female pore single, mid-ventral, on XIV. Male pores minute, on posterior wall of XVIII.

Septa 8/9-10/11 lacking. Intestinal origin in XV; intestinal caeca simple, originating in XXVII and extending forward to XXII. Last pair of hearts in XIII. Holandric; testis sacs paired and ventral; seminal vesicles in XI and XII, the former is larger. Prostates in XVI-XXI; ducts 3-5 mm long, narrow and looped. Sexthecal; ampulla sac-like; duct shorter than ampulla; unidiverticulate; diverticulum longer than combined lengths of duct and ampulla, with long slender stalk and a spheroidal to ovoidal seminal chamber. Genital marking glands almost spheroidal, slightly protuberant into coelom.

Habitats : Soil of gardens, lawns, banana groves, jungles.

Distribution : INDIA : West Bengal - Calcutta and Jalpaiguri districts; Andaman Islands. *Outside India* : Burma, Thailand, Vietnam, Malay Peninsula, Indonesia.

Remarks : *M. peguana* originated from Burma is endemic to Oriental region. This is a very rare species in India. This species was reported to occur in India only from Calcutta. It is now recorded here from Jalpaiguri district also.

23. *Metaphire planata* (Gates)

1926. *Pheretima planata* Gates, *Ann. Mag. nat. Hist.* (see. 9), **17** : 411. (Type loc. Rangoon, Burma; topotypes in U.S. National Museum, Washington.)

1972. *Metaphire planata* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 239.

1982. *Metaphire planta* : Julka, *Rec. zool. Surv. India*, **80** : 144.

Material : (1) Calcutta - 1 exs., Eden Gardens, 30.viii.1961, coll. N. S. Kumar and S. Sen. (2) Coochbehar *Dist.* - 4 exs., Atiamochar, 1.ix.1983, Coll. A. K. Mandal. (3) Darjeeling *Dist.* 1 exs., Churabati, 28.xii.1973; 1 ex., Mong Pong, 29.xii.1973; Coll. G. K. Srivastava and P. K. Maity. (4) Hooghly *Dist.* 2 exs., Jogram, 27.ii.1985, Coll. A. Chatterjee. (5) Jalpaiguri *Dist.* 26 exs., Duars, 21.xi.1938, Coll. ?. 2 exs., Kartick (Buxa Tiger Reserve), 21.xii.1984, Coll. K. R. Halder. (6) Midnapur *Dist.* - 1 ex., Alampur, 29.xi.1966, Coll. P. K. Talwar. (7) Murshidabad *Dist.* - 1 ex., Berhampur and 1 ex., Lalbagh, 21.ix.1983; 2 exs., New Farakka, 22.ix.1983; Coll. K. R. Halder. (8) West Dinajpur *Dist.* - 16 exs., Raiganj, 7.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 64-176 mm; diameter 4-7 mm. Segments 115-142. Prostomium lacking. Clitellum XIV-XVI, 56-65 on XX, 35-42 between spermathecal pores and 8-14 between male pores. Genital markings small, circular, 1-4 just median to each spermathecal pore, 8-13 on roof and walls of each copulatory pouch. First dorsal pore at 10/11 or 11/12. Spermathecal pors 2 pairs, minute and superficial, on anterior margins of VII and VIII. Female pore single, mid-ventral, on XIV. Male pores minute, on XVIII.

Septa 8/9-9/10 lacking. Intestinal origin in XV; intestinal caeca paired, simple originating in XXVII and extending forward to XX. Last pair of hearts in XIII. Holandric; testis sacs paired, of X ventral and of XI vertical; seminal vesicles in XI and XII. Prostates in XVI-XXI; duct U-shaped. Quadrithecal; ampula large; duct long and slender; unidiverticulate; diverticulum longer than combined lengths of duct and ampulla, with a short stalk and elongately ellipsoidal seminal chamber. Genital marking glands stalked.

Habitats : Soil of gardens, lawns, jungles.

Distribution : INDIA : West Bengal Calcutta, Coochbehar, Darjeeling, Hooghly, Jalpaiguri, Midnapur, Murshidabad and West Dinajpur districts: Andaman Islands; Assam; Orissa. *Outside India* : Bangla Desh, Burma, Thailand, Malay Peninsula.

Remarks : *M. planata* presumably originated from Burma is endemic to Oriental region. This is a rare species in India. In West Bengal it was reported to occur from Darjeeling district only. Now it is recorded here from seven other districts also.

24. ***Metaphire posthuma*** (Vaillant)

1868. *Perichaeta posthuma* Vaillant, *Annl Sci. Nat.*, (ser. 5), **10** : 228. (Type loc. Java; types in Museum National d' Histoire Naturelle, Paris.)

1900. *Pheretima posthuma* : Michaelsen, *Das Tierreich*, **10** : 295.

1972 *Metaphire posthuma* : Sims & Easton, *Biol. J. Linn. Soc.*, **4** (3) : 239.

1980. *Metaphire posthuma* : Soota & Halder, *Rec. zool. Surv. India*, **76** : 200.

Material :-(1) Bankura *Dist.* 5 exs., Aral Bansi near Bankura town, 4.iii.1985; 3 exs., Sonamukhi, 5.iii.1985; Coll. A. Chatterjee. (2) Calcutta 3 exs., Eden Gardens, 30.viii.1961, Coll. N. S. Kumar. 4 exs., Paik Para, 11.i.1963, Coll. D. K. Karmaker. 3 exs., St. Paul's Cathedral compound, 3.ix.1963, Coll. S. B. Roy. 10 exs., Calcutta Maidan, 21.vii.1978; 11 exs., Chetla Park, 29.viii.1978; Coll. K. R. Halder. (3) Coochbehar *Dist.* 1 ex., Toofanganj, 19.iv.1987, Coll. K. P. Halder. (4) Howrah *Dist.* - 2 exs., Bally, i.ix.1970, Coll. A. K. Sarker. 10 exs., Domjur, 5.iv.1986; 2 exs., Mourigram and 7 exs., Amta, 6.iv.1986; 4 exs., Bagnan and 4 exs., Shyampur, 7.iv.1986; Coll. K. R. Halder. (5) Jalpaiguri *Dist.* 2 exs., Baradabari, 21.viii.1983, Coll. A. K. Mandal. 27 exs., Bhutia Basti near Jayanti (Buxa Tiger Reserve), 18.xii.1984; 6 exs., Kartick (Buxa Tiger Reserve), 21.xii.1984; 5 exs., Jalpaiguri town, 9.iv.1987; Coll. K. R. Halder. (6) Malda *Dist.* 1 ex., Piasbari and 1 ex., Baiki, 16.iii.1984; 2 exs., Sanapur, 18.iii.1984; 21 exs., Tulsibari, 19.iii.1984; Coll. A. K. Das. (7) Midnapur *Dist.* 1 ex., Naradari near Tamluk, 13.xi.1985, Coll. J. Pattanayak. 3 exs., Midnapur town, 26.iii.1986; 1 ex., Garbeta, 27.iii.1986, 1 ex., Ghatal, 28.iii.1986; 1 ex., Gopiballavpur, 30.iii.1986; Coll. K. R. Halder. (8). Murshidabad *Dist.* - 18 exs., in and around Berhampur and 6 exs., Lalagh, 21.ix.1983; 7 exs., Raghunathgunj and 2 exs., Jangipur, 24.ix.1983; Coll. K. R. Halder. (9) Nadia *Dist.* 15 exs., in and around Krishnanagar, 16.ix.1983; 10 exs., Nabadwipdham, 2 exs., Nabadwipghat and 8 exs., Champta, 17.ix.1983; 3 exs., Goalapara, 4 exs., Kurshi and 3 exs., Beledanga, 18.ix.1983; 5 exs., Kalyani, 19.ix.1983; 10 exs., in and around Plassy, 25.ix.1983; Coll. K. R. Halder. (10) 24-Parganas (North) 9 exs., Naihati, 3.xi.1966, Coll. B. P. Haldar. (11) 24-Pagranas (South) 11 exs., Ranaghata near Joynagar-Mijilpur, 15.iii.1964; 7 exs., Kamdohari ad 4 exs., Boral, 22.vii.1979; 6 exs., Tentulberia near Garia Rly. Station, 18.viii.1980; 9 exs., Kamalgachi, 13.xi.1980; Coll. K. R. Halder. (12) West Dinajpur *Dist.* - 1 ex., Bangar, 4.iv.1987; 6 exs., Karandighi, 6.iv.1987; 3 exs., Raiganj, 7.iv.1987; Coll. K. R. Halder.

Diagnosis : Length 60-140 mm; diameter 3-8 mm. Segmets 91-124. Prostomium epilobic. tongue open. Clitellum XIV-XVI. Setae present on clitellar segments ventrally, 106-129 on VIII, 60-95 on XX, 36-44 between spermathecal pores and 16-22 between male pores. Genital markings paired, circular or nearly so, in setal circle, slightly median to male pore line, usually on XVII and XIX. First dorsal pore at 12/13. Spermathecal pores 4 pairs, minute and superficial, *ca.* $^1/_4$C apart, on posterior margins of V-VIII. Female pore single, mid-ventral on XIV. Male pores, minute and invaginate, on XVIII.

Septa 9/10 lacking. Gizzard in VIII; intestinal origin in XV, intestinal caeca paired, simple. originating in XXVII and extending forward to XXIV. Last pair of hears in XIII. Holandric; testis sacs unpaired, of X ventral and of XI vertically U-shaped; seminal vesicles in XI and XII, former is larger. Prostates in XV-XXI; ducts 2.5-3.5 mm long, each in a U-shaped loop. Octothecal; ampulla ovoid; duct shorter than ampulla; unidiverticulate, diverticulum arises from median face of duct, with a short stalk and a longer, ellipsoidal seminal chamber. Genital marking glands sessile on parietes.

Habitats : Sandy loam and loam soil in gardens, lawns, grass lands, open fields and groves. Under manure heaps.

Castings : *Castings* are deposited on the surface of soil in the form of small heaps of loose ovoidal pellets.

Economic Importance : It is commonly used as a laboratory material in India.

Distribution : INDIA : West Bengal Bankura, Burdwan, Calcutta, Coochbehar, Howrah, Jalpaiguri, Malda, Midnapur, Murshidabad, Nadia, 24-Parganas (North), 24-Parganas (South) and West Dinajpur districts; Andaman Islands; Bihar; Gujarat; Hariana; Himachal Pradesh; Jammu & Kashmir, Madhya Pradesh; Maharashtra; Orissa; Punjab; Rajasthan; Uttar Pradesh. *Outside India* : Pakistan; Bangla Desh, Burma, Thailand, Vietnam, Malay Peninsula, Indonesia, Philippines; U.S.A.

Remarks : The original home of this species is south east Asia. This species is widely distributed in India. In West Bengal it was known to occur from Burdwan, Calcutta and 24-Parganas (North) districts only. Now it is recorded here from other districts excepting Birbhum, Darjeeling, Hooghly and Purulia.

Genus 13. ***Perionyx*** Perrier

1872. *Perionyx* Perrier, *Nouv. Arch. Mus. Hist. nat. Paris*, **8** : 126. (Type species, *Perionyx excavatus* Perrier, 1872.)

1972. *Perionyx* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 138.

1987. *Perionyx* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No 92 13

Diagnosis : Setae numerous, in a circle at equator of each segment from II posteriorly. Clitellum annular, setae retained. Female pore single, intraclitellar and median. Male pores (combined with prostatic pores) on XVIII. Oesophagus without or with a small gizzard in V or VI; discrete calciferous glands, typhlosole, intestinal caeca and supra-intestinal glands absent. Holonephric.

Distribution : India ? Sri Lanka, Burma, Malayasia.

KEY TO SPECIES

1.	Three pairs of spermathecal pores.	–	2
–	Two pairs of spermathecal pores.	–	3
2.	Spermatheca with a ridge-like diverticulum.	–	*P. jorpokriensis*
–	Spermatheca without diverticulum.	–	*P. variegatus*
3.	Spermathecal pores at 6/7-7/8.	–	4
–	Spermathecal pores at 7/8-8/9.	–	14
4.	Penial setae present.	–	5
–	Penial setae absent.	–	10
5.	Ornamentation of penial setae as definite spines or teeth.	–	6
–	Ornamentation of penial setae as fine sculpturing.	–	7
6.	Male pores on large papillae of characteristic outline.	–	*P. alatus*
–	Male pores on small papillae.	–	*P. sikkimensis*
7.	Last pair of hearts in XII.	–	8
–	Last pair of hearts in XIII.	–	*P. pallidus*
8.	Male pores on small papillae which are conjoined on the middle line.	–	*P. gravelyi*
–	Male pores in or by the side of depression not on papillae.	–	9
9.	Male pores on the sides of a shallow depression.	–	*P. inornatus*
–	Male pores in a depression which is surrounded by a thick lip.	–	*P. pincerna*
10.	Testis sacs present.	–	11
–	Testis and funnels free.	–	12
11.	Male pores $\frac{1}{5}$ of body circumference apart, on small papillae.	–	*P. himalayanus*
–	Male pores near together, in line with *B* or *C*, on papillae delimited by a common groove in front or behind.	–	*P. pokhrianus*
12.	Setae on dorsal surface in anterior third of body larger and set more widely than behind.	–	*P. heterochaetus*
–	No such difference as above.	–	13
13.	Spermathecal pores large slits, widely apart.	–	*P. nanus*
–	Spermathecal pores small slits, in line with *C*.	–	*P. rimatus*
14.	Penial setae present.	–	*P. excavatus*
–	Penial setae absent.	–	15
15.	Clitellum extending over more than 13 segments.	–	*P. annaldalei*
–	Clitellum extending over fewer than 13 segments.	–	16
16.	Last pair of heart in XII.	–	*P. pulvinatus*
–	Last pair of hearts in XIII.	–	*P. macintoshi*

25. ***Perionyx alatus*** Stephenson

1920. *Perionyx alatus* Stephenson, *Mem. Indian Mus.*, **7** : 212. (Type loc. Sitong Ridge, Darjeeling *Dist.*, W. Bengal; types in Zoological Survey of India, Calcutta.)

1923. *Perionyx alatus* : Stephenson. *Fauna Brit. India. Oligochaeta* : 323.

Diagnosis : Length 84 mm; diameter 3 mm. Segments 123. Colour dusky purple dorsally, pale ventrally. Prostomium epilobic, tongue open. Clitellum XIII - $^{1}/_{3}$ XVII. Setae 50 on V, 55 on IX, *ca.* 54 on XII, 50 on XIX and *ca.* 52 in middle of body. Genital papillae one pair, on XVIII, large, transversely elongated, joined in the middle line by a narrow neck, with crenulated margins; the conjoined papillae surrounded by a deep groove. First dorsal pore at 4/5. Spermathecal pores 2 pairs in line with setal interval *D E*, in 6/7 and 7/8. Female pore single, mid-ventral, on XIV. Male pores as transverse grooves in the broader, inner part of the papillae.

Gizzard cylindrical, in V; intestinal origin in XX. Last pair of hearts in XIII. Nephridia end all in the same line. Holandric; testis sacs in X and XI; seminal vesicles in XI and XII. Prostates large in XVII-XIX; duct irregularly twisted. Penial setae 1 mm long and 20 μ thick; shaft almost straight but curved like hockey-stick at the proximal end; tip bluntly pointed, ornamentation of minute irregularly scattered spines or teeth. Quadrithecal; the posterior pair larger; ampulla sac-like; duct stout, shorter than ampulla, separated from the ampulla by a constriction, the swollen upper part of the duct corresponds to the diverticulum, but there is no definite seminal chambers.

Distribution : INDIA : West Bengal - Darjeeling district.

Remarks : This species is endemic to West Bengal.

26. ***Perionyx annandalei*** (Michaelsen)

1907 *Perionychella annandalei* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 154. (Type loc. Kurseong, Darjeeling *Dist.*, W. Bengal, India, type in Zoological Survey of India, Calcutta.)

1910. *Perionyx annandalei* : Michaelsen, *Abh. Geb. Naturw. Hamburg*, **19** : 61.

1923. *Perionyx annandalei* : Stephenson, *Fauna Brit. India. Oligochaeta* : 324.

1960. *Perionyx annandalei* : Gates, *Bull. Mus. Comp. Zool. Harvard*, **123** (6) : 216.

Diagnosis : Length 160-280 mm; diameter 6-10 mm. Segments 170-215. Colour dark violet-blue dorsally, reddish gray ventrally. Prostomium procpilobic or epilobic 1/2. Clitellum XII-XXIV, ring-shaped. Setae in the anterior part of the body very small, more closed ventrally. 85 on X, 70 on XIX. First dorsal pore at 6/7. Spermathecal pore 2 pairs, in 7/8 and 8/9, near the middle line. Female pore single mid-ventral on XIV. Male area depressed or elevated, occupying the whole length of XVIII, the area elevated to form a ridge in the setal zone; male pores in the lateral parts of the area in the setal zone, a few setae on the ridge between male pores.

Gizzard moderately large, in VI; calciferous glands lacking. Holandric; male funnels apparently free in X and XI; seminal vesicles in XI and XII or XI, XII and XIII, compact and grape-like. Prostates occupying XVIII and XIX; duct short and thick. No penial setae. Quadrithecal; ampulla sac-like or irregular; duct half as long as ampulla; seminal chambers, two or three, small knob-like or papilla-like, on duct.

Distribution : INDIA : West Bengal Darjeeling district; Meghalaya.

Remarks : This species is endemic to India.

27. *Perionyx excavatus* Perrier

1872. *Perionyx excavatus* Perrier, *Nouv. Arch. Mus. Hist. nat. Paris*, **8** : 126. (Type loc.- Saigon, Vietnam; types in Museum National d' Histoire Naturelle, Paris.)

1987. *Perionyx excavatus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. **92** : 13.

Material : (1) Bankura *Dist.* 15 exs., Jayrambati, 2.iii.1985; 4 exs., Sonamukhi, 5.iii.1985; Coll. A. Chatterjee. (2) Burdwan *Dist.* 31 exs., Burdwan town, 26.ii.1985; 19 exs., Panagarh and 20 exs., Andal, 7.iii.1985; coll. A. Chatterjee. (3) Calcutta - 12 exs., Paik Para, 10.viii.1967; 12 exs., Park Circus Maidan, 30.iv.1971; 6 exs., Calcutta Maidan, 21.vii.1978; 2 exs., Chetla Park, 29.viii.1978; 10 exs., Ultadanga, 22.i.1979; Coll. K. R. Halder. (4) Coochbehar *Dist.* - 4 exs., Dinhata, 16.iv.1987; 23 exs., Mathabhanga, 16.iv.1987; 4 exs., Toofanganj, 18.iv.1987; Coll. K. R. Halder. (5) Hooghly *Dist.* 10 exs., Tribeni and 40 exs., Chinsura, 24.ii.1985; Coll. A. Chatterje. (6) Howrah *Dist.* 2 exs., Amta, 6.iv.1986; 1 ex., Shyampur, 7.iv.1986; Coll. K. R. Halder. (7) Jalpaiguri *Dist.* 8 exs., Jalpaiguri town, 9.iv.1987; 9 exs., Lataguri (Duars), 11.iv.1987; 1 ex., Hasimara (Duars), 12.iv.1987; 1 ex., Alipurduar (Duars), 17.iv.1987; Coll. K. R. Halder. (8) Malda *Dist.* 14 exs., Gour, 25 exs., Piasbari and 22 exs., Baiki, 16.iii.1984; 1 ex., Malda town, 18.iii.1984; Coll. A. K. Das. (9) Midnapur *Dist.* 1 ex., Contai, 25.iii.1986; 1 ex., Midnapur town, 26.iii.1986; 1 ex., Garbeta, 27.iii.1986; 1 ex., Gopiballavpur, 30.iii.1986; Coll. K. R. Halder. (10) Murshidabad *Dist.* 14 exs., Sagardighi and 25 exs., Kandi, 11.iii.1985; 11 exs., Jalangi, 12.iii.1985; Coll. A. Chatterjee. (11) Purulia *Dist.* - 41 exs., Purulia town, 1.iv.1986; 2 exs., Manbajar, 2.iv.1986; Coll. K. R. Halder; (12) 24-Parganas (North) - 9 exs., Barrackpore, 20.ii.1979, Coll. G. C. Ghosh; 10 exs., Dakshineswar, 6.x.1980, Coll. K. R. Halder. 30 exs., Sodepur; 1.iii.1985, Coll A. Chatterjee. (13) 24-Parganas (South) 1 ex., Kamdohari, 22.viii.1979; 3 exs., Tentulberia, 18.viii.1980; Coll. K. R. Halder. (14) West Dinajpur *Dist.* - 27 exs. Karandighi, 6.iv.1987; 10 exs., Raiganj, 7.iv.1987; Coll. K. R. Halder.

Diagnosis : Length 30-180 mm; diameter 3-7 mm. Segments 123-178. Colour deep purple to reddish-brown dorsally, pale ventrally. Prostomium epilobic, tongue open. Clitellum XIII-XVII. Setae 56 on IX, 46-52 on XX, 4-6 between spermathecal pores. Nephropores inconspicuous, in one rather irregular longitudinal rank on each side near mL. First dorsal pore at any of 2/3-5/6. Spermathecal pores 2 pairs, near mid-ventral line, in 7/8 and 8/9. Female pore on XIV. Male pores in small transverse protuberances within a common field, each protuberance containing apertures of 4-9 penisetal follicles.

Septa all present from 4/5. Gizzard absent or rudimentary in V; oesophagus widened and moniliform in XIII and there with calciferous ridges, its inner wall in IX-XIV; intestinal origin in XV or XVI. Last pair of hearts in XII. Holandric, testes free in X and XI; seminal vesicles in XI and XII. Prostates in XVIII; ducts straight. Penial setae 0.60-0.69 mm long, 15-25 μ thick, ornamentation of 6-16 circles of triangular spines ectally, tip bluntly rounded or finely pointed or flattened and truncate. Quadrithecal; ampulla large; duct short and stout, often with intramural seminal chambers of various sizes located near ental end of duct.

Habitats : Manure and compost heaps. Under logs, bricks, rocks at edge of ponds, canals, swamps. Under barks of standing and fallen trees. Debris in axils of plantain leaves and in forks of trees. Leaves of aquatic plants. Soil near water courses. Soil saturated with water from bathrooms, cookhouses. Dhobi compound. Black earth. Paddy field.

Castings : *Castings* are deposited on soil surface in the form of short threads or rods.

Economic Importance : This species may be used as waste conditioner. These worms may be cultured for utilization of animal protein in poultry and fish feed.

Distribution : INDIA : West Bengal Bankura, Burdwan, Calcutta, Coochbehar, Darjeeling, Hooghly, Howrah, Jalpaiguri, Malda, Midnapur, Murshidabad, Purulia, 24-Parganas (North), 24-Parganas (South) and West Dinajpur districts; Andaman Isladns; Arunachal Pradesh; Assam; Himachal Pradesh; Maharashtra; Manipur; Orissa; Sikkim; Tamil Nadu; Uttar Pradesh. *Outside India* : Madagascar and its adjacent islands; Sri Lanka, Burma, Thailand, Malay Peninsula, Indonesia, Philippines, Taiwan; West Indies.

Remarks : This species originated from the Himalayas is widely distributed throughout India. In West Bengal it was reported to occur from Calcutta, Darjeeling and Howrah districts. Now it is recorded here from other districts excepting Birbhum and Nadia.

28. ***Perionyx gravelyi*** Stephenson

1917. *Perionyx gravelyi* Stephenson, *Rec. Indian Mus.*, **13** : 378. (Type loc. - Pashok, Darjeeling *Dist.*, W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1981. *Perionyx gravelyi* : Julka, *Rec. zool. Surv. India, Occ. Paper* No. 26 : 22.

Diagnosis : Length 38-68 mm; diameter 1-2 mm. Segments 77-115. Colour light purple with darker median stripe dorsally, pale ventrally. Prostomium epilobic, tongue open. Clitellum XIII-XVII. Setae 23-25 on II, 26-29 on III, 30-33 on VIII, 30-39 on XII, 28-32 on XX. First dorsal pore at 6/7. Nephropores inconspicuous in one irregular rank on each side of the body and near mL. Spermathecal pores 2 pairs, small transverse slits, in line with *B*, *C* or *D*, in 6/7-7/8. Female pore single, mid-ventral, on XIV. Male pores small, transverse slits, slightly post-setal, in *A B*.

Gizzard small, in V; intestinal origin in XVI or XVII. Last pair of hearts in XII. Nephridia avesiculate; ducts entering the parietes in an irregular longitudinal rank on each side. Holandric; testes and male funnels free; seminal vesicles in XI and XII. Prostates squarish, in XVIII; duct slightly muscular, straight, narrowed before entering the parietes. Penial setae 0.437-0.515 mm long and 9-11 μ thick just below the tip; shaft slightly bowed near tip, tip poined; ornamentation of 8-10 rows of fine pointed spines near the tip. Quadritheca; ampulla spherical; duct about as long as ampulla, narrowed towards parietes; diverticulum represented by a transverse ridge around ental end of duct, consisting of small iridescent seminal chambers. Ovaries fan-shaped with several egg-strings.

Distribution : INDIA : West Bengal Darjeeling district; Arunachal Pradesh.

Remarks : This species is endemic to India.

29. ***Perionyx heterochaetus*** (Stephenson)

1917. *Perionyx aborensis* var. *heterochaetus* Stephenson, *Rec. Indian Mus.*, **13** : 379. (Type loc. Pashok, Darjeeling *Dist.*, W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1923. *Perionyx heterochaetus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 335.

Diagnosis : Length 60 mm; diameter 2.5 mm. Segments 100. Colour dark purple to brownish with darker median stripe dorsally, pale ventrally. Prostomium epilobic, tongue not closed behind. Clitellum XIII-XVII. Setae 30 on V, 31 on VIII, 31 on XII, 33 on XIX, *ca.* 50 in the middle of the body. First dorsal pore at 5/6. Spermathecal pores 2 pairs, in 6/7 and 7/8, in line with E, $\frac{1}{6}$ C apart. Female pore single, mid-ventral, on XIV. Male area a whitish patch occupying the whole length of XVIII, the lateral margins rather swollen, the centre rather concave; male pores as transverse grooves in setal zone, 2/15 C apart.

Gizzard vestigial, in V; oesophagus swollen in XI-XIII; intestinal origin behind the prostates. Last pair of hearts in XII. Holandric; testes and male funnels free, in X and XI; seminal vesicles in XI and XII. Prostates squarish, in XVIII; duct slightly muscular, curled and twisted. Penial setae absent. Quadrithecal; ampulla irregular in shape, about as broad as long; duct $\frac{2}{3}$ as long as ampulla; diverticulum single, knob-like, sessile on ental end of duct; seminal chambers few inconspicuous.

Distribution : INDIA : West Bengal - Darjeeling district.

Remarks : This species is endemic to West Bengal.

30. ***Perionyx himalayanus*** Michaelsen

1917. *Perionyx himalayanus* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 158. (type loc. Sandakphu, Darjeeling *Dist.*, W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1923. *Perionyx himalayanus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 336.

Diagnosis : Length 56-62 mm; diameter 2.5-3 mm. Segments 86-95. Colour grey with slight reddish tint dorsally in front, pale ventrally. Prostomium epilobic, tongue not cut off from behind. Clitellum XIII-XVII. Setae moderately large, 40 on VIII, 42 on XXI. First dorsal pore in region 6/7-8/9. Nephropores in one longitudinal rank on each side of the body and near mL. Spermathecal pores 2 pairs, in 6/7 and 7/8, *ca.* $\frac{1}{8}$ C apart. Female pore single, mid-ventral, on XIV. Male pores rather post setal, *ca.* $\frac{1}{5}$ C apart, on small transversely oval papillae.

Gizzard vestigial, in VI (?); no calciferous glands. Nephridia end apparently in the same line. Holandric; male funnels apparently enclosed in unpaired sacs, in X and XI; seminal vesicles 3 pairs, in X-XII. Prostates, smalll, compact, irregularly glandular, in XVIII; duct irregularly bent or coiled. Penial setae lacking. Quadrithecal; ampulla large, ovoid, obliquely placed; duct half as long as ampulla, narrowed at ectal end; diverticula two, very small, sessile on ental end of duct, nearly opposite each other.

Distribution : INDIA : West Bengal - Darjeeling district.

Remarks : This species is endemic to West Bengal.

31. ***Perionyx inornatus*** Stephenson

1916. *Perionyx inornatus* Stephenson, *Rec. Indian Mus.*, **12** : 320. (Type loc. Sandakphu, Darjeeling *Dist.*, W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1923. *Perionyx inornatus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 337.

Diagnosis : Length 96 mm; diameter 5 mm. Segments 124. Colour yellowish brown dorsally, pale ventrally. Prostomium apparently proepilobic. Setae more closed ventrally than dorsally, 56 on V, 70 on IX, 75 on XII, 83 on XIX. First dorsal pore at 6/7. Spermathecal pores 2 pairs, in 6/7 and 7/8, the distance between them is same as that between the male pores. Female pore single, mid-ventral, on XIV. Male pores in *D E*, on the sides of a shallow transversely oval depression with shelving sides, in transverse extent equal to $\frac{1}{9}$C.

Gizzard soft, squarish, in V; intestinal origin in XIV. Last pair of hearts in XII. Holandric, testes and male funnels free, in X and XI; seminal vesicles in XI and XII. Prostates small, in XVIII; duct

soft, straight. Penial setae 0.92 mm long and 30 μ thick at the middle; shaft straight, tip bluntly pointed; ornamentation of 14 irregular and interrupted rings of very minute sculpturings.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

32. *Perionyx jorpokriensis* Julka

1975. *Perionyx jorpokriensis* Julka, *Mitt. zool. Mus. Berlin*, **51** (1) : 21. (Type loc. - Jorpokri, Darjeeling *Dist.*, W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1981. *Perionyx jorpokriensis* : Soota & Halder, *Rec. zool. Surv. India*, **79** : 233.

Diagnosis : Length 58-62 mm; diameter 3 mm. Segments 99-106. Colour red though appearing dark blue dorsally. Prostomium epilobic, tongue open. Clitellum XIII-XVII, intersegmental furrows lightly marked, dorsal pores occluded, setae retained. Setae more closely set ventrally, 28-35 on II, 45-52 on VIII, 42-45 on XII, 40-43 on XX. First dorsal pore at 4/5. Nephropores in a single irregular rank near mL. Spermathecal pores 3 pairs in 6/7-8/9, transverse slits with protuberant and anular lips, in line with F or G. Female pore single, presetal, mid-ventral, on XIV. Male field a little depressed rectangular area, slightly raised along mV, reaching anteriorly to 17/18, posteriorly to 18/19, laterally to *F G* or *G H*; male pores postsetal, on the centre of two circular porophores, in line with *D* or *E*.

Gizzard small, in V; oesophagus widened and bead-shaped, in XIII. Last pair of hearts in XII. Nephridia, avesiculate; ducts long and slender, passing into parietes in a slightly irregular rank on each side. Holandric; testes and male funnels free; seminal vesicles in XI and XII. Prostates squarish, in XVIII; duct slender, straight, forming a loop before entering parietes. Penial setae absent. Sexthecal; spermathecae medium sized; ampulla globular; duct muscular, a little shorter than ampulla, widens before entering parietes; a distinct ridge with two or three iridescent lobes present on the ental end of duct.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

33. *Perionyx macintoshi* Beddard

1883. *Perionyx "m'intoshi"* Beddard, *Ann. Mag. nat. Hist.*, (ser. 5), **12** : 217. (Type loc. 'Akhyab' Burma; typus amissus.)

1975. *Perionyx macintoshi* : Julka & Halder, *Proc. zool. Soc. Calcutta*, **28** : 15.

Diagnosis : Length 214-375 mm; diameter 9-12.5 mm. Segments 188-261. Colour light blue dorsally, reddish ventrally. Prostomium epilobic, tongue open. Clitellum XII-XIII (?). Setae more closely spaced ventrally than dorsally, 62-63 on II, 107-126 on VIII, 106-114 on XII, 74-78 on XX, 68-104 on XXI. First dorsal pore at 5/6 or 6/7. Nephropores 4 pairs (2 dorsal and 2 ventral) on preclitellar segments and 8 pores (2 dorsal, 2 on either side and 2 ventral) on post clitellar segments. Spermathecal pores 2 pairs, large transverse slits, in 7/8 and 8/9, in line with *F* or *G*. Male field *ca.*18 intersetal interval wide, slightly tumescent, dislocating 17/18 and 18/19; male pores minute, in a transverse groove, in front of18/19, in line with *D*.

Gizzard large, in VI; intestinal origin in XIX. Last pair of hearts in XIII. Nephridia meromeganephric. Holandric; seminal vesicles in XI and XII, in each segment united dorsally. Prostates in XVIII; duct *ca.* 2 mm long, slender, straight, widened at ectal end, with slight muscular

sheen and slightly looped; sperm duct passes into ental end of prostatic duct. Penial setae absent. Quadrithecal; ampulla anteroposteriorly compressed, ovoidal; duct narrow.

Distribution : INDIA : West Bengal Darjeeling, Howrah (?) districts; Arunachal Pradesh; Meghalaya. *Outside India* : Nepal, Bhutan, Burma.

Remarks : This species is endemic to Oriental region.

34. ***Perionyx nanus*** Stephenson

1917. *Perionyx nanus* Stephenson, *Rec. Indian Mus.*, **13** : 381. (Type loc. Pashok, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1923. *Perionyx nanus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 346.

Diagnosis : Length 53 mm; diameter 1.5 mm. Segments 100. Colour brownish purple dorsally, pale ventrally. Prostomium epilobic $\frac{1}{2}$, tongue open behind. Clitellum XIV-XVII. Setae *ca.*36 on IX and XII, 35 on XIX and 34 on the middle of the body. First dorsal pore at 5/6. Spermathecal pores two pairs, in 6/7 and 7/8, widely apart. Female pore mid-ventral, on XIV. Male pores in a transverse groove, in line with *G* or *G H*, $\frac{1}{4}$ C apart, slightly behind the setal zone; each pore surrounded by a whitish thickened patch which takes up the whole ventral surface of XVIII.

Gizzard vestigial, in V; oesophagus widened in IX; intestinal origin in XIX. Last pair of hearts in XII. Holandric; testes and male funnels free, in X and XI; seminal vesicles in XI and XII. Prostates in XVII-XIX; duct thin, soft and bent. Peninal setae absent. Quadrithecal; ampulla pear-shaped; duct broad and soft; unidiverticulate; diverticulum wart-like, sessile at the junction of ampulla and duct.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

35. ***Perionyx pallidus*** Stephenson

1917. *Perionyx pallidus* Stephenson, *Rec. Indian Mus.*, **13** : 376. (Type loc. Kalimpong, Darjeeling Dist., W. Bengal, India types in Zoological Survey of India, Calcutta.)

1923. *Perionyx pallidus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 347.

Diagnosis : Length 80 mm; diameter 3.25 mm. Segments 118. Colour pale, a purple tinge anteriorly on the dorsal side and median purple stripe throughout. Prostomium epilobic $\frac{1}{2}$ Clitellum XIII-XVI. Setae more closely set ventrally than dorsally, 53 on V, 72 on IX, 64 on XII, 52 on XIX and 70 on the middle of the body. First dorsal pore at 4/5. Spermathecal pores two pairs, small slit-like, in 6/7 and 7/8, $\frac{1}{10}$ C apart. Female pore single, mid-ventral on XIV. Male pores in a transverse groove, $\frac{1}{10}$ C apart.

Gizzard vestigial, in VI; intestinal origin in XVII. Last pair of hearts in XIII. Nephridial ducts terminate in the same line. Holandric, testes and male funnels free in X and XI; seminal vesicles in XI and XII, in each segment united dorsally. Prostates small; duct straight. Penial setae 0.175 mm long, 17 μ thick; ornamentation of a few fine sculpturing on the distal half. Quadrithecal; ampulla sac-like; duct short; diverticulum lacking.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

36. ***Perionyx pincerna*** Stephenson

1916. *Perionyx pincerna* Stephenson, *Rec. Indian Mus.*, **12** : 319. (Type loc. Near Ghoom, Darjeeling Dist., W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1923. *Perionyx pincerna* : Stephenson, *Fauna Brit. India, Oligochaeta* : 348.

Diagnosis : Length 45 mm; diameter 3 mm. Segments 88. Colour light brownish-grey. Prostomium epilobic $\frac{1}{4}$, tongue cut off from behind. Setae more closely set ventrally that dorsally, 47 on V, 57 on IX, 60 on XII, 50 on XX. First dorsal pore at 4/5. Spermathecal pores 2 pairs, small slits, near middle line, in 6/7 and 7/8, *ca.* $\frac{1}{10}$ C apart. Female pore single, mid-ventral on XIV. Male field as a transversely oval depression on XVIII, surrounded by a thick whitish lip dislocating anteriorly 17/18 and posteriorly 18/19; male pores in *C* or *D*.

Gizzard in V; intestinal origin in XVIII. Last pair of hearts in XII. Nephridia opening in the same line. Holandric; testes and male funnels free in X and XI; seminal vesicles in XI and XII. Prostates small, lobed, in XVIII; duct soft, narrow. Penial setae 0.63 mm. long, 24 μ thick at the middle; shaft simple, straight excepting a bend at the proximal end; tip slightly curved and blunt; ornamentation of about a dozen irregular and much broken circles of faint sculpturings appearing as fine points near the tip. Quadrithecal; ampulla oval sac, sessile on parietes; no diverticulum.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

37. ***Perionyx pokhrianus*** Stephenson

1920. *Perionyx pokhrianus* Stephenson, *Mem. Indian Mus.*, **7** : 208. (Type loc. Jorpokri, Darjeeling Dist., W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1923. *Perionyx pokhrianus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 349.

Diagnosis : Length 65 mm; diameter 3 mm. Segments 96. Colour pale violet dorsally, unpigmented ventrally. Prostomium epilobic ½, tongue open behind. Clitellum XIII-XVI. Setae slightly closer set ventrally than dorsally, 50 on V, 58 on IX, 54 on XII, 48 on XIX and 44 in the middle of the body. Genital papillae one pair, mid-ventral, touching each other, taking up greater part of the length of XVIII, bounded in front and behind by common transverse groove. First dorsal pore at 4/5. Spermathecal pores 2 pairs, in 6/7 and 7/8, nearly in line with *B*. Male pores near the middle line, nearer to the posterior limit of the papillae.

Gizzard large, barrel-shaped, in V; intestinal origin in XVIII. Last pair of hearts in XIII. Nephridia apparently terminate in the same line. Holandric; testis sacs in X and XI; seminal vesicles in XI and XII. Prostates large, much indented, in XVII-XIX; duct soft, short, thin irregularly twisted, somewhat dilated at ectal end. Penial setae absent. Quadrithecal; ampulla irregularly lobed; duct short; diverticula represented by 3 small swellings on the anterior half of duct.

Distribution : INDIA : West Bengal - Darjeeling district.

Remarks : This species is endemic to West Bengal.

37a. ***Perionyx pokhrianus*** var. ***affinis*** Stephenson

1920. *Perionyx pokhrianus* var. *affinis* Stephenson, *Mem. Indian. Mus.*, **7** : 210. (Type loc. Sitong Ridge, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1923. *Perionyx pokhrianus* var. *affinis* : Stephenson, *Fauna Brit. India, Oligochaeta* 350.

Diagnosis : Length 55 mm; diameter 2.25 mm. Segments 105. Colour light slaty or purplish with darker median stripe dorsally, pale ventrally. Prostomium epilobic 2/3, tongue open behind. Clitellum XIII-XVI. Setae 38 on V, 44 on IX, 45 on XII, 37 on XIX, and 36 in the middle of the body. Genital papillae one pair on XVIII, bounded by grooves in front and behind, and separated by slight interval in the middle. Spermathecal pores 2 pairs, in 6/7 and 7/8, in line with *C D*. Female pore single, mid-ventral on XIV. Male field as a depression with sloping sides, on which are placed the genital papillae; male pores small transverse slits, on setal arc, on papillae, in line with *C*, *D* or *E*.

Gizzard in V; intestinal origin in XVIII. Last pair of hearts in XII. Nephridial ducts terminate at different levels, without regular alternation. Holandric; testis sacs in X and XI; seminal vesicles in XI and XII, in each segment united dorsally. Prostates large, in XVII-XIX; duct moderately long, bent, soft and rather thin entally, thicker and shining ectally. Penial setae absent. Quadrithecal; ampulla large irregularly lobed; duct stout, longer than ampulla; unidiverticulate; diverticulum as rounded knob with 2 seminal chambers, on ental end of duct.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

38. ***Perionyx pulvinatus*** Stephenson

1916. *Perionyx pulvinatus* Stephenson, *Rec. Indian Mus.*, **12** : 317. (Type loc. Near Ghoom, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1975. Perionyx pulvinatus : Julka, *Mitt. zool. Mus. Berlin*, **51** (1) : 22.

Diagnosis : Length 57-93 mm; diameter 3-3.5 mm. Segments 121-126. Colour deep brown with darker median stripe dorsally, pale ventrally. Prostomium epilobic, tongue closed. Clitellum XI, XII-XIX, inter segmental furrows indistinct, setae retained, dorsal pores occluded. Setae 44-46 on II, 52 on III, 66-68 on VIII, 40-42 on XX. First dorsal pore at 4/5. Nephropores in a single irregular rank on dorsum. Spermathecal pores 2 pairs, in 7/8 and 8/9, large transverse slits, in line with *J-K*. Female pore single, mid-ventral, presetal, on XIV. Male field a rectangular depression with rounded corners, on XVIII, dislocating anteriorly 17/18 and posteriorly 18/19; male pores large, slightly postsetal, on longitudinal oval-shaped cushions.

Gizzard small, in V; oesophagus widened, in XIII; intestinal origin in XV; typhlosole lacking. Last pair of hearts in XII. Nephridia avesiculate, duct slender and long. Holandric; testes and male funnels free; seminal vesicles in XI and XII. Prostates large, lobed, in XVIII-XIX; duct muscular, nearly straight. Penial setae absent. Quadrithecal; ampulla irregularly shaped, roughly pyramidal, with nodular surface; duct as long and almost as wide as ampulla; no diverticulum.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

39. ***Perionyx rimatus*** Stephenson

1920. Perionyx rimatus Stephenson, *Mem. Indian. Mus.*, 7 : 206. (Type loc.- Jorpokri, darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1975. Perionyx rimatus : Julka, Mitt. zool. Mus. Berlin, 51(1) : 23.

Diagnosis : Length 75-80 mm; diameter 4-4.5 mm. Segments 105-107. Colour light purple dorsally in the anterior part, pale excepting a median stripe in the posterior half; pale ventrally.

Prostomium epilobie ½. Clitellum XIII-XVI, setae retained. Setae smaller and more closely set ventrally, 42-59 on V, 63 on IX,64-65 on XII, 56 on XIX, 56 in the middle of the body. First dorsal pore at 4/5. Nephropores in a single irregular rank near mL. Spermathecal pores 2 pairs, in 6/7 and 7/8, small slits, in line with *C*. Female pore single, presetal, mid-ventral on XIV. Male field transversely elliptical, a glandular dermal thickening, dislocating anteriorly 17/18 and posteriorly 18/19, extending laterally into *I J*; male pores in a deep transverse furrow across the middle of XVIII.

Gizzard small, in V; oesophagus widened in XIII-XIV; intestinal origin behind the prostates. Last pair of hearts in XII. Nephridia avesiculate, duct slender and straight. Holandirc; testes and male funnels free; seminal vesicles in XI and XII; sperm duct passes through the anterior lobe of prostate to open ental end of prostatic duct. Prostates large, in XVII-XVIII; duct narrow at ental end. Penial setae absent. Quadrithecal; ampulla a large irregular sac; duct stout, a little shorter than ampulla; diverticula represented by iridescent swellings near the junction of ampulla and duct.

Distribution : INDIA : West Bengal - Darjeeling district.

Remarks : This species is endemic to West Bengal.

40. ***Perionyx sikkimensis*** (Michaelsen)

1907. *Perionychella sikkimensis* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 156. (Type loc.- Sandakphu, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1910. *Perionyx sikkimensis* : Michaelsen, *Abh. Geb. Naturw. Hamburg*, **19** : 60.

1923. *Perionyx sikkimensis* : Stephenson, *Fauna Brit. India, Oligochaeta* : 358.

Diagnosis : Length ca.120 mm; diameter 4-5 mm. Segments 109. Colour violet-grey dorsally, darker anteriorly; grey ventrally. Prostomium epilobic. Clitellum XIII-XVII. Setae more closely set ventrally than dorsally, 60 on VII, 64 on X, 78 on XIII, 72 on XXV. First dorsal pore at 6/7 or 7/8. Spermathecal pores 2 pairs, in 6/7 and 7/8, ca. $\frac{1}{7}$ C apart. Male pores on small papillae, *ca.* $\frac{1}{8}$ C apart.

Gizzard small, cylindrical, in VI (?). Last pair of hearts in XII (?). Holandric; testes and male funnels free; seminal vesicles in XI and XII, meeting dorsally and embracing oesophagus. Prostates small and compact, in XVIII; duct fairly thick and nearly straight, about as long as glandular part. Penial setae *ca.*0.9 mm long, 28 μ thick; shaft almost straight, slightly bent at distal end; tip sharply pointed; ornamentation of irregular, sometimes oblique, transverse rows of triangular teeth at distal part.

Distribution : INDIA : West Bengal Darjeeling district.

Remarks : This species is endemic to West Bengal.

41. ***Perionyx variegatus*** (Michaelsen)

1907. *Perionychella variegata* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 158. (Type loc.- Phallut, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta.)

1928. *Perionyx variegatus* : Stephenson, *Fauna Brit. India, Oligochaeta* : 362.

1981. *Perionyx variegatus* : Soota & Halder, *Rec. zool. Surv. India*, **79** : 233.

Diagnosis : Length 21-24 mm; diameter 2-2.75 mm. Segments 49-63. Colour primarily yellowish grey; dorsum speckled with dark violet-grey spots; a dark longitudinal stripe dorsally. Prostomium epilobic, tongue open. Clitellum XIII-XVII. Setae moderately large, *ca.* 45-60 in the

middle of the body. First dorsal pore at 5/6. Spermathecal pores 3 pairs, in 6/7-8/9, about in line with *H.* Male pores on prominent circular papillae, ca.$\frac{1}{7}$ C apart, about in line with E, 8-9 setae intervene between the pores; the papillae take up almost whole length of XVIII.

Gizzard small, in V; intestinal origin in XIV. Last pair of hearts in XII. Nephridia with a long terminal vesicle. Holandric; male funnels free; seminal vesicles 3 pairs, large, in X, XI and XII. Prostates kidney-shaped, consisting of a much branched glandular tube; duct long, slightly bent. Penial setae absent. Sexthecal; ampulla globular; duct as long as ampulla; no diverticulum.

Distribution : INDIA : West Bengal - Darjeeling district; Sikkim.

Remarks : This species is endemic to India.

Genus 14. ***Polypheretima*** Michaelsen

1934. *Pheretima (Polypheretima)* (part) Michaelsen. *Quart. J. microsc. Sci.*, **77** : 15. (Type species, *Perichaeta stelleri* Michaelsen, 1892.)

1979. *Polypheretima* : Easton, *Bull. Br. Mus. nat. Hist. (Zool.)*, **35** (1) : 28.

Diagnosis : Body cylindrical. Creeping sole absent. Setae perichaetine, never excessively crowded ventrally. Clitellum annular, in XIV-XVI. Crescentic genital markings absent. First dorsal pore between 5/6 and 12/13. Spermathecal pores small. Male pores on circular porophores which may be within copulatory pouches. Oesophageal gizzard single, in VIII; intestinal gizzards and caeca absent. Usually holandric, occasionally metandric; spermathecae diverticulate; diverticulum simple and usually ectal in origin; ovaries in XIII.

Distribution : Endemic species have been recorded throughout the *Pheretima* group domain except from New Britain, the Solomon Islands, New Hebrides, Caroline Islands and Marianas.

Remarks : The genus is represented in West Bengal by a single species *P. elongata.*

42. ***Polypheretima elongata*** (Perrier)

1872. *Perichaeta elongata* Perrier, *Nouv. Arch. Mus. Hist. nat. Paris*, **8** : 124. (Type loc.- Peru; types in Museum National d'Histoire Naturelle, Paris.)

1875. *Perichaeta biserialis* Perrier, *C. r. hebd. Seanc. Acad. Sci. Paris (D)*, **81** : 1044.

1900. *Pheretima elongata* + *P. biserialis* : Michaelsen, *Das Tierreich*, **10** : 265.

1976. *Metapheretima elongata* : Easton, *Bull. Br. Mus. nat. Hist. (Zool.)*, **30** : 40.

1979. *Polypheretima elongata* : Easton, *Bull. Br. Mus. nat. Hist. (Zool.)*, **35** : 53.

Material : (1) Calcutta 4 exs., Calcutta Maidan, 21.vii.1978, Coll. K. R. Halder. (2) 24-Parganas (South) 2 exs., Baradanagar near Raidighi, 5.iv.1964; 2 exs., Purba Sridharpur near Raidighi, 18.xii.1966; 1 ex., Kurebhanga, 11.xi.1979; 5 exs., Tentulberia near Garia Rly. Station, 18.viii.1980; 2 exs., Balia near Garia Rly. Station, 6.vii.1987, Coll. K. R. Halder. 7 exs., Sagar Island, 31.vii.1974, Coll. A. Misra. 1 ex., Kakdwip, 11.ix.1979; 11 exs., Sagar Island, 9.vii.1960; Coll. B. P. Halder.

Diagnosis : Length 40-360 mm; diameter 1.5-10 mm. Segments 136-297. Prostomium rudimentary or lacking. Setae 67-104 on VIII, 55-75 on XX, 13-17 between spermathecal pores and 7-15 between male pores. Genital markings transversely elliptical, paired, presetal on XIX and successive segments in line with or slightly median to male pores, occasionally on VI, VII and XVII. First dorsal pore at 12/13. Spermathecal pores, when present, minute and superficial. Female

pore single, mid-ventral, on XIV. Male pores paired, on squat penes within shallow copulatory pouches, *ca.* $\frac{1}{4}$ C apart, on XVIII.

Septa 8/9-9/10 absent. Intestinal origin in XV. Last pair of hearts in XII. Holandric; testis sacs large, unpaired and annular in X and XI; seminal vesicles in XI and XII. Prostates in XVI-XXI; ducts 2-6 mm long and looped. Polythecal; small spermathecal batteries in 5/6 and 6/7 or 5/6 or 6/7 only or absent; unidiverticulate; diverticulum arises from ectal end of duct, with longer stalk and ovoidal to ellipsoidal seminal chamber. Genital marking glands sessile on parietes.

Habitats : Under compost and manure heaps, rubbish. Soils : red, black cotton, black taro.

Castings : *Castings* are found on soil surface in the form of cords of about 2 mm thickness and 20-24 mm length or in irregular piles 10-20 mm high and 20-35 mm wide.

Economic Importance In Karnataka this species was found to have rendered the soil compact, hard and cloddy.

Distribution : INDIA : West Bengal Calcutta and 24-Parganas (South) districts; Andaman and Nicobar Islands; Andhra Pradesh; Karnataka; Madhya Pradesh; Maharashtra; Tamil Nadu. *Outside India* : Africa, Madagascar, Comoro Island; Pakistan; Sri Lanka, Bangla Desh, Burma, Thailand, Malay Peninsula, Indonesia, Philippines, Taiwan; Australia, Papua New Guinea, New Britain, New Caledonia, Caroline Islands, Ryuku Islands, Hawaii, Tahiti; West Indies, South America.

Remarks : The original home of this species is the region including Indonesia and Philippines. This species is very common in the Sundarban area of West Bengal.

Genus 15. ***Tonoscolex*** Gates

1933. *Tonoscolex* Gates, *Rec. Indian Mus.*, **35** : 484. (Type species, *Notoscolex birmanicus* Gates, 1927.)

1927. *Tonoscolex* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 224.

Diagnosis : Clitellum annular, setae retained. Spermathecal pores 2 pairs, in 6/7 and 7/8. Female pores on XIII.

Digestive system with a massive gizzard in VI, paired calciferous glands, an intestinal origin in XIV and a lamelliform typhlosole but without intestinal caeca and supra-intestinal glands. Meronephric. Biprostatic; prostates strap-shaped, extending through several segments; ducts short and joined entally by sperm ducts. Holandric; testes in IX-X. Quadrithecal; spermatheca unidiverticulate; diverticulum shorter than combined lengths of duct and ampulla. Ovaries in XII.

Distribution : India (West in the Himalayas to Darjeeling, Duars and eastern part of Coochbehar Dist., south in Assam to Khasi Hills), Burma.

Remarks : The genus is represented in West Bengal by 2 species *T. horai* and *T. monorchis*.

KEY TO SPECIES

Setal arrangement perichactine.	_	*T. horai*
Setal arrangement lumbricine.	_	*T. monorchis*

43. *Tonoscolex horai* (Stephenson)

1922. *Megascolex horai* Stephenson, *Rec. Indian Mus.*, **34** : 432. (Type loc. Cherrapunji, Meghalaya, India; type in Zoological Survey of India, Calcutta.)

1934. *Tonoscolex horai* : Gates, *ibid.*, **36** : 256.

1972. *Tonscolex horai* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 229.

Material : Coochbehar Dist. 28 exs., Toofanganj, 18.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 50-110 mm; diameter 2-2.5 mm. Segments 166-188. Prostomium epilobic, tongue open. Clitellum 12/13-16/17. Setae perichactin, *A A* and *Z Z* wide but usually *Z Z* > *A A*, 18-22 on VIII, 21-32 on XX. First dorsal pore at 10/11. Spermathecal pores 2 pairs, small transverse slits, at or close to *B*. Male pores at *B*, ca. $\frac{1}{5}$ C apart.

Calciferous glands in X, XI and XII. Last pair of hearts in XI. Seminal vesicles in VIII and XI. Prostates in XVII and XVIII; ducts slender but muscular and looped. Spermathecal ampulla small sac, sessile on body wall. Penial setae absent.

Habitats : Sandy loam soil in gardens and lawns.

Distribution : INDIA : West Bengal Coochbehar district; Meghalaya.

Remarks : This species is endemic to India. This is a rare species reported to occur only from its type locality Cherrapunji, Meghalaya. Now it is recorded here for the first time from West Bengal also.

44. *Tonoscolex monorchis* (Stephenson)

1916. *Megascolides "Oneilli"* var. *monorchis* Stephenson, *Rec. Indian Mus.*, **12** : 313. (Type loc. Darjeeling to Soom, West Bengal, India; type in Zoological Survey of India, Calcutta.)

1923 *Notoscolex oneili* var *monorchis* : Stephenson, *Fauna Br. India, Oligochaeta* : 214.

1972 *Tonoscolex monorchis* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 230.

Material : Jalpaiguri Dist. 1 ex., Jayanti (Buxa Tiger Reserve), 13.xii.1984, Coll. K. R. Halder.

Diagnosis : Length 115-160 mm; diameter 2-5 mm. Segments 188-270. Prostomium prolobic. Setae lumbricin, *A B* < *C D* < *B C* < *A A*, *D D* ca. = $\frac{2}{3}$ C. First dorsal pore at 9/10. Spermathecal pores 2 pairs, at *A*. Male pores minute, in *A B*.

Calciferous glands kidney shaped, in VIII-XII. Last pair of hearts in XII. Seminal vesicles in X and XI. Prostates in XIX; ducts considerably coiled. Spermathecal ducts almost confined to parietes; diverticulum digitiform.

Habitats : Soil in forest.

Distribution : INDIA : West Bengal Darjeeling and Jalpaiguri districts.

Remarks : This species is endemic to West Bengal. This is a rare species reported to occur only from its type locality in the Darjeeling district. Now it is recorded here from Jalpaiguri district also.

V. Family ALMIDAE

Diagnosis : Setae sigmoid in eithe lingitudinal rows, none penial. Dorsal pores absent. Gizzard lacking or if present oesophageal and in front of testis segments; extramural calciferous glands lacking. Holonephric. Prostates absent. Seminal vesicles trabeculate. Spermathecae adiverticulate, behind testis segments. Ovaries in XIII.

Distribution : Africa, Madagascar; India, Sri Lanka, Burma, Malay Peninsula, Malay Archipelago, Indonesia; Costa Rica, Colombia, Ecuador, eastern Brazil.

Remarks : The family is represented in West Bengal by a single genus *Glyphidrilus*.

Genus 16. *Glyphidrilus* Horst

1889. *Glyphidrilus* Horst, *Tijdschr. Nederlandsche Dierk. Ver.* 2, **2** : LXXVI. (Type species, *Glyphidrilus weberi* Horst, 1889.)

1972. *Glyphidrilus* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 234.

1987. *Glyphidrilus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 5.

Diagnosis : Prostomium zygolobic. Anus dorsal. Setae *D D* slightly larger than *A A*. Spermathecal pores at three or more intersegmental furrows. Male pores inconspicuous, ventral to the laterally protuberant ridges or "Wings" in clitellar segments. Digestive system with an oesophageal gizzard in region of VII-VIII, an intestinal origin behind XIV and a simple, lamelli form typhlosole but without calciferous glands, intestinal caeca and supra-intestinal glands. Nephridiopores at *B* lines, nephridia absent anterior to XII. Holandric; seminal vesicles 4 pairs in IX-XII. Polythecal.

Distribution : Tanjania; India, Sri Lanka. Burma, Malay Peninsula, Indonesia.

Remarks : The genus is represented in West Bengal by a single species *G. tuberosus*.

45. *Glyphidrilus tuberosus* Stephenson

1916. *Glyphidrilus tuberosus* Stephenson, *Rec. Indian Mus.*, **12** : 349. (Type loc. Cuttack, Orissa, India; types in Zoological Survey of India, Calcutta.)

1987. *Glyphidrilus tuberosus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 6.

Material : (1) Bankura Dist. - 16 exs., Shaltora, 19.xi.1968; 23 exs., Aral Bansi, 27.xi.1986; 1 ex., Joyrambati; 1.xii.1968; Coll. S. K. Mukhopadhyay. (2) Birbhum Dist. 4 exs., Nalhati, 27.ix.1983; 93 exs., in and around Sainthia, 28.ix.1983; 24 exs., Bolpur, 29.ix.1983; Coll. K. R. Halder. (3) Howrah Dist. - 1 ex., Shyampur, 7.iv.1986, Coll. K. R. Halder. (4) Midnapur Dist. - 9 exs., Belda and 17 exs., Contai, 25.iii.1986; 17 exs., in and around Midnapur town, 26.iii.1986; 14 exs., Garbeta, 27.iii.1986; 22 exs., Kolaghat, 29.iii.1986; Coll. K. R. Halder. (5) Nadia Dist. 58 exs., Plassy, 25.ix.1983, Coll. K. R. Halder. (6) Purulia Dist. 1 ex., Purulia town, 1.iv.1986; 2 exs., Manbajar, 2.iv.1986; 25 exs., Bagmundi, 3.iv.1986; 36 exs., Raghunathpur, 4.iv.1986; Coll. K. R. Halder. (7) West Dinajpur Dist. 4 exs., Bangar, 4.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 60-118 mm; diameter 2.5-3 mm. Segments 221. Clitellum annular, XIV, XV, XVI-XXVIII, XXIX; wings XX-XXIV. Genital markings small, circular to elliptical tubercles, post setal, usually arranged in 6 transverse ranks on a segment 2 in *A A*, 1 in *A B*, slightly lateral to *B* on X-XII, XIII; 1 median to *A*, 1 in *A B* and 1 lateral to *B* on XVI, XVII, XVIII-XIX, XXIV-XXVIII, XXX. Spermathecal pores minute in 13/14 and 14/15. Female pores paired, minute, slightly lateral to *B* lines, presetal, on XIV.

Gizzard apparently in VII; intestinal orgin in XV. Last pair of hearts in XI. Spermathecae small spherical sacs, 2-4 on each side in XIV and XV.

Habitats : Submerged soil with high organic matter. Muddy soil at the edge of ponds, canals, swamps. In low land crop field.

Castings : *Castings* are deposited on soil surface in the form of elongated threads arranged in small tower-like structures.

Distribution : INDIA : West Bengal - Bankura, Birbhum, Howrah, Jalpaiguri, Midnapur, Nadia, Purulia and West Dinajpur districts; Orissa; Tamil Nadu.

Remarks : This species is endemic to India and was reported to occur in West Bengal from Jalpaiguri district only. Now it is recorded here from seven other districts of West Bengal.

VI. Family MONILIGASTRAIDAE

Diagnosis : Setae sigmoid, single pointed, 4 pairs per segment. Dorsal pores absent. Female pores near *B*. Male pores in 10/11 to 12/13. Digestive system with oesophageal gizzards behind ovarian segment, intestinal origin behind XVII but without calciferous glands, typhlosole and supra-intestinal glands. Holonephric. Testes and male funnels intraseptal. Sperm ducts : each opens to the exterior through a 'prostate' Spermathecae attached to the posterior face of a septum with ampullae dorsal to the gut. Holonephric.

Distribution : Eastern Asia, south Asia and south east Asia.

Remarks : The family is represented in West Bengal by a single genus *Drawida*.

Genus 17. ***Drawida*** Michaelsen

1900. *Drawida* Michaelsen, *Das Tierreich, Berlin*, **10** : 114. (Type species, *Moniligaster barwelli* Beddard, 1886).

1972. *Drawida* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 244.

1987. *Drawida* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 37.

Diagnosis : Nephropores present from III. Spermathecal pores paired in 7/8. Female pores paired at or just behind 11/12. Male pores paired at or near 10/11. Gizzards in region of XII-XXVII; intestinal caeca absent. Testes in 9/10. Ovaries in XI. Capsular prostates paired in X.

Distribution : Siberia, China, Korea, Japan; India, Nepal, Burma, Malay Peninsula, Indonesia, Philippines.

Remarks : The genus is represented in West Bengal by a single species *D. nepalensis*.

46. ***Drawida nepalensis*** Michaelsen

1907. *Drawida nepalensis* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 146. (Type loc. - Gowchar, Nepal; typus amissus.

1909. *Drawida burchardi* : Michaelsen, *Mem. Indian. Mus.*, 1 : 149.

1916. *Drawida jalpaigurensis* Stephenson, *Rec. Inidan Mus.*, **12** : 307. (Type loc. Teesta River, Jalpaiguri Dist., West Bengal, India; types in Zoological Survey of India, Calcuttat.)

1924. *Drawida troglodytes* Stephenson, *ibid.*, **26** : 129. (Type loc. Siju Cave, Garo Hill, Meghalaya, India; type in Zoological Survey of India, Calcutta.)

1926. *Drawida cacharensis* Stephenson, *ibid.*, **28** : 251. (Type loc. Katlichera, S. Cachar, Assam, India; types in Zoological Survey of India, Calcutta.)

1961. *Drawida nepalensis* : Gates, Burma *Res. Soc. 50th Anniv.* Pub. No.1 : 57.

1982. *Drawida nepalensis* : Julka, *Rec. zool. Surv. India*, **80** : 147.

Material : (1) Bankura Dist. 11 exs., Joyrambati, 1.xii.1986, Coll. S. K. Mukhopadhyay. (2) Calcutta 2 exs., St. Paul's Cathedral Compound, 5.vii.1967, Coll. J. M. Julka & K. R. Halder. (3)

Coochbehar Dist. - 3 exs., Dinhata, 15.iv.1987; 16 exs., Mathabhanga, 16.iv.1987; 2 exs., Toofanganj, 18.iv. 1987; Coll. K. R. Halder. (4) Darjeeling Dist. 1 ex., Siliguri, 10.iv.1987, Coll. K. R. Halder. (5) Jalpaiguri Dist. - 3 exs., Baradabari (Duars), 21.viii.1983, Coll. A. K. Mandal. 26 exs., Jayanti (Buxa Tiger Reserve), 13.xii.1984; 1 ex., Bhutia Basti near Jayanti (Buxa Tiger Reserve), 18.xii.1984; 4 exs., Raidak (Duars), 19.xii.1984; 5 exs., Jalpaiguri town, 9.iv.1987; 4 exs., Lataguri (Duars), 11.iv.1987; 2 exs., Mohitnagar, 13.iv.1987; Coll. K. R. Halder. (6) Nadia Dist. 2 exs., Katagunj near Kalyani, 19.ix.1983, Coll. K. R. Halder.

Diagnosis : Length 50-130 mm; diameter 2-5 mm. Segments 120-180. Clitellum IX-XIV. Setae *A A* = or slightly > or < *B C*, *D D ca.* = or slightly > $\frac{1}{2}$ C. Genital markings : one small, circular, translucent area lateral or anterior to each male porophore, another similar one on VII, just anterior to each spermathecal pore. Nephropores at or near *D*. Spermathecal pores small transverse slits, just median to *C*. Female pores at *B* in 11/12. Male pores at or median to m *B C* in 10/11.

Gizzards 2-4, in XII-XX; intestinal origin in XXVII (±1). Nephridia of X lacking in adults. Sperm ducts in a cluster of loops as long as testis sacs, pass into ental end of prostate directly. Prostates glandular; prostatic capsule 2-4 mm long, slenderly club-shaped. Spermathecal ampulla irregularly pear-shaped; diverticulum sac-like, 3-5 mm long in VII with regular annulations. Genital marking glands solid, spheroidal.

Habitats : Soil in gardens, lawns, forests, under composts. Earth at base of bamboo dumps. Mud under water cress.

Distribution : INDIA : West Bengal - Bankura, Calcutta, Coochbehar, Darjeeling, Jalpaiguri and Nadia districts; Andaman and Nicobar Islands; Assam; Bihar; Himachal Pradesh; Meghalaya; Sikkim; Uttar Pradesh. *Outside India* : Pakistan; Nepal, Bangla Desh, Burma, Indonesia.

Remarks : This species was originated from the Himalayas. In West Bengal it was reported to occur from Darjeeling and Jalpaiguri districts only. Now it is recorded from Bankura, Calcutta, Coochbehar and Nadia districts also.

VII. Family OCNERODRILIDAE

Diagnosis : Setae lumbricine. clitellum multilayered. Spermathecal, female and male pores in antero-posterior order. Digestive system with a short oesophagus but without intestinal caeca. Holonephric. Last pair of hearts in XI. Seminal vesicles trabeculate. Prostates tubular with central canal. Spermathecae in front of testis segments. Ovaries in XIII, fan-shaped with several egg-strings.

Distribution : Tropical and southern Africa; South India and nearby areas, some islands in the Indian ocean; tropical America.

Remarks : This family is recorded here for the first time in West Bengal and is represented by 2 genera *Gordiodrilus* and *Nematogenia*.

KEY TO GENERA

Oesophagus without any gizzard.	_	*Gordiodrilus*
– Oesophagus with gizzards.	_	*Nematogenia*

Genus 18. *Gordiodrilus* Beddard

1892. *Gordiodrilus* Beddard, *Ann. Mag. nat. Hist.*, (ser.6), **10** : 93. (Type species, *Gordiodrilus elegans* Beddard, 1892.)

1972. *Gordiodrilus* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 271.

Diagnosis : Setae closely paired. Nephropores inconspicuous, in or close to *C D*. Dorsal pores absent. Septa all present from 5/6. Digestive system with a ventro-median calciferous gland in IX and intestinal origin in XII but without gizzard, typhlosole and supra-intestinal gland. Spermathecae adiverticulate.

Distribution : Tropical Africa. One species is transported to India, Burma, Dominica and perhaps non-tropical portions of Africa.

Remarks : The genus is represented by a single species *G. elegans* morph *paski*.

47. *Gordiodrilus elegans* morph **paski** Stephenson

1928. *Gordiodrilus paski* Stephenson, *Ann. Mag. nat. Hist.*, (Ser.10), **1** : 1. (Type.loc. - Kigoma Harbour, Lake Tanganyika, central Africa; types in Brit. Mus. (Nat. Hist.), London.)

1982. *Gordiodrilus elegans* morph. *paski* : Julka, *Rec. zool. Surv. India*, **80** : 149.

Material : Purulia Dist. 81 exs., Purulia town, 1.iv.1986, Coll. K. R. Halder.

Diagnosis : Length 35-47 mm; diameter 1-1.5 mm. Segments 80-98. Prostomium epilobic. Clitellum annular, XIII-XIX, XX. Setae $A\ B = C\ D$, $A\ A < B\ C$, $D\ D = \frac{1}{2}$ C. Spermathecal pores 2 pairs, in or near *B*, in 7/8 and 8/9. Female pores paired, just lateral to *B*, on XIV. Prostatic pores 2 pairs, on setal circle of XVII and XVIII, in *A B* at anterior and posterior ends of seminal grooves. Male pores one pair, in seminal grooves, at 17/18.

Holandric; testis sacs in X and XI; seminal vesicles in XII, occasionally in XI also. Quadriprostatic. Quadrithecal; spermathecal duct slightly spindle-shaped, longer than ampulla.

Habitats : Under rotten aquatic plants on the bank of water bodies.

Distribution : INDIA : West Bengal Purulia district; Andaman Islands; Karnataka. *Outside India* : Africa; Burma; West Indies.

Remarks : The original home of this species is tropical Africa. This is a rare species in India. It is recorded here for the first time from West Bengal.

Genus 19. *Nematogenia* Eisen

1900. *Ocnerodrilus (Nematogenia)* Eisen, *Proc. California Acad. Sci.*, (ser.3), **2** : 112. (Type species, *Pygmaeodrilus lacuum* Beddard, 1893.)

1900. *Nematogenia* : Michaelsen, *Das Tierreich*, **10** : 376.

1972. *Nematogenia* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 277.

Diagnosis : Setae closely paired. Nephropores inconspicuous in or close to *C D*. Spermathecal pores one pair. Male pores on XVII. Prostatic pores one pair on XVII. Septa all present from 4/5. Digestive system with gizzards in VI-VII, paired calciferous glands in IX, intestinal origin in XII but without typhlosoles and supra intestinal glands. Spermathecae adiverticulate.

Distribution : Guinea to Congo, tropical Africa. The range has been extended around the world by human transportation of one species.

Remarks : The genus newly recorded here from India is represented by a single species *N. panamaensis.*

48. *Nematogenia panamaensis* (Eisen)

1900. *Ocnerodrilus (Nematogenia) lacuum* var. *panamaensis* Eisen, *Proc. California Acad. Sci.*, (ser.3), **2** : 127. (Type loc. - Panama; typus probably amissus.)

1900. *Nematogenia panamaensis* : Michaelsen, *Das Tierreich*, **10** : 376.

1904. *Nematogenia josephina* Cognetti, *Boll. Mus. Zool. Univ. Torino*, **19**, 478 : 3 (Type loc. San Jose', Costa Rica; Types in the Torino Museum?)

1923. *Nematogenia panamaensis* : Stephenson, *Fauna Brit. India, Oligochaeta* : 483.

1972. *Nematogenia panamaensis* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 272.

Material : Jalpaiguri Dist. - 57 exs., Lataguri (Duars), 11.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 40-75 mm; diameter 1-2 mm. Segments 95-124, Prostomium epilobic. Clitellum saddle-shaped, XIII or XIV-XXII, XXIII or XXIV. Setae *A B ca.* = *C D*, *A A B C*. First dorsal pore at or behind 8/9. Spermathecal pores at or close to *B*, in 8/9. Female pores at *B* nearer eq/XIV. Prostatic pores as transverse slits on transversely oval papillae. Male pores just behind prostatic pores.

Metandric; seminal vesicles large in XII. Biprostatic; prostates very long. Bithecal; spermathecae large, ampulla ovoid, duct slender.

Habitats : Moist habitats of sandy loam soil in low lands, upland pastures and crop fields.

Distribution : INDIA : West Bengal Jalpaiguri district. *Outside India* : West Africa; Sri Lanka, Philippines; Central America, West Indies, South America.

Remarks : This is primarily a lowland tropical species originated from tropical Arifica.

VII. Family OCTOCHAETIDAE

Diagnosis : Intestinal origin behind XIII. Last hearts behind XI. Meronephric, nephridia present in preclitellar segments. Prostates tubular with central canal. Spermathecae pregonadal and diverticulate. Ovaries in XIII.

Distribution : Tropical Africa; India, Burma; Australasia; tropical America.

KEY TO GENERA

1.	Oesophageal gizzard single.	_	2
–	Oesophageal gizzard doubled.	_	5
2.	Discrete calciferous glands present.	_	3
–	Discrete calciferous glands absent.	_	*Ramiella*
3.	One pair of prostate glands.	_	4
–	Two pairs of prostate glands.	_	*Octochaetona*
4.	Intestinal typhlosole not rudimentary.	_	*Eutyphoeus*
–	Intestinal typhlosole rudimentary.	_	*Scolioscolides*

5.	Calciferous glands one pair only.	_	*Dichogaster*
–	Calciferous glands more than two pairs.	_	6
6.	Calciferous glands 3 pairs in X-XII.	_	*Lennogaster*
–	Calciferous glands 4 pairs in X-XIII.	_	*Pellogaster*

Genus 20. *Dichogaster* Beddard

1888. *Dichogaster* Beddard, *Quart. J. miscrsc. Sci. (n.s.)*, **29** : 251. (Type species, probably *Dichogaster damonis* Beddard, 1888.)

1972. *Dichogaster* : Gates, *Trans. Am. phil. Soc.*, **62** (7) : 277.

1987. *Dichogaster* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No.92 : 21.

Diagnosis : Setae lumbricin, closely paired, *A A ca.* = *B C*, *D D* > $\frac{1}{2}$ C, *a* and *b* of prostatic segments penial. Dorsal pores present. Clitellum, intersegmental furrows obliterated, dorsal pores occluded, setae retained. Spermathecal pores at or close to 7/8 and 8/9. Male and prostatic pores in seminal grooves. Digestive system with 2 gizzards in front of 7/8, a pair of calciferous glands behind XIII, an intestinal origin in XIX, a lamelliform typhlosole beginning in the region of XXII-XXIII and lateral typohlosoles through some or all of XXIII-XXIX but without intestinal caeca and supra-intestinal glands. Ovaries in XIII, fan-shaped with severl egg-strings; ovisacs paired, in XIV.

Distribution : Tropical Africa; India; tropical America. Species of *bolaui* group widely transported to various parts of the world.

Remarks : The genus is represented in West Bengal by 3 species *D. bolaui* and *D. modiglianii* and *D. saliens*.

KEY TO SPECIES

1.	Prostrate 2 pairs, in XVII and XIX.	_	2
	– Prostrate one pair, in XVII.	_	*D. saliens*
2.	Female pore single on mV.	_	*D. bolaui*
	– Female pores paired.	_	*D. modiglianii*

49. *Dichogaster bolaui* (Michaelsen)

1891. *Benhamia bolavi* Michaelsen, *Jb. hamb. Wiss. Anst.*, **8** : 9. (Type loc. Bergedorf, Hamburg, Germany; types in Zoologisches Institute and Zoologisches Museum Universitat, Hamburg.)

1917 *Dichogaster bolaui* : Stephenson, *Rec. Indian Mus.*, **13** : 413.

1987. *Dichogaster bolaui* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No.92 : 22.

Material : (1) Calcutta 1 ex., Kakurgachi, 13.viii.1963, Coll. Soil Zool. Unit, Z.S.I. (2) Coochbehar Dist. 2 exs., Dinhata, 15.iv.1987; 7 exs., Toofanganj, 18.iv.1987; Coll. K. R. Halder. (3) Jalpaiguri Dist. 1 ex., Jayanti (Buxa Tiger Reserve), 13.xii.1984; 8 exs., Jalpaiguri town, 9.iv.1987; Coll. K. R. Halder. (4) West Dinajpur Dist. 2 exs., Jordighi, 5.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 19-23 mm; diameter 1-3 mm. Segments 70-98. Prostomium epilobic, tongue narrowed posteriorly. Clitellum annular, XIV-XVIII, occasionally extending anteriorly to XIII and

posteriorly to XIX, XX, XXI. Genital markings absent. First dorsal pore at 5/6 or 6/7. Spermathecal pores 2 pairs, minute and superficial, at *A* in 7/8 and 8/9. Female pore single, mid-ventral, minute and superficial, on XIV. Prostatic pores 2 pairs, minute and superficial, at *A*, on XVII and XIX, at anterior and posterior ends of seminal grooves. Male pores paired, minute and superficial, in seminal grooves, on XVIII.

Septa all present from 7/8. Gizzards in VI and VII; calciferous glands trilobed in XV-XVII. Last pair of hearts in XII. Holandric; seminal vesicles acinous, vestigeal, in XI and XII. Quadriprostatic; prostates in XVII and XIX; duct straight. Penial setae 0.27-0.4 mm long, 3.5-7.5 μ thick at midshaft; tip hooked or widened and then scalpel -, spatula -, oar-, spoon-shaped; ornamentation of several triangular teeth. Quadrithecal; ampulla sac-like; duct barrel-shaped, as long as ampulla; unidiverticulate; diverticulum small, digitiform, attached to ental end of duct.

Habitats : Soil with high organic matter; kitchen waste; soil around compost pits; rotten wood; in barks of trees; in tree holes; earth around roots of potted plants; banks of ditches draining waste effluents of human habitations.

Castings : Castings are deposited on soil surface in small heaps of tiny globular pellets.

Economic Importance : This species may be utilized for converting organic matter into available nutrients.

Distribution : INDIA : West Bengal - Calcutta, Coochbehar, Howrah, Jalpaiguri and West Dinajpur districts; Andaman and Nicobar Islands; Andhra Pradesh; Arunachal Pradesh; Goa; Gujarat; Himachal Pradesh; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Meghalaya; Orissa; Rajasthan; Sikkim; Tamil Nadu; Uttar Pradesh. *Outside India* : Africa, Madagascar and its adjacent islands; Germany, Pakistan, China, Japan; Sri Lanka, Bangla Desh, Burma, Malay Peninsula, Indonesia, Philippines, Vietnam, Hainan; Australia, some islands in the Pacific Ocean; North America; Central America, West Indies, South America.

Remarks : This species was presumably originated from West Africa and is widely distributed in India. In West Bengal it was reported to occur from Calcutta and Howrah districts only. Now it is recorded here from Coochbehar, Jalpaiguri and West Dinajpur districts also.

50. ***Dichogaster modiglianii*** (Rosa)

1896. *Benhamia modiglianii* Rosa, *Ann. Mus. Sto. Nat. Genova*, **16(36)**: 510. (Types loc.- Padang, Sumatra; types in Museo Civico di Storia Naturale, Genova.)

1931. *Dichogaster modiglianii* : Stephenson, *Proc. zool. Soc. Lond.*, **1931** : 65.

1987. *Dichogaster modiglianii* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No.92 : 24.

Material : (1) Birbhum Dist. - 1 ex., Muradihi near Sainthia, 28.ix.1983, Coll. K. R. Halder. (2) Coochbehar Dist. - 5 exs., Toofanganj, 18.iv.1987, Coll. K. R. Halder. (3) Darjeeling Dist. 1 ex., Siliguri, 10.iv.1987, Coll. K. R. Halder. (4) Jalpaiguri Dist. 2 exs., New Jalpaiguri, 10.iv.1987; 3 exs., Mohitnagar, 13.iv.1987; Coll. K. R. Halder. (5) Midnapur Dist. - 4 exs., Belda, 25.iii.1986; 2 exs., Midnapur town, 26.iii.1986; 15 exs., Garbeta, 27.iii.1986; Coll. K. R. Halder. (6) Nadia Dist. - 1 ex., Bhatjungla near Krishnanagar, 16.ix.1983; 2 exs., Plassy, 25.ix.1983; Coll; K. R. Halder. (7) Purulia Dist. - 21 exs., Manbajar, 2.iv.1986; 8 exs., Raghunathpur, 4.iv.1986; Coll. K. R. Halder. (8) West Dinajpur Dist. 3 exs., Jordighi, 5.iv.1987; 1 ex., Raiganj, 7.iv.1987; Coll. K. R. Halder.

Diagnosis : Length 22-60 mm; diameter 1-2 mm. Segments 76-120. Prostomium epilobic, tongue narrowdd posteriorly. Clitellum annular, XIII-XX. Genital markings absent. First dorsal pore

at 4/5 or 5/6. Spermathecal pores 2 pairs, minute and superficial, at or very close to *A*, in 7/8 and 8/9. Female pores paired, presetal, minute and superficial, just median or post meridian to *A*, on XIV. Prostatic pores 2 paires, minute and superficial, at *A*, on XVII and XIX, at the ends of seminal grooves; male pores paired, minute and superficial, in seminal grooves, on XVIII.

Gizzards between septa 4/5 and 7/8; calciferous glands trilobed, in XV-XVII; typhlosole XXII-XXIII to LXXVIII-LXXXI. Last pair of hearts in XII. Nephridia in four longitudinal rows behind clitellum. Holandric; testis sacs enclosed in unpaired sacs, in X and XI; seminal vesicles lacking or vestigial in XII. Quadriprostatic; prostates in XVII and XIX; duct straight. Penial setae 0.31-0.42 mm long, 5-9 μ thick entally; shaft straight or slightly bowed; tip slightly thickened or recurved; ornamentation of scale-like markings. Quadrithecal; ampulla pear-shaped; duct slightly bulbous and larger than ampulla; unidiverticulate; diverticulum stalked with a small, spheroidal to ellipsoidal seminal chamber, arising from the middle of duct.

Habitats : Soil with high organic matter; soil around compost pits, rotten wood; in barks of trees.

Distribution : INDIA : West Bengal Birbhum, Calcutta, Coochbehar, Darjeeling, Jalpaiguri, Midnapur, Nadia, Purulia and West Dinajpur districts; Andaman Islands; Meghalaya; Orissa. *Outside India* : Angola; Pakistan; Burma, Malay Peninsula, Indonesia, Philippines; Mexico; South America.

Remarks : This species was presumably originated from West Africa. It is rare in India. In West Bengal it was reported to occur only from Calcutta. Now it is recorded here from other districts also.

51. *Dichogaster saliens* (Beddard)

1893. *Microdrilus saliens* Beddard, *Proc. zool. Soc. Lond.*, **1892** : 683. (Type loc., undesignated?, types supposedly from Penang, Singapore and Java, but were obtained from earth Wardian cases at the Kew Gardens ; types in Brit. Mus. (Nat. Hist.), London.)

1900. *Dichogaster crawi* Eisen, *Proc. Calif. Acad. Sci. (ser. 3)*, **2** : 228.

1900. *Dichogaster saliens* : Eisen, *Proc. Calif. Acad. Sci. (ser. 3)*, **2** : 226.

1923. *Dichogaster crawi* : Stephenson, *Fauna Brit. India, Oligochaeta* : 474.

1923. *Dichogaster saliens* : Stephenson, Ibid. : 478.

1972. *Dichogaster saliens* : Gates, *Trans. Am. Phil. Soc.*, **62**(7) : 281.

Diagnosis : Length 17-70 mm, diameter 1.5-2.5 mm. Segments 65-122. Prostomium proepilobic, tongue narrowed posteriorly. Clitellum annular, XIII-XIX, 1/2XX. Genital markings, when present, unpaired, median, on 15/16. First dorsal pore at 5/6, occasionally at 3/4 or 4/5 or 6/7. Spermathecal pores 2 pairs, at or close to *A*, in 7/8 and 8/9. Female pores paired, presetal or setal or slightly posterior to setal arc, within *A* lines, on XIV. Prostatic pores 2 pairs, minute, at anterior ends of seminal grooves, at *A* and extending from eg/XVII to 17/18; male pores paired, minute, at posterior ends of seminal grooves on or close to 17/18.

Gizzards between septa 4/5 and 7/8; calciferous glands trilobed in XV-XVII; typhlosole XXII-XXIII to LXXXI-LXXXVIII. Last pair of hearts in XII. Nephridia in four longitudinal rows behind clitellum. Holandric; seminal vesicles vestigeal in XI and XII or XII only or lacking. Biprostatic; prostates in XVII only. Penial setae 0.4 0.71 mm long, 6-13 μ thick, nearly straight entally, or slightly bowed, more or less sinuous ectally; tip knobbed or pointed; ornamentation with scale like markings or faint ridges in sinuousities. Quadrithecal; ampulla small and ovoidal; duct slightly bulbous, longer than ampulla; unidiverticulate; diverticulum shortly stalked with a small, spheroidal to ellipsoidal seminal chambers, arising from the middle of duct.

Habitats : Sandy clay soil, elephant dung, manure, under stones on banks of streams, edges of drains, gardens.

Distribution : INDIA ; West Bengal— Darjeeling district; Arunachal Pradesh ; Karnataka; Meghalaya; Sikkim. Outside India : Africa; Sri Lanka, Burma, Malay Peninsula, Java, Christmas Island; U.S.A., Mexico; El Salvador, Panama, South America; Australia.

Remarks : This species was presumably originated from West Africa and is rare in India. In West Bengal it was so far known to occur from Pashok, Darjeeling district only.

Genus 21. *Eutyphoeus* Michaelsen

1900. *Eutyphoeus Michaelsen, Das Tierreich*, 10 : 322. (Type species, *Typhoeus orientalis* Beddard, 1883.)

1987. *Eutyphoeus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 25.

Diagnosis : Setae lumbricin. Dorsal pores present. Clitellum annular, extending beyond XIV and XVI, intersegmental furrows obliterated, dorsal pores occluded, setae retained. Spermathecal pores one pair, superficial, never minute, in 7/8. Female pores minute, on XIV. Prostatic pores one pair, minute, in region of *A B*, near eq/XVII. Male pores near to but behind prostatic pores. Digestive system with a gizzard between septa 5/6 and 8/9, one pair of intramural calciferous glands in XII, intestinal origin in XV, typhlosole simple and lamelliform, one pair of intestinal caeca and one pair of supra-intestinal glands. Last pair of hearts in XIII. Bithecal, spermathecae diverticulate, diverticulum attached to ental end of short duct. Ovaries fan-shaped with several egg-strings.

Habitat : Grass lands. Humus soil of forest.

Castings : Castings are deposited on soil surface in the form of small towers.

Distribution : Pakistan; India, Nepal, Bangla Desh, Burma, Vietnam.

KEY TO SPECIES

1.	Holandric.	_	2
	Metandric.	_	3
2.	Penial setae present.	_	*E. incommodus*
	Penial setae absent.	_	*E.quadripapillatus*
3.	Penes long.	_	4
	Penes short, annular.	_	5
4.	Genital markings in 15/16 only.	_	*E. nicholsoni*
	Genital markings pre-, intra - and post clitellar.	_	*E. waltoni*
5.	Genital markings present on XV and usually on XVI also.	_	*E. orientalis*
	Genital markings lacking on XV-XVI.	_	*E. gammiei*

52. ***Eutyphoeus gammiei*** (Beddard)

1888. *Typhoeus gammii* Beddard, *Quart. J. microsc. Sci.*, **29** : 111. (Type loc. - Darjeeling, West Bengal, India; types in Brit. Mus. (Nat. Hist.), London amiss.)

1900. *Eutyphoeus gammiei* : Michaelsen, *Das Tierreich*, **10** : 323.

1907 Eutyphoeus chittagongianus Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 181. (Type loc. - Comilla, Bangla Desh; types in Zoological Survey of India, Calcutta.)

1914. *Eutyphoeus koboensis* Stephenson, *Rec. Indian Mus.*, **8** : 404. (Type loc. - Abor country, India; types in Zoological Survey of India, Calcutta.)

1914. *Eutyphoeus magnus* Stephenson, *ibid.*, **8** : 408. (Type loc. - Rotung, India; types in Zoological Survey of India, Calcutta.)

1923 *Eutyphoeus gammiei* (Part) Stephenson, *Fauna Brit. India, Oligochaeta* : 434. (Excluding *E. kempi*.)

1925. *Eutyphoeus gammiei* : Stephenson, *Rec. Indian Mus.*, **27** : 72.

1975 *Eutyphoeus gammiei* : Julka, *Mitt. zool. Mus. Berlin*, **51**(1) : 24.

Material : (1) Darjeeling Dist. - 1 ex., Dhobighora, Kurseong, 1.iii.1926, Coll. M. Shariff. 1 ex., Dalingcoat, 20.xii.1973, Coll. G. K. Srivastava & P. K. Maity. (2) Jalpaiguri Dist. - 2 exs., Baradabari (Duars), 21.viii.1983, Coll. A. K. Mandal. 2 exs., Alipurduar (Duars), 17.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 193-263 mm; diameter 7-10 mm. Segments 182-405. Clitellum $\frac{1}{2}$ XIII-XVII. Genital markings in *B B*, unpaired, paired and then in contact or marginally united, at mid-ventral, in some or all of 9/10-13/14, 19/20-23/24. First dorsal pore at 11/12. Spermathecal pores centered at or lateral to *B*. Female pore single on left side of XIV. Univestibulate and penile; vestibulum a transversely placed aperture with lobed anterior margin and straight posterior margin; penes short and annular.

Ventral intestinal caeca 32-75 in XXV-XCIX; supra-intestinal glands in 4-6 of XCVI-CXL. Metandric; testis sac ventral; seminal vesicles between 10/11 and 12/13. Prostates much glandular extending back to XX; duct long and looped. Penial setae several per battery, 2-5 mm long and 20-40 μ thick, shaft slightly S-curved; tip thickened and spoon-shaped; ornamentation of densely crowded rows of fine spines. Spermathecal ampulla an irregular sac; duct very short and thick; bidiverticulate; diverticulum posteriorly directed, one median and one lateral.

Distribution : INDIA : West Bengal - Darjeeling and Jalpaiguri districts; Arunachal Pradesh; Assam; Meghalaya. *Outside India* : Bangla Desh.

Remarks : This species is endemic to Oriental Region and is very common in the eastern Himalayas. In West Bengal it was reported to occur only from Darjeeling district. Now it is recorded here from Jalpaiguri district also.

53. ***Eutyphoeus incommodus*** (Beddard)

1901. *Typhoeus incommodus* Beddard, *Proc. zool. Soc. Lond.*, **1901** : 200. (Type loc. - Calcutta, West Bengal; typus amissus.)

1903. *Eutyphoeus incommodus* : Michaelsen, *Geogr. Verbr.* : 109.

1914 *Eutyphoeus mohammedi* Stephenson, *Rec. Indian Mus.*, **10** : 350. (Type loc. - Allahabad, Uttar Pradesh; type in Brit. Mus. (Nat. Hist.), London.)

1916. *Eutyphoeus annandalei* var *fulgidus* Stephenson, *ibid*, **12** : 342 (Type loc. - Anwarganj, Uttar Pradesh; types in Zoological Survey of India, Calcutta.)

1938. *Eutyphoeus incommodus* : Gates, *ibid.*, **40** : 83.

1987. *Eutyphoeus incommodus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No.92 : 25

Material : (1) Birbhum Dist. - 7 exs., Maloberia near Sainthia, 28.ix.1983, Coll. K. R. Halder. (2) Calcutta - 3 exs., Calcutta Maidan, 21.vii.1978; 4 exs., Chetla Park, 29.viii.1978; Coll. K. R. Halder. (3) Murshidabad Dist. - 2 exs., New Farakka, 22.ix.1983, Coll. K. R. Halder. (4) Nadia Dist - 3 exs., Nabadwipdham, 3 exs., Nabadwipghat and 9 exs., Champta, 17.ix.1939; 3 exs., in and around Kalyani, 19.ix.1983; Coll. K. R. Halder. (5) West Dinajpur Dist. - 1 ex., Bangar, 4.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 25-147 mm; diameter 2.5-6 mm. Segments 92-189. Clitellum XIII, $\frac{1}{2}$ XIII-XVII, XVIII. Genital markings paired, postsetal in *A B*, on XII, XIII-XVI. First dorsal pore at 11/12, occasionally at 10/11 or 12/13. Spermathecal pores paired, small, transverse slits, slightly lateral to *B*. Female pores paired, presetal, at or slightly median to *A*. Avestibulate and apenile; male pores within slight transversely placed fissures, at or close to *B*, each fissure at the centre of a disc-shaped to slightly conical porophore.

Septa 6/7 and 7/8 aborted. Lateral intestinal caeca lacking; ventral intestinal caeca 3-9 in XXVII-XXXVI; supra-intestinal glands 3-6 pairs in LXII-LXXV; typhlosole begins in XXV-XXVI. Holandric; testes and male funnels enclosed in annular sacs, in X and XI; seminal vesicles in IX and XII, extending posteriorly to XIII. Prostatic duct 2-6 mm long, slender. Penial setae 0.15-1.4 mm long and 15-17 μ diameter; shaft almost straight, distal end slightly curved; tip bluntly rounded, ornamentation of spares, rather widely separated rows of fine spines. Spermathecae paired, in VIII; ampulla globular, duct straight; polydiverticulate; diverticulum forms a circle or frill of seminal chambers around the duct. Genital marking glands lacking.

Distribution : INDIA : West Bengal - Birbhum, Calcutta, Murshidabad, Nadia and West Dinajpur districts; Bihar; Haryana; Himachal Pradesh; Orissa; Punjab; Rajasthan; Uttar Pradesh. *Outside India* : Pakistan.

Remarks : This species is very common in northern part of India. In West Bengal it was reported to occur only from its type locality Calcutta. Now it is recorded here from four other districts also.

54. *Eutyphoeus nicholsoni* (Beddard)

1901. *Typhoeus nicholsoni* Beddard, *Proc. zool. Soc. Lond.*, **1901** : 195. (Type loc. - Calcutta, West Bengal, India, typus amissus.)

1903. *Eutyphoeus nicholsoni* : Michaelsen, *Geogr. Verbr.*, 109.

1907. *Eutyphoeus knani* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 182. (Type loc. - Katwari Bazar, Basti Dist., Uttar Pradesh, India; types in Zoological Survey of India, Calcutta and Zoologisches Institute and Zoologisches Museum Universitat, Hamburg.)

1938 *Eutyphoeus nicholsoni* : Gates, *Rec. India Mus.*, **40** 94

1966. *Eutyphoeus nicholsoni* : Soota, *Rec. zool. Surv. India*, **64** : 180.

Material : (1) Birbhum Dist. - 17 exs., Maloberia near Sainthia and 5 exs., Muradihi near Sainthia, 28.ix.1983, Coll. K. R. Halder. (2) Murshidabad Dist. - 6 exs., in and around Berhampur, 21.ix.1983; 6 exs., in and around Farakka; 22.ix.1983; 11 exs., in and around Kandi, 23.ix.1983; Coll. K. R. Halder. (3) Nadia Dist. - 4 exs., in and around Krishnanagar, 16.ix.1983; 5 exs., Chandmari near Kalyani, 19.ix.1983; Coll. K. R. Halder.

Diagnosis : Length 145-185 mm; diameter 5-5.5 mm. Segments 190-225. Clitellum XIII-XVII. Setae *A B ∠C D ∠ B C ∠ A A*. Genital markings paired, circular or oval, in 15/16, approximated in contact or margins united at mid-ventral line reaching laterally in *B C* and anteroposteriorly to setal circle of XV and XVI. First dorsal pore at 11/12. Spermathecal pores paired, at or just lateral to *A*. Female pore single on left side of XIV. Bivestibulate and penile; vestibula deep and well-like, apertures transversely slit-like about in *A B*; penes 1.25-1.50 mm long.

Septa 5/6-7/8 aborted. Lateral intestinal caeca lacking; median ventral intestinal caeca 24-30 in XXXV-LXIX; supra intestinal glands 4-7 pairs in LXXX-LXXXIX. Metandric; testis sac ventral; seminal vesicles in XII extending posteriorly to XIV. Prostates coiled, duct muscular and long, in an S-shaped curve. Penial setae about 4 mm long and 26-33 μ diameter; shaft nearly straight or gently curved ectally; tip bluntly rounded; ornamentation of sparse indistinct triangular teeth. Spermathecal ampulla broad and lobed; duct more than 2 mm long, narrowed ectally; polydiverticulate; seminal chambers in one or two clusters or a semicircular row, on posterior face of duct. Genital marking glands interrupt the longitudinal muscles and protrude conspicuously into coelome.

Distribution : INDIA West Bengal Birbhum, Calcutta, Murshidabad and Nadia districts; Bihar; Uttar Pradesh.

Remarks : This species is endemic to India and is very common in Uttar Pradesh. In West Bengal it was reported to occur from its type locality Calcutta only. Now it is recorded here from Birbhum, Murshidabad and Nadia districts also.

55. ***Eutyphoeus orientalis*** (Beddard)

1833. *Typhoeus orientalis* Beddard, *Ann. Mag. nat. Hist.*, (ser. 5), **12** : 219. (Type loc. Calcutta, West Bengal, India; typus amissus.)

1889 *Typhoeus masoni* Bourne, *J. Asiatic Soc. Bengal*, **58** : 112. (Type loc. Dehra Dun, Uttar Pradesh, India; types in the Hamburg Museum.)

1903. *Eutyphoeus masoni* + *E. orientalis* : Michaelsen, *Georgr. Verler.* : 109.

1907. *Eutyphoeus paivi* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 178. (Type loc. Pusa, Bihar, India; types in Zoological Survey of India, Calcutta.)

1907. *Eutyphoeus bastianus* Michaelsen, *ibid.*, **24** : 183. (Type loc. Katwari Bazar, Uttar Pradesh, India; types in Zollogical Survey of India, Calcutta.)

1907. *Eutyphoeus andersoni* Michaelsen, *ibid.*, **24** : 185. (Type loc. Rajshahi, Bangla Desh; types in Zoological Survey of India, Calcutta.)

1914 *Eutyphoeus bishambari* Stephenson, *Rec. Indian Mus.*, **10** : 355.. (Type loc. Pusa, Bihar; types in Zoological Survey of India, Calcutta.)

1938. *Eutyphoeus orientalis* : Gates, *Rec. Indian Mus.*, **40** : 98.

1966. *Eutyphoeus orientalis* : Soota, *Rec. zool. Surv. India*, **64** : 179.

Material : (1) Birbhum Dist. 1 ex., Maloberia near Sainthia, 28.ix.1983; Coll. K. R. Halder. (2) Calcutta - 1 ex., Indian Museum compound, 30.xi.1970, Coll. Raj Tilak. 1 ex., Calcutta Maidan, 27.vii.1978; 7 exs., Chetla Park, 29.viii.1978; Coll. K. R. Halder. (3) Hooghly Dist. - 1 ex., Chinsura, 12.xii.1986, Coll. G. C. Ghosh. (4) Howrah Dist. - 4 exs., Bally, 8.ix.1970, Coll. A. K. Sarker. (5) Murshidabad Dist. - 5 exs., Pakuria near Berhampur and 1 ex., Lalbagh, 21.ix.1983; 1 ex., Kalyanpur near Kandi, 23.ix.1983; 1 ex., Jangipur, 24.ix.1983; Coll. K. R. Halder. (6) Nadia Dist. 1 ex., Krishnanagar and 1 ex., Subhasnagar near Krishnanagar, 16.ix.1983; 4 exs., Champta, 17.ix.1983; 4 exs., Kataganj near Kalyani, 19.ix.1983; 1 ex., Hazrapota near Plassy, 25.ix.1983;

Coll. K. R. Halder. (7) 24-Parganas (North) - 1 ex., Barrackpore, 19.ix.1936; 2 exs., Pulta, 10.xi.1938; Coll. Pulta Survey Party. 2 exs., Rajarhat, 26.xi.1962, Coll. J. C. Naskar. 1 ex., Naihati, 3.xi.1966, Coll. B. P. Haldar. 6 exs., Gopalpur, 26.x.1979, Coll. K. R. Halder & R. K. Chakraborty. (8) 24-Parganas (South) - 2 exs., Kamdohari near Garia, 22.viii.1979; 1 ex., Balia near Garia Rly. Station, 24.x.1979; 1 ex., Kamalgachi near Garia, 13.xi.1980; Coll. K. R. Halder.

Diagnosis : Length 130-250 mm; diameter 5-10 mm. Segments 164-220. Clitellum XIV-XVI. Genital markings : paired, postsetal, *ca.* in *A B*, on XV-XVI and in 18/19-20/21, occasionally on IX-X, XIII-XIV and 21/22-26/27. First dorsal pore at 11/12. Spermathecal pores paired, in *B C*. Female pore single, on left side. Bivestibulate and penile; penes short and annular, each pennis on the roof of a deep vestibulum; vestibular apertures circular to transversely elliptical or slit-like in *A B*.

Septa 5/6-7/8 lacking. Gizzard large; lateral intestinal caeca lacking; median ventral intestinal caeca 31-34 in XXIV-LXVII, supra-intestinal glands 4-7 pairs in LXXXVI-XCVI. Metandric; testis sac ventral; seminal vesicles in XII, long, extending back to several segments. Prostates large coiled tubes; duct thinner. Penial setae 4-5 mm long and 32-36 μ diameter; shaft straight; tip simple, rounded or bluntly rounded with spoon-shaped concavity. Spermathecal ampulla an ovoidal sac; duct short, stout and muscular; bidiverticulate; diverticulum one median and one lateral. Genital marking glands interrupting the musculature and sessile on the parietes.

Distribution : INDIA : West Bengal - Birbhum, Calcutta, Hooghly, Howrah, Murshidabad, Nadia, 24-Parganas (North) and 24-Parganas (South) districts; Bihar; Uttar Pradesh. *Outside India* : Bangla Desh.

Remarks : This species is endemic to Oriental Region and is very common in Uttar Pradesh. In West Bengal it was reported to occur only from its type locality Calcutta. Now it is recorded here from seven other districts also.

56. ***Eutyphoeus quadripapillatus*** Michaelsen

1907. *Eutyphoeus quadripapillatus* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 175. (Type loc. Saraghat, Bangla Desh; types in Zoological Survey of India, Calcutta and the Hamburg Museum.)

1938. *Eutyphoeus quadripapillatus* : Gates, *Rec. Indian Mus.*, **40** : 106.

Diagnosis : Length 60-110 mm; diameter 3.75 mm. Segments 120-175. Clitellum from 12/13 to 17/18. Genital markings 2 pairs postsetal, small, centres on or just lateral to *B*, on XIII and XIV. First dorsal pore at 11/12. Spermathecal pores, small, transversely slit-like in *A B*. Female pores paired. Avestibulate and apenile. Male porophores, rather disc-shaped and transversely placed; centre of each porophore on or close to *B*.

Supra-intestinal glands 3-4 pairs in LXII-LXXI. Holandric; testes and male funnels in X and XI, apparently free; seminal vesicles in IX and XII, the posterior pair extending back as far as XXX. Prostates, small, confined to XVII-XIX; duct slender, 2-4 mm long. No penial setae. Spermathecal ampulla nearly circular and depressed; duct short; polydiverticulate; seminal chambers in a circle around the spermathecal duct, with four openings into duct lumen.

Distribution : INDIA : West Bengal - Calcutta; Bihar. *Outside India* : Bangla Desh.

Remarks : This species is endemic to Oriental Region.

57. *Eutyphoeus waltoni* Michaelsen

1907. *Eutyphoeus waltoni* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 179. (Type loc. - Mainpuri, Uttar Pradesh, India; types in Zoological Survey of India, Calcutta.)

1907 *Eutyphoeus bengalensis* Michaelsen, *ibid.*, **24** 183. (Type loc. - Saraghat, Bangla Desh; types in Zoological Survey of India, Calcutta and the Hamburg Museum.)

1914 *Eutyphoeus ibrahimi* Stephenson, *Rec. Indian Mus.*, **10** : 357 (Type loc. - Kapurthala, Punjab, India; type in Zoological Survey of India, Calcutta.)

1966 *Eutyphoeus waltoni* . Soota, *Rec. zool. Surv. India*, **64** : 179

Diagnosis . Length 53-230 mm; diameter 4-8 mm. Segments 115-201. Clitellum annular, from XIII or 13/14 to 17/18. Genital markings paired, postsetal, *ca.* in *A B*, on IX (VIII and X), in 14/15-15/16,18/19(19/20-22/23). First dorsal pore at 11/12. Spermathecal pores pired, with centres on or median to *C*. Female pore single, on left side of XIV. Bivestibulate and penile; vestibula deep and well-like with circular to transversely slit-like aparture, in *A C*; penes 1 mm long. Male pores in *B*, in a pair of narrow transverse depressions.

Median ventral intestinal caeca in XXXIII-LXII; supra-intestinal glands 4-5 pairs in LXXVI-LXXXVI. Metandric; testis sac ventral in XI; seminal vesicles extending back to 14/15. Prostates extend through XVI or XVII to XIX or XX; duct 5-8 mm long. Penial setae, 4-5 mm long and 20-30 μ diameter; shaft slightly curved in distal half; tip spoon-shaped; ornamentation of fairly closely crowded, somewhat irregular, circles of teeth. Spermathecal ampulla, an elongated sac; duct short, *ca.* 2 mm long; bidiverticulate; diverticula one lateral and one median. Genital marking glands interrupting the longitudinal musculature and sessile on the parietes.

Distribution : INDIA : West Bengal - Calcutta; Bihar; Gujarat; Madhya Pradesh; Punjab; Uttar Pradesh. *Outside India* : Bangla Desh.

Remarks : This species is endemic to Oriental Region.

Genus 22. *Lennogaster* Gates

1939 *Lennogaster* Gates, *Rec. Indian Mus.*, **41** : 183. (Type species. *Eudichogaster yercus* Stephenson, 1931.)

1987. *Lennogaster* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 27.

Diagnosis : Setae lumbricin, ventral couples from XVII penial. Dorsal pores present. Clitellum annular, intersegmental furrows obliterated, setae retained. Dorsal pores present. Reproductive apertures minute and superficial; prostatic and male pores in seminal grooves - prostatic pores one pair on XVII or 2 pairs on XVII and XIX; female pores paired, on XIV. Septa present from 4/5. Digestive system with 2 oesophageal gizzards in V-VI; 3 pairs of discrete extramural calciferous glands in X-XII; intestinal origin in XV; typhlosole simple and lamelliform, but without intestinal caeca and supra-intestinal glands. Spermathecae diverticulate. Metagynous.

Distribution : INDIA, Bangla Desh, Burma.

Remarks : The genus is newly recorded here from West Bengal and is represented by a single species, *L. pusillus*.

58. *Lennogaster pusillus* (Stephenson)

1920 *Eudichogaster pusillus* Stephenson, *Mem. Indian Mus.*, **22** : 765. (Type loc. - Saugar, Madhya Pradesh, India; types in Brit. Mus. (Nat. Hist.) London.)

1921 *Eudichogaster barkudensis* Stephenson, *Rec. Indian Mus.*, **22** : 765. (Type loc. - Barkuda Island, Orissa, India, types in Zoological Survey of India, Calcutta.)

1939. *Lennogaster barkudensis* : Gates, *ibid.*, **41** : 191.

1939. *Lennogaster barkudensis* : Gates, *ibid.*, **41** : 199.

1945. *Lennogaster pusillus* : Gates, *Proc. Indian Acad. Sci.*, **21** (B) : 252.

1987 *Lennogaster pusillus* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 27

Material : (1) Birbhum Dist. - 1 ex., Nischintapur near Rampurhat, 30.ix.1983, Coll. K. R. Halder. (2) Calcutta - 4 exs., Chetla Park, 29.viii.1978, Coll. K. R. Halder.

Diagnosis : Length 20-68 mm; diameter 1-2.5 mm. Segments 105-132. Prostomium procpilobic, tongue closed. Clitellum XIII-XVII. Setae $A\ B < C\ D < B\ C < A\ A$, $D\ D = \frac{1}{2}$ C, no copulatory setae on VIII. First dorsal pore at 11/12. Spermathecal pores one pair, at *A* on VIII. Female pores antero-median to *A*. Seminal grooves crescentic, diagonally placed on oval porophores, extending from setal arc of XVII to 17/18 at *A B*. Prostatic pores one pair, at *A*, on setal arc at anterior ends of seminal grooves. Male field transversely thickened on XVII; male pores paired in or near 17/18 at posterior ends of seminal grooves at *B*.

Typhlosole in XVII-XVIII to LXX-LXXVI. Last pair of hearts in XII. Proandric but with male funnels in XI, testes and male funnels in X enclosed in paired sacs; seminal vesicles absent. Prostates paired in XVII, occasionally extending to XVIII: duct slender equal in length to gland. Penial setae 0.53 - 0.65 mm long, 4-5 μ diameter; shaft straight or slightly curved; tip slightly widened or indented or slightly rounded; ornamentation of scattered, small, triangular teeth. Bithecal; ampulla elongate, in VIII, occasionally extending in VII; duct narrow, short and erect; unidiverticulate; diverticulum spheroidal to tubular, sessile at ental end of duct.

Habitats : Soil with high organic matter. In kitchen wastes, compost pits and in roofs of thatched houses.

Castings : Castings are deposited on soil surface in the form of small towers.

Economic Importance : This species may be utilized in the biodegradation of wastes to some extent.

Distribution : INDIA : West Bengal - Birbhum and Calcutta districts; Himachal Pradesh; Karnataka; Madhya Pradesh; Orissa; Uttar Pradesh.

Remarks : This species is endemic to India and is very rare in West Bengal

Genus 23. *Octochaetona* Gates

1962. *Octochaetona* Gates, *Ann. Mag. nat. Hist.* (ser.13), **5** : 211. (Type species, *Octochaetus surensis* Michaelsen, 1910.)

1987 *Octochaetona* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 28

Diagnosis : Setae lumbricin, ventral setae of XVII and XIX penial. Dorsal pores present. Clitellum annular, female pores segment included, intersegmental furrows obliterated, dorsal pores occluded, setae retained, extending beyond XIV and XVI. Spermathecal pores 2 pairs, at or behind 7/8 and 8/9. Female pore one pair on XIV. Prostatic pores 2 pairs, at the ends of seminal grooves, on XVII and XIX. Male pores one pair, in seminal grooves, on XVIII. Digestive system with a small oesophageal gizzard, one pair of discrete extramural calciferous glands close to attachment of septum 15/16, intestinal origin behind XVI, a ventrally bifid typhlosole, but without intestinal caeca

and supra-intestinal glands. Quadrithecal. Quadriprostatic. Metagynous, ovaries fan-shaped with several egg-strings, ovisacs in XIV.

Distribution : Pakistan; Peninsular India, Nepal, Burma, Malay Peninsula, Philippines.

Remarks : The genus is represented in West Bengal by 2 species *O. beatrix* and *O. compta.*

KEY TO SPECIES

Metandric.	–	*O. beatrix*
– Holandric.	–	*O. compta*

59. *Octochaetona beatrix* (Beddard)

1902. *Octochaetus beatrix* Beddard, *Ann. Mag. nat. Hist.* (ser.7), **9** : 456. (Type loc. - Calcutta, West Bengal, India; types in Brit. Mus. (Nat. Hist.) London.)

1907. *Octochaetus fermori* Michaelsen, *Mitt. naturh. Mus. Hamb.*, **24** : 171. (Type loc. - Raniganj, Burdwan Dist., West Bengal, India; types in Zoological Survey of India, Calcutta.)

1907. *Octochaetus hodgarti* Michaelsen, *ibid.* **24** : 172. (Type loc. - Gowchar, Nepal; types in the Hamburg Museum.)

1910. *Octochaetus pittnyi* Michaelsen, *Abh. Geb. Naturw. Hamburg*, **19** : 86. (Type loc. - Trivandrum, Kerala, India; types in Zoological Survey of India, Calcutta.)

1914. *Octochaetus dasi* Stephenson, *Rec. Indian Mus.*, **10** : 346. (Type loc. - Baroda, Gujarat, India; types in Zoological Survey of India, Calcutta.

1925. *Octochaetus (Octochaetoides) birmanicus* Gates, *Ann. Mag. nat. Hist.* (ser. 9), **16** : 55. (type loc.- Rangoon, Burma; types in Zoological Survey of India, Calcutta.)

1929. *Octochaetus lunatus* Gates, *Proc. U.S. Natl. Mus.*, **75** (10) : 24. (Type loc. - Mandalaya, Burma; types in Brit. Mus. (Nat. Hist.) London.)

1962. *Octochaetona beatrix* : Gates, *Ann. Mag. nat. Hist.* (ser. 13), **5** : 213.

1987. *Octochaetona beatrix* : Julka & Senapati, *Rec. zool. Surv. India., Occ. Paper* No. 92 : 30.

Material : (1) Calcutta - 2 exs., Rabindra Sarobar, 29.xii.1965, Coll. S. K. Bhattacharya. 1 ex., Calcutta Maidan, 21.vii.1978; 4 exs., Chetla Park, 29.viii.1978; Coll. K. R. Halder. (2) Darjeeling Dist. - 24 exs., Reang, 6.vii.1974, Coll. T. D. Soota. (3) Murshidabad Dist. - 1 ex., Kharsa near Kandi, 23.ix.1983, Coll. K. R. Halder. (4) Nadia Dist. - 6 exs., in and around Krishnanagar, 16.ix.1983; 1 ex., Chandmari near Kalyani, 19.ix.1983; Coll. K. R. Halder. (5) 24-Parganas (South) - 1 ex., Kasba, 26.ix.1967, Coll. J. M. Julka & K. R. Halder.

Diagnosis : Length 40-134 mm; diameter 2-5 mm. Segments 133-197. Prostomium epilobic, tongue closed. Clitellum XIII-XVII, XVIII. Setae *A B* < *C D* < *B C* <*A A*, *D D* > $\frac{1}{2}$ C. Genital markings absent. First dorsal pore at 12/13, occasionally at 11/12. Spermathecal pores minute, at or slightly anterior to setal arc of VIII and IX, median to *A*. Female pores paired presetal, in *A A*. Prostatic pores minute, median to *A*. Seminal grooves concave. Male field depressed; male pores minute, at or slightly median to *A*.

Septa 5/6-7/8 absent. Gizzard between 4/5 and 8/9; intestinal origin in XVII; typhlosole in XXV to CIV-CXII. Last pair of hearts in XIII. Metandric; testes and male funnels enclosed in a sub-oesophageal U-shaped sac, in XI, male funnels present in X; seminal vesicles small, in XII. Prostates in XVII and XIX; duct thin and short. Penial setae 0.5-0.85 mm long and 15-20 μ diameter; shaft curved; tip pointed; ornamentation of sparse triangular teeth. Spermathecae paired,

in VIII and IX; ampulla small, ovoid, beneath the gut; duct muscular and shorter than ampulla; unidiverticulate; diverticulum spheroidal, shortly pyriform, oval or flattened and shelf-like, shortly stalked, arising from ental end of duct.

Habitat : Sandy loam and loam soil in lawns and grass lands. Humus soil in forests.

Distribution : INDIA : West Bengal - Burdwan, Calcutta, Darjeeling, Murshidabad, Nadia and 24-Parganas (South) districts; Assam; Gujarat; Himachal Pradesh; Karnataka; Kashmir; Kerala; Madhya Pradesh; Maharashtra; Orissa; Punjab; Uttar Pradesh.

Outside India : Pakistan; Nepal, Burma, Malay Peninsula, Philippines.

Remarks : This species is widely distributed throughout India. In West Bengal it was reported to occur from Burdwan and Calcutta districts only. Now it is recorded here from four other districts also.

60. *Octochaetona compta* Gates

1945. *Octochaetoides comptus* Gates, *Jour. Roy. Asiatic Soc. Bengal* (Sci.), **11** : 80. (Type loc. Nellore, Andhra Pradesh, India; types in Zoological Survey of India, Calcutta.)

1962. *Octochaetona compta* : Gates, *Ann. Mag. nat. Hist.* (ser. 13), **5** : 213.

Material : (1) Bankura Dist. - 1 ex., Bishnupur, 28.xi.1986, Coll. S. K. Mukhopadhyay. (2) Burdwan Dist. - 1 ex., Galsi, 6.ii.1986, Coll. S. K. Mukhopadhyay.

Diagnosis : Length 70-150 mm; diameter 3-7 mm. Segments 131-176. Prostomium epilobic. Clitellum from 12/13 to 16/17 ventrally and to 17/18 laterally and dorsally. Setae on XXX, $A\ B < C\ D < B\ C < A\ A$, $D\ D > \frac{1}{2}$ C. First dorsal pore at 12/13. Spermathecal pores minute, in *A B*, just in front of or just behind presetal secondary furrow of VIII and IX. Male genital field transversely placed, almost elliptical, reaching anteriorly to 16/17, posteriorly to 19/20 and laterally to *C*.

Septa 5/6-6/7 lacking. Gizzard short but widened in VI; calciferous glands reniform to U-shaped with 4-8 lobes in 15/16; intestinal origin in XVII. Last pair of hearts in XIII. Holandric, testes free; seminal vesicles 3 pairs in IX, XI and XII. Prostates in XVII and XIX; duct 3-5 mm long and looped. Penial setae 0.74-0.85 mm long and 14-16 μ thick; shaft straight or slightly arced; ornamentation of 15-30 slightly irregular circles of small teeth. Spermathecal duct shorter than ampulla; unidiverticulate; diverticulum usually a dorsoventrally flattened disc attached to the anterior face of duct.

Habitat : Sandy loam and laterite soil in lawns and grass lands.

Distribution : INDIA : West Bengal - Bankura and Burdwan districts; Andhra Pradesh.

Remarks : This species is endemic to India and was originated from peninsular India. It is recorded here for the first time from West Bengal.

Genus 24. *Pellogaster* Gates

1939. *Pellogaster* Gates, *Rec. Indian Mus.*, **41** : 200. (Type species, *Eudichogaster bengalensis* Michaelsen, 1910.)

1987. *Pellogaster* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 33.

Diagnosis : Setae lumbricine. Female pores paired, on XIV. Prostatic pores paired, at ends of seminal grooves, on XVII and XIX. Male pores paired, in seminal grooves, on XVIII. Digestive

system with 2 oesophageal gizzards, in V-VI, 4 pairs of extramural calciferous glads, in X-XIII, typhlosole simple and lamelliform, but without intestinal caeca and supra-intestinal glands.

Distribution : INDIA (northern portion of peninsula from Jubbalpore to Orissa and W. Bengal).

Remarks : The genus is represented in West Bengal by a single species ***P. bengalensis***.

61. ***Pellogaster bengalensis*** Michaelsen

1910. *Eudichogaster bengalensis* Michaelsen, *Abh. Geb. Naturw. Hamburg*, **19** : 96. (Type loc. - Tribeni, Hooghly Dist., W. Bengal, India; type in Zoological Survey of India, Calcutta.)

1939. *Pellogaster bengalensis* : Gates, *Rec. Indian Mus.*, **41** : 201.

1987. *Pellogaster bengalensis* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 34.

Diagnosis : Length 40-74 mm; diameter 2-3 mm. Segments 94-140. Prostomium tanylobic. Clitellum annular, $\frac{1}{2}$ XIII, XIV-XVI, XVII. Genital markings tiny, circular to oval, paired, close to the spermathecal pores, on VIII-IX, presetal on XVII and postsetal on XIX, at *A B*, occasionally on setal annuli of X and XX, posterior margin of XIX and in or slightly posterior to 19/20, at *A A*. First dorsal pore at 10/11 or 11/12. Spermathecal pores 2 pairs, tiny, transverse or crescentic slits, at or close to the sites of missing *a* setae, on VIII and IX. Female pores presetal, within *A*. Male pores minute slits, at *A B*. Prostatic pores minute, at *A B*; seminal grooves straight.

Intestinal origin in XVI; typhlosole XVIII to LXXIII. Last pair of hearts in XII. Holandric; testes and male funnels free in X and XI; seminal vesicles in XI and XII. Penial setae : 0.7-1.3 mm long and 16-20 μ diameter; tip claw-shaped to pointed or bluntly rounded; ornamentation of about 15 irregular broken circles of fine to triangular spines. Quadrithecal; spermathecae paired in VIII and IX, each with a sessile ental diverticulum.

Distribution : INDIA : West Bengal - Hooghly district; Bihar; Madhya Pradesh; Orissa.

Remarks : This species is endemic to India.

Genus 25. ***Ramiella*** Stephenson

1921. *Ramiella* Stephenson, *Proc. zool. Soc. Lond.*, **1921** : 109. (Type speices, *Octochaetus bishambari* Stephenson, 1914.)

1987. Ramiella : Julka & Senapti, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 34.

Diagnosis : Setae lumbricine. Dorsal pores present. Clitellum extending into XIII and XVII, intersegmental furrows obliterated, dorsal pores occluded, setae retained. Spermathecal pores 2 pairs, at or behind 7/8 and 8/9. Female pores paired, on XIV. Seminal grooves between equators of XVII and XIX. Prostatic pores 2 pairs, at the ends of seminal grooves, on XVII and XIX. Male pores paired, in seminal grooves, on XVIII.

Septa all present from 4/5. Digestive system with one oesophageal gizzard, intestinal origin behind XIII, typhlosole in the form of a low ridge to a simple lamella, but without calciferous gland, intestinal caeca and supra-intestinal glands. Quadrithecal. Quadriprostatic. Metagynous; ovaries fan-shaped with several egg-strings; ovisacs in XIV.

Distribution : INDIA (Western portion of the Gangetic plain south through western part of the peninsula to Coorg). One species, *R. bishambari* has been transported to China, Burma, Indonesia, Philippines.

Remarks : The genus is newly recorded here from West Bengal and is represented by a singe species *R. bishambari.*

62. *Ramiella bishambari* (Stephenson)

1914. *Octochaetus bishambari* Stephenson, *Rec. Indian Mus.*, **10** : 347. (Type loc. - Saharanpur, Uttar Pradesh, India; types in Brit. Mus. (Nat. Hist.), London.)

1920. Octochaetus pachpaharensis Stephenson, *Mem. Indian Mus.*, **7** : 239. (Type loc. - Pachpahar, Madhya Pradesh, India; types in Zoological Survey of India, Calcutta).

1923. *Ramiella bishabari* : Stephenson, *Fauna Br. India, Oligochaeta* : 398.

1923. *Ramiella pachpaharensis* : Stephenson, *ibid.* : 400.

1931. *Ramiella cultrifera* Stephenson, *Rec. Indian Mus.*, **33** : 187. (Type loc. - Rangoon, Burma; types in Brit. Mus. (Nat. Hist.), London).

1954. *Ramiella bishambari* : Gate, *ibid.*, **52** : 75.

1987. *Ramiella bishambari* : Julka & Senapati, *Rec. zool. Surv. India, Occ. Paper* No. 92 : 35.

Material : (1) Jalpaiguri Dist. - 1 ex., Jalpaiguri town, 9.iv.1987; 16 exs., Hasimara (Duars), 12.iv.1987; 22 exs., Alipurduar (Duars), 17.iv.1987; Coll. K. R. Halder. (2) Midnapur Dist. - 3 exs., Belda, 25.iii.1986; 6 exs., Kolaghat, 29.iii.1986; Coll. K. R. Halder. (3) West Dinajpur Dist. - 3 exs., Bangar, 4.iv.1987, Coll. K. R. Halder.

Diagnosis : Length 20-38 mm; diameter 0.8-1.2 mm. Segments 78-91. Prostomium epilobic, tongue open. Clitellum annular, $\frac{1}{2}$ XIII, XIII- $\frac{1}{2}$ XVII, XVII. Setae *A B ca. = C D, A A ca. = B C*, ventral setae of XVIII lacking, of XVII and XIX penial. Genital markings, when present, small, circular to oval; paired, presetal on VII-IX, XVII, XX, postsetal on VII-VIII, X-XI, at or close to *A B*; unpaired and median; postsetal on XIX or 19/20. First dorsal pore at 6/7-10/11. Spermathecal pores paired, small, at *B*, slightly behind intersegmental furrows, on VIII and IX. Female pores paired, presetal, within *A*. Prostatic pores minute, at *B*; seminal grooves convex, at *A B*. Male pores minute, at or slightly lateral to *A*.

Gizzard small, barrel-shaped, in VI; intestinal origin in XIV; typhlosole a low ridge. Last pair of hearts in XII. Holandric; testes and male funnels free, in X and XI; seminal vesicles in XII, occasionally in XI and XII. Prostates in XVII and XIX; duct S-shaped. Penial setae ribbon-like, 0.5-0.95 mm long and 20-36 μ diameter; ornamentation of 7-15 transverse rows of triangular teeth. Spermathecae paired, in VIII and IX; ampulla ovoid; duct slender, longer than ampulla; unidiverticulate; diverticulum spheroidal to oval, sessile on ental end of duct. Genital marking glands lacking.

Habitat : Soil with high organic matter. In grass lands, lawns, forests and municipal dumps.

Distribution : INDIA : West Bengal - Jalpaiguri, Midnapur and West Dinajpur districts; Andaman and Nicobar Islands; Madhya Pradesh; Orissa; Uttar Pradesh. *Outside India* : Pakistan, China; Burma, Indonesia, Phillipines.

Remarks : This species originated from the sub Himalayan region, is very common in North India.

Genus 26. *Scolioscolides* Gates

1937. *Scolioscolides* Gates, *Rec. Indian Mus.*, 39 : 305. (Type species, *Megascolides bergtheili* Michaelsen, 1907.)

1972. *Scotioscolides* : Gates, *Trans. Am. phil. Soc.*, 62 (7) : 313.

Diagnosis : Setae lumbricine. Dorsal pores present. Clitellum annular, intersegmental furrows obliterated, dorsal pores occluded, setae retained. Spermathecal pores one pair, superficial not minute. Female pores paired minute, on XIV. Combined male and prostatic pores paired, on XVIII. Digestive system with one oesophageal gizzard in the space between septa 5/6 and 8/9, one pair of intramural calciferous glands in XII, intestinal origin in XV, paired lateral intestinal caeca, unpaired anteriorly directed small mid-ventral caeca one each in a number of consecutive segments in front of a short series of supra-intestinal glands, a rudimentary typhlosole terminating posteriorly with supra-intestinal glands. Meronephric, all nephridia small and avesiculate. Biprostatic; sperm ducts join prostatic ducts entally. Bithecal; spermathecae diverticulate; diverticulum arises at the ental end of a short duct.

Distribution : Possibly in the Himalayas east of Darjeeling.

Remarks : The genus is represented in West Bengal by a single species *S. bergtheili.*

63. *Scolioscolides bergtheili* (Michaelsen)

1907. *Megascolides bergtheili* Michaelsen, *Mitt. naturh. Mus. Hamb.*, 24 : 150. (Type loc. - Sandakphu, Darjeeling Dist., W. Bengal, India; types in Zoological Survey of India, Calcutta and Hamburg Museum.)

1937. *Scolioscolides bergtheili* : Gates, *Rec. Indian Mus.*, 39 : 307.

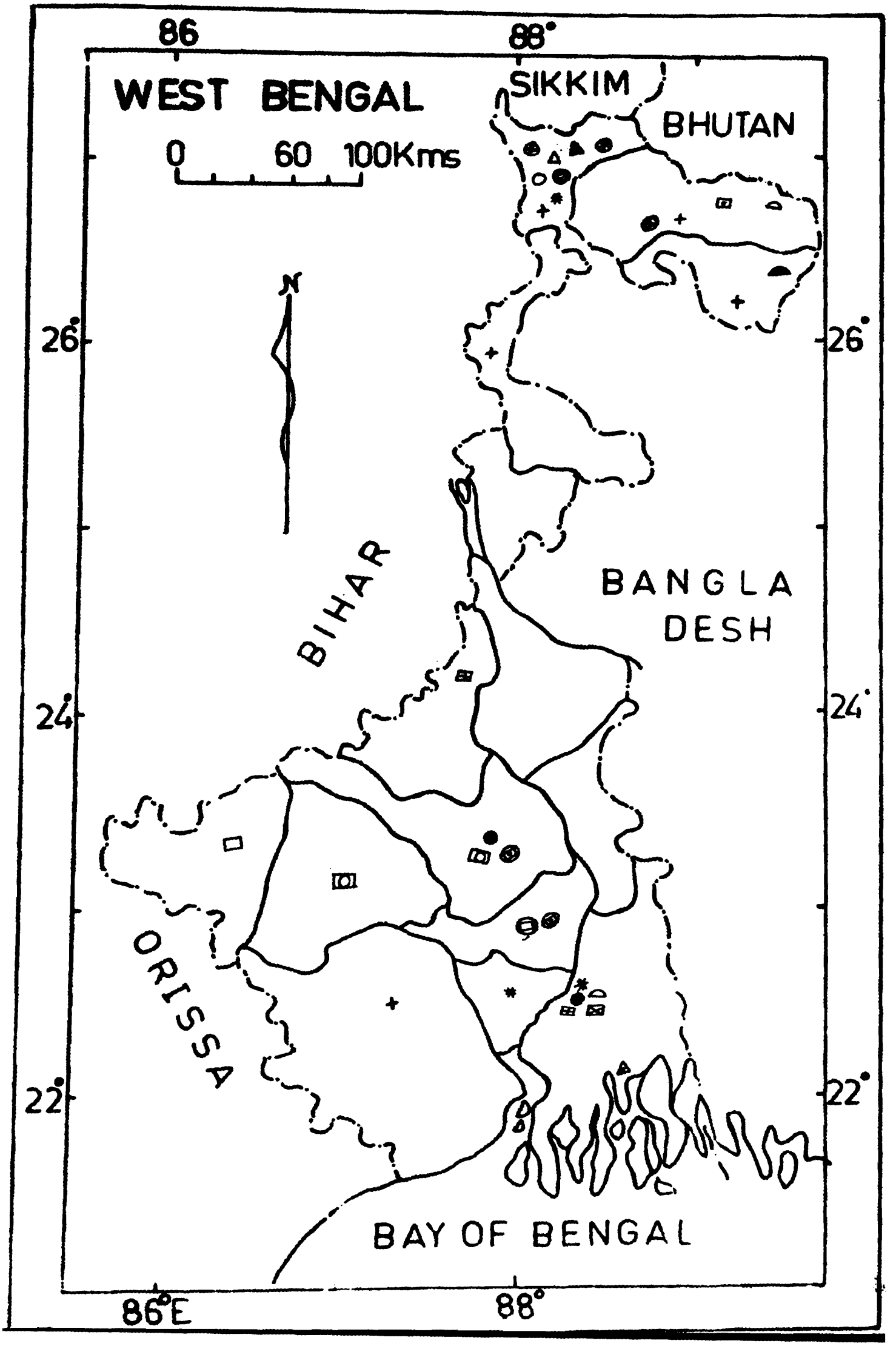
1972. *Scolioscolides bergtheili* : Gates, *Trans. Am. phil. Soc.*, 62 (7) : 314.

Diagnosis : Length 100-120 mm; diameter 4.5-5 mm. Segments 146-175. Prostomium tanylobic. Clitellum XIII-XVII. Genital markings unpaired and median, primarily presetal, reaching into *B C*, in some of XII, XIII, XX, XXI. First dorsal pore at 11/12. Spermathecal pores in *A B*, in 7/8. Male pores (combined with prostatic pores) small, transversely crescentic, each with a distinctly demarcated and rather penis-like but small tubercle in a porophore that reaches into *B C* and *A A*.

Intestinal origin in XV; lateral intestinal caeca in XXI; ventral intestinal caeca in XXIV-XXVIII; supra-intestinal glands 2 pairs in LIX-LX or LX-LXI. Last pair of hearts in XII. Holandric; seminal vesicles in IX and XII. Prostates in XVIII-XIX; duct 1.75 mm long, looped entally. Spermathecal diverticula median and lateral. Penial setae absent.

Distribution : INDIA : West Bengal - Darjeeling districts.

Remarks : This species is endemic to West Bengal.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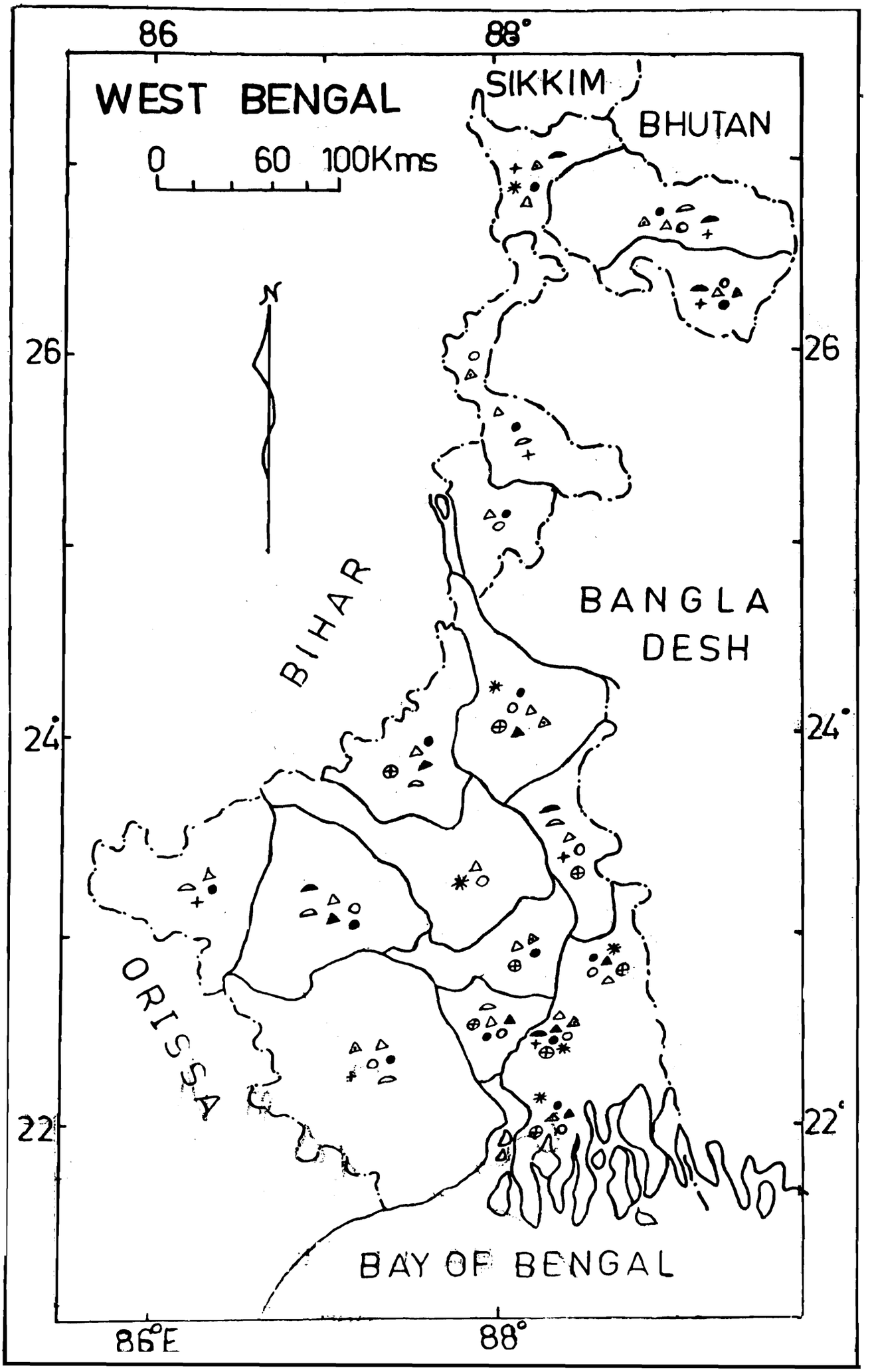
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Map No. I Showing the distrbution of rare species

(1) *Plutellus ghumensis* ( ) (2) *Plutellus sikkimensis* ( ) (3) *Pontodrilus bermudensis* ( ) (4) *Pontoscolex corethrurus* ( ) (17) *Amynthas robustus* ( ) (19) *Metaphire anomala A morph* ( ) (20) *Metaphire californica* ( ) (21) (i) *Metaphire houlleti H morph* ( ) (21) (iii) *Metaphire howlletismaller Hp morph* ( ) (23) *Metaphire peguana* ( ) (43) *Tonoscolex horai* ( ) (47) *Gordiodrilus elegans morph. paski* ( ) (48) *Nematogenia panamaensis* ( ) (55) *Eutyphoeus guadripapillatus* ( ) (57) *Lennogaster pusillus* ( ) (59) *Octochaetona compta* ( ) (60) *Pellogaster bengalensis* ( ) (61) *Ramiella bishambari* ( ) (62) *Scolioscolides bergtheili* ( ).

Map No. 2 Showing widely distributed species

(18) Lampito mauritii ( ) (21) (ii) Metaphire houlleti larger Hp morph ( ) (23) Metaphire planata ( ) (24) Metaphire Posthuma ( ) (27) Perionyx excavatus ( ) (45) Glyphidrilus tuberosus ( ) (46) Drawida nepalensis ( ) (50) Dichogaster modiglianii ( ) (54) Eutyphoeus orientalis ( ) (58) Octochaetona beatrix ( ).

SUMMARY

A comprehensive account of the earthworm fauna of West Bengal comprising 62 species belonging to 26 genera under 8 families is presented. All the species have been keyed and described for easy identification. Diagnostic characters are provided for all the families as well as genera occurring in the state. In addition, the state-wise distribution in India, district-wise distribution in West Bengal and global distribution along with endemicity and origination have been summarised in three tables. A general account of morphology, terminology and preservation is added and information on type locality and repository is also provided. The genus *Nematogenia* represented by *N. panamaensis* is new to India while the families Glossoscoblecidae represented by *Pontoscolex corethrurus* and Ocnerodrilidae represented by *Gordiodrilus elegans* morph *paski* to West Bengal; the genera *Lennogaster* represented by *L. pusillus* and the species *Octochaetona compta* (Family Octochaetidae) and *Tonoscolex horai* (Family Megascolecidae) are new to West Bengal. The study also added one more, *Metaphire houlleti* larger Hp morph to the list of four parthenogenetic morphs, one of *Gordiodrilus elegans*, one of *Metaphire anomala* and two of *Metaphire houlleti* known from India.

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FRESHWATER OLIGOCHAETES

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INTRODUCTION

Fresh water oligochaeta is a small group of worm-like invertebrates comprising three families of the Phylum Annelida with relatively simple body organisation. They live in the aquatic environment of ponds, lakes streams and even drains either swimming freely or adhering to the surface of the subs tratum, i.e aquatic weeds or living in mud under water, sometimes forming a tube around their bodies and projecting the hind end out of mud for the purpose of breathing atmospheric oxygen. Many of these have specialised respiratory organs. In size they range from microscopic to about 125 mm, usually pale red, whitish or creamy in colour. Some of these worms act as food for fishes and other animals of water.

Literature of the fresh water oligochaeta of India reveals that the group was worked out in Punjab, Uttar Pradesh and West Bengal by stephenson (1907-25), in Calcutta of West Bengal by Annandale (1905-1906), around Travancore of Kerala by Aiyar (1925-30) and the whole of Southern India by Naidu (1962-65). As a result of these works 66 species have been recorded from the country and only 18 species from the State of West Bengal.

The present work is an attempt to study the systematics of the group of the state. Material for this study were collected through occasional field trips to the districts of West Bengal during various Seasons of the year between 1986-1988. It includes description, distribution together with key for identification of 27 species, none of whom is new to science but 12 species show new locality records. The paper also furnishes a list of species higherto known from West Bengal. Synonemes have been reduced to avoid over-repetition but includes the original description and authors responsible for major changes in nomenclature.

MATERIAL AND METHOD

Collection : Worms living among aquatic vegetation and decaying vegetable matters are usually collected by washing these plants and algal masses in white based enamel trays or by leaving them on the tray for certain period of time, so that the worms come out and settle on the sides of the tray. Mud dweller are usually collected by washing a small quantity of mud at a time by an excess amount of water in the tray and then collecting them with the help of a small pipette. Bigger worms are however collected directly by needless from the trays or from their habitats.

Preservation : Among the various methods of preservation applied for successful studies of the worms in the laboratory, preservation by putting the worms directly in 4% formalin proved to be the best. Though formalin brings about certain amount of opacity of the skin, a greater part of it may be overcome by bleaching the skin with chemicals like lactophenol. Narcotisation prior to preservation with alcohol appeared to be useless because their soft bodies distritigrate easily under its influence.

Observation : The best way for a detailed study of the anatomy and morphology is to study them in living condition. During these studies the number, position, shape of setae, condition of brain, blood vessels, position of nephridium can be studied most successfully and in detail. But as oppertunities for making observation on living animals is seldom, preserved material are studied in the laboratory with glycerine under cover glass. For study of the details of setae oil immersion lens is used.

MORPHOLOGY AND TERMINOLOGY

Prostomium : The anterior most part of the body above the mouth opening; rounded, triangular or semicircular, sometimes bearing a whip lik projection or proboscis from its tip.

Setae : Specialised organelles for locomotion, crawling or swimming; arranged in dorsal and ventral bundes, one pair of each per segment. In shape and number they vary much and are of immense taxonomic importance.

Dorsal Setae : One pair per bundle arranged on dorsal surface. Contents are of two or three kinds, the needle, the hair and the crotchet setae.

Needles Setae : These are shorter, simple or bifid, with or without the median rounded portion or nodulus. The shaft is often bent in the form of a sickle.

Hair setae : Elongated, sometimes double or more than the breadth of the body and pointed ends, sometimes whip like and specially elongated in some segments. Sometimes completely absent.

Ventral setae : These are characteristically double headed (pronged), hook like (Crotchet) with the swollen portion (nodulus) at different position of the shaft. In shape they resemble the English letter 'f' usually present from segment II and are always greater in number (4-10).

Gills, branchiae or branchial processes : These are specialised organs for respiration. These may be simple extensions of the body, arranged serially, each having a loop of blood vessel *(Branchiodrilus, Branchiura)* or are leaf like expansions located at hind end of the body in a specialised depression called the 'branchial fossa' *(Dero, Auloohorus)*, sometimes guarded by a pair of lateral extensions 'the palps' *(Aulophorus)*.

Pharynx : A dorsal dilatation of the fore part of the digestive tube, usually extends from the IInd to the IVth segment.

Pharyngeal, Oesophageal or Septal glands : The pharynx and part of the oesophagus are more or less sarrounded by these deeply staining cells with glandular contents.

Stomach : A dilatation of the digestive tube behind the oesophagus.

Clitellum : A protective band in the skin overlying the reproductive organs, found approximately in segments V - VII containing glandular and supporting cells.

Nephridia : Specialised coiled tube like convoluted bodies with external opening for the purpose of excretion of nitrogenous wastes, a pair per segment.

Pineal Setae : These are new structures develop in the immediate vicinity of the atrial duct after the disappearance of the ventral setae of the atrial segments.

Dorsal vessels : The long vascular tube along dorsal body wall, free in the oesophageal and pharyngeal segments, being immediately connected with the alimentary plexus on the stomach and intestine.

Commisural vessels : These vessels unite the longitudinal vessels in a number of anterior segments only.

Testes : These are large masses of nuclei in a sparse syncytial cytoplasm and are attached to the posterior phase of septum 4/5 on each side of the ventral nerve cord and stretch back through the whole segment.

Ovaries : These are small structures similarly attached to the sides of the nerve cord and to the septum in front. It contains a very large oogonium nearest to the point of fixation.

SYSTEMATIC ACCOUNT

List of fresh water oligochaeta hitherto known from the State of West Bengal.

(Taxa new to India are marked by ** and those new to West Bengal by *)

I. Family AELOSOMATIDAE

1. Genus ***Aelosoma*** Ehrenberg
   1. *Aelosoma bengalense* Stephenson

II. Family NAIDIDAE

A. Subfamily CHAETOGASTERINAE

2. Genus ***Chaetogaster*** von Baer
   2. *Chaetogaster langi* bretscher
   3. *C. limnae bengalensis* Annandale

B. Subfamily NAIDINAE

3. Genus ***Allonais*** Sperber
   4. *Allonais gwaliorensis* (Stephenson)*
   5. *A. inaequalis* (Stephenson)*
   6. *A. paraguayensis* (Michaelsen)
4. Genus ***Branchiodrilus*** Michaelsen*
   7. *Branchiodrilus hortensis* (Stephenson)*
   8. *B. semperi* (Bourne)*
5. Genus ***Dero*** Oken*

   a. Subgenus ***Aulophorus***
   9. *Aulophorus tonkinensis*

   b. Subgenus ***Dero***
   10. *Dero cooperi* Stephenson*
   11. *D. dorsalis* Ferroniere*
   12. *D. indica* Naidu*
   13. *D. zeylanica* Stephenson*
6. Genus ***Nais*** Muller

14. *Nais barbata* Muller
15. *N. elinguis* Muller
16. *N. simplex* Pignet **

7. Genus ***Slavina*** Vejdovsky
17. *Slavina appendiculata* (d'udekem)

8. Genus ***Stylaria*** Lamarck
18. *Stylarias fossularis* Leidy

c. Subfamily **PRISTININAE**

9. Genus ***Pristina*** Ehrenberg
19. *Pristina aequiseta* Bourne
20. *P. longiseta longiseta* Ehrenberg
21. *P. proboscidea* Beddard
22. *P. sperberae* Naidu*

III. Family **TUBIFICIDAE**

10. Genus ***Aulodrilus*** Bretscher*
23. *Aulodrilus remex* Stephenson*

11. Genus ***Bothrioneurum*** Stolc.
24. *Bothrioneurm iris* Beddard.

12. Genus ***Branchiura*** Beddard
25. *Branchiura sowerbyi* Beddard

13. Genus ***Limnodrilus*** claparede
26. *Limnodrilus hoffmeisteri* claparede

14. Genus ***Tubifex*** Lamarck*
27. *Tubifex tubifex* (Muller)*

Key to the Families

1. Crotchet setae and septa absent ..... **AELOSOMATIDAE**
   Crotchet setae and septa present 2
2. Crotchet setae in both ventral and dorsal bundles ..... **TUBIFICIDAE**
   Crotchet setae in ventral bundles only ..... **NAIDIDAE**

I. Family AELOSOMATIDAE

Diagnosis : Small, upto 10 mm. prostomium with cilia. Setae in four bundles, both dorsal and ventral bundles with capillary setae, often with single or double pointed hooks or needles setae. Septum wanting in most part. Testes and ovaries in Vth and VIth segments.

Remarks : Aelosomatidae is represented by a single genus *Aelosoma* Ehrenberg.

Genus *Aelosoma* Ehrenberg, 1831

1831. *Aelosoma* Ehrenberg, *Symb. Phys.* (Page no. not available)

1980. *Aelosoma* : Persia, *In* Aquatic oligochaete Biology, Brinkhurst & Cook (Eds), p. 80

Diagnosis : Prostomium not separated from the body by a well marked groove. Eyes and septa absent. Dorsal and ventral setae from IInd segment onwards and composed of needles and hairs. Stomach conspicous. Nephridia paired, starts from IInd or IIIrd segment. budding zones apparent.

Remarks : The genus *Aelosoma* is represented in India by six species, only one of which is so far known from West Bengal.

1. *Aelosoma bengalense* Stephenson, 1911

1911. *Aelosoma bengalense* Stephenson, *Rec. Ind. Mus. Calcutta*, **6** : 204.

1962. *Aelosoma bengalense* : Naidu, *J. Bomb. nat. Hist. Soc.* **38**(3) : 648-651, figs, 1 & 3.

Diagnosis : Size microscopic, length 1-1.5 mm in preserved state; whitish. Prostomium with sensory hairs. Body wall colourless and transparent. Setae all straight, capillary; bundles consist as a rule of one long and several shorter, the long one nearly twice the length of the shorter, bayonet shaped and non-serrate. Mouth ventral 'v' shaped; oesophagus in IInd and stomach in IVth to 1/2 VIIIth segment. Nephridia begins in IInd segment. Budding zone more than one is common.

Habits : Glyding, not swimming; purely fresh water.

Distribution : India - West Bengal : Calcutta; Kerala. Outside India - S. America.

Family NAIDIDAE

Diagnosis : Prostomium sometimes forming a proboscis. Ventral setae of an indefinite number per bundle beginning in IInd segment and consisting of double sometimes single pointed crotehets; dorsal setae sometimes absent, begins in IInd, IIIrd, IVth Vth and VIth segments when present, consisting of a variable number of hair setae and quite different shaped needle setae or needle setae only. Vascular system with dorsal and ventral vessels, alimentary plexus and commisural vessels. Nephridia open. clitellum in a few segments in the region of the gonads. Pineal setae often present. Asexual reproduction by budding or fragmentation.

Distribution : Europe; Pakistan; Tibet; Ceylon; Nand S. America.

Remarks : Naididae is the biggest family of the fresh water oligochaeta including 11 genera in India and in the state of West Bengal. It is divided into three subfamilies.

Key to the Subfamilies

1. Dorsal setae absent; segment III specially elongated ..... Subfamily CHAETOGASTRINAE
   Dorsal setae present; no specially elongated segment 2
2. Dorsal setae begin from segment IV, V or VI ..... Subfamily NAIDINAE
   Dorsal setae usually begin from segment III ..... Subfamily PRISTININAE

Subfamily CHAETOGASTRINAE

Diagnosis : Prostomium reduced; segment III elongated. Eye absent. Dorsal setae usually absent, when present consist of double pronged crotchets. Oesophageal as well as septal glands absent. Chloragen begining in Vth. Nephridia closed. Testes in Vth and ovaries in VIth segment. Prostate gland absent.

Genus ***Chaetogaster*** von Baer 1827

1827. *Chaetogaster* Von Baer, *Nova Acta. Phys. med. Acad. Leop. Card. Nat. Cur. Bonn.* **13** : 611.

1980. *Chaetogaster* : Persia, *In* Aquatic oligochaete biology, Brinkhurst & Cook (Eds), p. 85.

Type Species *Chaetogaster limnae* von Baer

Diagnosis : Dorsal setae absent; Ventral setae double pronged or simple crotchets but absent in IIIrd to Vth segment. Septa incomplete. Stomach well defined. Clitellum in 1/2Vth-VIth segment. Pineal setae present.

Distribution : Europe; Pakistan; Tibet; Persia; Burma and India.

Key to the Species

1. Double pronged crotchets with strongly curved teeth ..... ***C. limnae bengalensis***

   Double pronged crotchets with normally curved teeth ..... ***C. langi***

2. ***Chaetogaster langi*** Bretscher 1896

1896. *Chaetogaster langi* bretscher, *Rev. Suisse. Zool.* **3** : 512-513, fig. 1.

1966. *Chaetogaster langi* : Naidu, *Hydrobiologia*, **27**(1-2) : 211.

Diagnosis : Size very small, upto 2 mm; transparent. Prostomium short and blunt, fringed with sensory hairs. Setae 5-7 per bundle in IInd segment, 3-6 in the rest, length equal to two third the diameter of the body; distal prong of the forked end longer than the proximal. Mouth subterminal, always open. Nephridia two per segment begining from VIIth segment.

Habits : Usually stick to the walls of the container. Never found among aquatic weeds, Found in brackish water also.

Distribution : India : West Bengal - Calcutta; Andhra Pradesh. Outside India : Africa; Europe; Pakistan; Persia; N. & S. America.

3. ***Chaetogaster limnae bengalensis*** Annandale, 1905

1905. *Chaetogaster bengalensis* Annandale, *Journ & Proc. Asiat. Soc. Bengal.* 1 : 117, pl. III, fig. 1-4.

1966. *Chaetogaster limnae bengalensis* : Naidu, *Hydrobiologia*, **27**(1-2) : 211.

Diagnosis : Size small, about 10 mm at full length; diameter less than 0.5 mm. Prosomium practically absent. Setae in bundle of 15-17, arranged in semicircles, shaft straight, prongs almost equal in length and thickness; in segment II the setae are longer than those of others, position of nodulus median to distal.

Habit : Purely fresh-water. Sometimes commensal on water snails.

Distribution : India : West Bengal - calcutta; Madhya Pradesh; Punjab. Outside India : Pakistan; Burma.

Subfamily NAIDINAE

Diagnosis : Eyes normally present. Pharyngeal, Oesophageal and septal glands present. No especially elongated segment. Pharynx with dorsal diverticulum. Male reproductive organ in IVth segment (seldom in Vth). 4 or more pairs of commisural vessels.

Key to the Genera

1. Prostomium with proboscis ..... ***Stylaria***

   Prostomium without proboscis 2

2. Branchial processes present 3

   Branchial processes absent 4

3. Branchial processes dorso-and ventro-laterally arranged, finger-like, a pair per segment anteriorly ..... ***Branchiodrilus***

   Branchial process are located within branchial fossa at the hind end, leaf-like,of variable number ..... ***Dero***

4. Dorsal bundle of setae with double pointed or pectinate needles ..... ***Allonais***

   Dorsal bundle of setae with simple needles 5

5. Specially elongated hair setae present in VIth segment; body covered with rows of sensory papillae ..... ***Slavina***

   Specially elongated hair setae absent; no sensory papillae ..... ***Nais***

Genus *Allonais* Sperber, 1948

1948. *Allonais* Sperber, *Zool. Bidr. Uppsala.* **28** : 299-201.

1980. *Allonais* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : p. 95.

Type Species - *Allonais inaequalis* (Stephenson, 1911)

Diagnosis : No eye. Prostomium bluntly triangular. Dorsal bundle of setae from VIth segment and consisting of hairs and double pointed or pectinate needles; ventral setae of IInd to Vth segment only slightly different from those of the following segments. Septal glands absent.

Distribution : India; S. America.

Remarks : Genus *Allonais* Sperber includes five Indian species, three of which occur in West Bengal.

Key to the Species

1. Needle setae of dorsal bundle bifid and unequal 2

   Needle setae of dorsal bundle pectinate ..... *A. inaequalis*

2. Distal teeth of needles longer than proximal ..... *A. gwaliorensis*

   Proximal teeth of needles longer than dital ..... *A. paraguayensis*

4. *Allonais gwaliorensis* (Stephenson, 1920)

1920. *Nais gwaliorensis* Stephenson, *Mem. Ind. Mus.* Calcutta, **7** : 198-199, pl. IX, figs. 3-4.

1948. *Allonais gwaliorensis* : Sperber, *Zool. Bidr. Uppsala,* **28** : 205-206.

1962. *Allonais gwaliorensis* : Naidu, *J. Bomb. nat. Hist. Soc.* **59**(3) : 919-921, fig. 27 A-F.

Material : Bankura district : 1 ex. Bishnupur, 28.12.86., Coll. S. K. Mukhopadhyay.

Diagnosis : Size medium, 15-20 mm., Slender, pale white. Prostomium without sensory hairs. Dorsal setae with 1-2 hair and 1-2 needles per segment, hairs simple and smooth; needles sickle shaped, bifid with distal tooth thinner, slightly longer and straighter than proximal one having acute angle between the teeth; ventral setae 4-6 per bundle, bifid crotchets with distal prongs longer than proximal ones. In segment II number is little less; nodulus slightly proximal in IInd to Vth segments, median in Vth and distal in others. Nephridia start from VIIth segment. Fragmentation occurs.

Habit : Live among aquatic weeds; swim freely by lateral undulations.

Distribution : India : West Bengal - Bankura district; Andhra Pradesh; Madhya Pradesh. Outside India : East Asia.

5. ***Allonais inaequalis*** (Stephenson, 1911)

1911. *Nais pectinata* var. *inaequalis*, Stephenson, *Rec. Ind. Mus.*, Calcutta, **6** : 208-209, fig. 2.

1948. *Allonais inaequalis* : Sperber, *Zool. Bidr. Uppsala.*, **28** : 201-203, fig 21 A-D.

Material : Burdwan district : 2 exs, Katwa town, 5.12.86; Calcutta Museum tank, 17.11.85; Howrah district : 1 ex, Mourigram, 7.4.86; Hooghly district : 2 exs. Janai, 10.12.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size large, 25 mm; light brown with irregular reddish brown patches near dorsal bundle of setae. Eye absent. Prostomkum elongated. Dorsal bundle of setae begin from VIth segment and consist of 1-2 hairs and 1-2 needles per bundle, hairs smooth and slightly curved, needles pectimate with 1-4 intermediate teeth connected by webb, proximal prong longer than distal; ventral setae 4-6 per bundle, those of segments II-V thinner and straighter than other with slightly proximal nodulus, others having nodulus slighly distal and teeth equally long. Clitellum embracing segments VI to VIII. Nephridium begins from VIIIth segment.

Habit : Found amog aquatic plants and decaying vegetable matter. Swim by horizontal undulations.

Distribution : India : West Bengal - Burdwan, Calcutta, Howrah and Hooghly districts; Andhra Pradesh; Kerala and Uttar Pradesh. Outside India : S. Africa; S. America.

6. ***Allonais paraguayensis*** (Michaelsen, 1905)

1905. *Nais paraguayensis* Michaelsen, *Zoologica*, **18**, half 44 : 350.

1948. *Allonais paraguayensis paraguayensis* : Sperber, *Zool. Bidr. Uppsala*, **28** : 203-204, fig. 28B

1980. *Allonais paraguayensis* : Persia, *In* Aquatic oligochaete Biology, Brinkhurst & Cook (Eds.) : 95.

Material : Malda district : 1 ex. Bamongola, 13.11.87, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 10 mm, light orange, segments 100 (approx.). Prostomium short, rounded, Anus dorsal. Dorsal setae from VIth segments onwards, with needles and hairs, 1-2 of each per segment; hairs simple; needles sickle shaped, bifid with proximal tooth being twice as long as and thicker than distal which is again bifid; ventral bundle of setae with 3-6 bifid crotchets having distal prongs are of equal length with the proximal. Clietellum embracing Vth - VIIIth segments. Nephridium starts between VIIth and VIIIth. Pineal setae present.

Habit : Swims on water surface with transverse movements rotating round its axis.

Distribution : India : West Bengal Calcutta; Malda districts; Bihar; Madhya Pradesh. Outside India : East Asia, N. & S. America.

Genus ***Branchiodrilus*** Michaelsen, 1900

1890. *Chaetobranchus* Bourne, *Quart, J. Mic. Sci.* **31** : 83.

1900. *Branchiodrilus* Michaelsen, *Tier.*, **10** : 24.

1962. *Branchiodrilus* : Naidu, *J. Bomb. nat. Hist. Soc.* **59**(2) : 525.

Type species - *Branchiodrilus Semperi* (Bourne)

Diagnosis : Prostomium rounded. Paired branchial proceses dorsalaterally placed on many or most of the body segments beginning immediately after the anterior end of the body. Dorsal setae begin in the same segments as the gills and consisting of hair and needle setae; ventral setae bifid crotchets. Clitellum in Vth-VIIIth segments. Pineal setae present.

Distribution : Pakistan; India.

Remarks : This is the first record of the genus from West Bengal.

Key to the Species

1. Needle setae of posterior segments curved distally ..... *B. semperi*

   Needle setae of all segments with straight tips ..... *B. hortensis*

7. ***Branchiodrilus hortensis*** (Slephenson, 1910)

1910. *Lahoria hortensis* Stephenson, *Rec. Ind. Mus.* Calcutta, **5**, p. 59, text figs. 1-3, pl. VII, figs. 1-3.

1912. *Branchiodrilus hortensis* : Stephenson, *Rec. Ind. Mus.* Calcutta, **7**, p. 229.

1948. *Branchiodrilus hortensis* : Sperber, *Zool. Bidr. Uppsala*, **28**; p. 157-158, fig. 28A.

Material : Bankura Dist. 1 ex., Saltora, 29.11.86; Hooghly district : 1 ex., Chinsura, 12.12.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size moderate, 25 mm; segments about 100. Prostomium bluntly conical, well marked, transverse pigmented bands extended over the body upto XXth segment. Gills extend almost upto the hind end of the body, gradually diminishing in size posteriorly, largest being three times the diameter of the body. Dorsal setae consisting of usual hairs and needles, 2 of each per bundle; first 40 hair setae hidden inside the gills, behind which they are free; needles short and pointed, ventral setae consisting of 4-5 bifid crotchets, having distal prong longer than proximal and thinner and at the bases, nodulus a little distal. Clitellum includes Vth to VIIIth segments. Pineal setae 2-3 in each bundle, simple but hooked.

Habit : Mud dwellers, not swiming.

Distribution : India : West Bengal - Bankura and Hooghly districts; Uttar Pradesh. Outside India - Nil.

8. ***Branchiodrilus semperi*** (Bourne, 1890)

1890. *Chaetobranchus semperi* Bourne, *Quart. J. Mic. Sci.*, **31** : P. 83, pl XLI.

1900. *Branchiodrilus semperi* : Michaelsen, *Tier.*, **10** : 24.

1948. *Branchiodrilus semperi* : Sperber, *Zool. Bidr. Uppsala*, **28** : 156.

Material : Bankura dist : 4 exs, Saltora, 29.11.86; Burdwan dist : 3 exs, Katwa, 5.12.86; 1 ex, Burdwan University campus, 8.12.86; Midnapur dist : 2 exs, Garbeta, 28.3.86; 2 exs. Midnapur Town, 30.3,86; Nadia dist : 4 exs., Champta near Nabadwip, 18.11.87; Purulia dist : 12 exs, Raghunathpur, 4.4.86; West Dinajpur dist : 7 exs, Bangar, 4.4.87, Coll. S. K. Mukhopadhyay.

Diagnosis : Size large, 30-40 mm. diameter 0.5 mm; segments 80-90. Transverse pigmented bands in anterior part of the body only. Prostomium bluntly triangular. Gills dorsolateral, one pair in each of the anterior 40-50 segments beginning from the IInd segment, the first five or six pairs a little shorter, gradually increasing in length after the 20th segment, after which become shorter until they become mere warts; length of the largest gill is several times the diameter of the body; gills are hollow projections of the body wall, ciliated, each having a loop of the dorsal blood vessel. Dorsal setae enclosed within the gills begin from the IInd segment, consisting of hairs and needles; two or three of each in each bundle, very long in the anterior segments; ventral setae starts from the IInd segment, 4-6 per bundle, bifid crotchets, outer prongs of which being twice the length of the inner, while in hind segments the inner being twice the length of the outer. Nephridium begins at XIIth segment. Budding zone seen one at a time.

Habit : Mud dwellers; not swimming.

Distribution : India : West Bengal - Bankura, Burdwan, W. Dinajpur, Midnapur, Nadia and Purulia districts; Andhra Pradesh; Tamil Nadu. Outside India - Nil.

Genus *Dero* Oken, 1815

1815. *Dero* Oken, Lehrbuch der Naturgeschichte 3. Zoologie 1 : Fleischlose Thiere. Leipzig.

1980. *Dero* : Persia, *In* Aquatic Oligichaete biology, Brinkhurst & Cook (Eds.) : 90.

Diagnosis : Eye absent. Dorsal setae from either IVth or Vth segment onwards, consisting of hairs and doubled pronged pectinate or palmate needles. Ventral setae of IInd to Vth segment different from the rest, having the distal teeth longer than the proximal but euqlly thick, compared with equally long or short but thinner in the later segment. Pharynx in IInd to IVth segment with pharyngeal glands. Nephridia invested with peritoneal cells in some. Usually tube dwellers.

Distribution : Africa; Europe; China; Palestine; Pakistan; Turkestan; India; Ceylon; North and South America and West Indies.

Remarks : This is the first record of the genus from West Bengal.

Key to the Subgenera

Posterior border of branchial fossa projecting into two palps; dorsal setae begin from IVth, Vth or VIth segment ..... ***Dero (Aulophorus)***

Posterior border of branchial fossa do not project as palp; dorsal setae begin from IVth or VIth segment..... ***Dero (Dero)***

Subgenus *Aulophorus* Schmarda, 1861

Subgeneric type *Aulophorus furcatus* (Muller)

Diagnosis : Dorsal setae start from IVth, Vth or VIth segment; Ventral setae of IInd to Vth segment may or may not be different from the following segments. Posterior border of branchial fossa projecting into two palps. Coelomocytes may or may not be present. Pineal setae absent usually. Budding or fragmentation. Live in portable tubes.

Distribution : Africa; India; Sumatra; North and South America.

9. *Dero (Aulophorus) tonkinensis* (Vejdovsky)

1894. *Dero tonkinensis* Vejdovsky, *Mem. Soc. Zool. Fr.*, 7 : 244-245.

1909. *Aulophorus tonkiensis* : Michaelsen, *Mem. Ind. Mus.*, 1 : 132.

1962. *Dero (Aulophorus) tonkiensis* : Naidu, *J. Bombay nat. Hist. Soc.*, 59 (3) : 911-914.

Material : Burdwan dist : 2 exs., Burdwan Univesity campus, 8.12.1986, Coll. S. K. Mukhopadhyay.

Diagnosis : Size very small, 2-5 mm, whitish and transparent. Prostomium bluntly triangular. Dorsal setae begin from VIth segment and consisting of one hair and one needle in each bundle, sometimes 2 of each; hairs smooth, bayonet-shaped, needles straight with distal nodulus having webbed teeth like oars; ventral setae 3-4 per bundle, those of IInd to Vth segment 4-5 per bundle, bifid crotchets, having proximal nodulus. Branchial organ cup-shaped, fossa opening posteriorly; palps one pair with stiff hairs; gills 2 pairs, digitiform, shorter than palps. Nephridium starts from VIIIth segment. Budding zone apparent.

Habit : Worms seems to live in chitinous tubes, which hang down with one end attached. When free from tubes worms swim with vigourous undulations of the body.

Distribution : India; West Bengal - Burdwan district; Andhra Pradesh; Karnataka and Uttar Pradesh. Outside India : Africa.

Subgenus *Dero* Oken, 1815

1948. *Dero (Dero)* sperber, *Zool. Bidr. Uppsala*, 28 : 162.

1980. *Dero (Dero)* : Persia, *In* Aquatic Oliguchate Biology, Brinkhurst & Cook (Eds.) : 90.

Diagnosis : Dorsal setae begin from IVth or VIth segment; ventral setae of IInd to VIth segmet as a rule sharply differentiated from the following. Palp absent. Budding occurs. Usually live in fixed tubes.

Key to the Species

1. Dorsal setae begin from IVth segment..... *D. (D.) dorsalis*
   Dorsal setae begin from VIth segment..... 2
2. Dorsal setal bundles with one hair and one needle in all segments ..... *D. (D.) cooperi*
   Dorsal setal bundles with more than one hair and one needle per bundle..... 3
3. Dorsal setal bundle with 2 hairs and 2 needles in anterior and middle segments... *D. (D.) indica*
   Dorsal setal bundles with 3-4 hairs and 3-4 needles in anterior and middle bundles .....
   ..... *D. (D.) zeylanica*

10. *Dero (Dero) cooperi* Stephenson, 1932

1932. *Dero cooperi* Stephenson, *Proc. Zool. Soc. Lond.*, 1932 (1-2) 231-232, figs. 2-5.

1980. *Dero (Dero) cooperi* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds) : 90-91

Material : Bankura dist : 1 ex., Saltora, 29.11.86; 2 exs., Susunia, 2.12.86; 1 ex., Aral Bansi, 27.11.86; Burdwan dist : 1 ex., Andal, 3.12.86; 2 exs., Raina, 7.12.86; 1 ex., University campus, 8.12.86; Midnapore dist : 1 ex., Midnapore town, 30.3.86; Malda dist : 3 exs., Bmangola, 13.12.87; Nadia dist : 1 ex., Champta, 18.11.87; Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 10 mm, pale red. Prostomium with sensory hairs. Dorsal setae start from VIth segment having one hair and one needle per bundle; hairs bayonet - shaped, smaller than body diamter; needle sickle-shaped with distal nodulus, bifid with short but equal teth; ventral setae from IInd segment, those of IInd to Vth, 4-5 per bundle, straighter, thinner and longer, with proximal nodulus. Branchial fossa having anterior margin flat and broad, posterior margin prolonged into convex lip; gill 4 pairs, one pair dorsal, one pair lateral and two pairs ventral. Clitellum covers Vth to VIIth segment. Nephridium starts in VIIth segment.

Habit : Live in tubes with mucus, sand and mud; swim with spiral movements.

Distribution : India : West Bengal - Bankura, Burdwan, Malda, Midnapore and Nadia districts; Andhra Pradesh; Karnataka; and Uttar Pradesh. Outside India : Abyssinia and Pakistan.

11. *Dero (Dero) dorsalis* Ferroniere, 1899

1899. *Dero dorsale* Ferroniere, *Bull. Soc. Sci. nat. ouset. Nantes.* **9** : 255-257.

1933. *Dero dorsalis* : Michaelsen, *Zool. Jharb. Syst.*, **64** : 334.

1980. *Dero (Dero) dorsalis* : Sperber, *Zool. Bidr. Uppsala*, **28**.

Material : Bankura dist : 1 ex., Saltora, 29.11.86; Burdwan dist : 3 exs., Andal, 3.12.86; 3 exs., Galsi, 6.12.86; 1 ex., Katwa, 5.12.86; 2 exs., University campus, 8.12.86; 13 exs., Raina, 7.12.86; West Dinajpur : 2 exs., Bangar, 4.4.87; 1 ex., Raigunje, 7.4.87; Hooghly dist : 1 ex., Pandooah, 10.12.86; 1ex., Kamarpukur, 1.12.86; Maldah dist : 5 exs., Kaliachawk, 12.11.87; Nadia dist : 1 ex., Champta, 18.11.87; 2 exs., Paraz, 17.11.87; Midnapore town, 30.3.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 10-15 mm, elongated and slender; segmentation prominent. Dorsal setae begin from IVth segment, one hair and on needle or 2 of each in every bundle, hairs not much elongated, bayonet-shaped; needles sickle-shaped, bifid having distal tooth slightly longer than proximal, ventral setae vary in number, usually 4, 3 or 2 per bundle in anterior, middle and posterior segments respectively, those of IInd to Vth segment are less curved with median nodulus while in others it is distal. Branchial fossa with 5 pairs of gills, ciliated and foliate; anterior margin of fossa entire, posterior margin with short, broad and diverging palp like processes. Clitellum in Vth - VIIIth segment. Nephridium starts in VIIth. pineal setae absent. Tube dwellers.

Hatit : Live in soft mud along with other species of the genus.

Distribution : India : West Bengal - Bankura, Burdwan, West Dinajpur, Hooghly, Malda, Midnapore and Nadia Districts; Andhra Pradesh and Kerala. Outside India - Europe.

12. *Dero (Dero) indica* Naidu, 1962

1962. *Dero indica* Naidu, *J. Bombay nat. Hist. Soc.*, **59** (1) : 533-536, fig. 14 (A-G).

1980. *Dero indica* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 93.

Material : Bankura district : 1 ex., Saltora, 29.11.86; Howrah dist : 1 ex., Domjur, 7.4.86; Coll. S. K. Mukhopadhyay.

Diagnosis : Size moderate, 15-20 mm, pale red. Prostomium bluntly triangular. Dorsal setae begin from VIth segment with 2 hairs and 2 needles per bundle in segments of anterior half while one of each in segments of posterior half; hairs bayonet-shaped; needles sickle-shaped, nodulus toward distal end, bifid with strong teeth having the outer prongs longer; ventral setae 3-4 per bundle, bifid crotchets, teeth unequal with distal prong thinner and slightly longer than proximal, nodulus distal, setae of IInd to Vth segment longer and straighter. Branchial organs funnel shaped; gills 4 pairs, foliate, one pair short, two pairs long and one pair broad. Nephridium starts in VIIth segment. Budding zone clear.

Habit : Live in soft mud along with *Branchiodrilus semperi, Limnodrilus hoffmeisteri* and other species of the genus *Dero.*

Distribution : India : West Bengal - Bankura and Howrah districts; Andhra Pradesh and Karnataka. Outside India : Nil.

3. *Dero (Dero) Zeylanica* Stephenson, 1913

1913. *Dero zeylanica* Stephenson, *Spolia Zeylan.*, Colombo, 8 : 252-256, pl.1, figs. 1-4.

1948. *Dero (Dero) zeylanica* : Sperber, *Zool. Bidr. Uppsala*, **28** : 178-179.

Material : Bankura dist : 1 ex., Aral Bansi, 27.11.86; 3 exs., Saltora, 29.11.86; 4 exs., Susunia, 2.12.86; Burdwan dist : 12 exs., Katwa, 5.12.86; 14 exs., Galsi, 6.12.86; 11 exs., Raina, 7.12.86; 1 ex., University campus, 8.12.86; Malda dist : 1 ex., Bamangola, 13.11.87; 7 exs., Kaliachawk, 13.11.87; Midnapore dist : 2 exs., Midnapore town, 30.3.86; Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 8 mm, light brown. Prostomium rounded. Dorsal setae begin from VIth segment, each bundle having 2 hairs and 2 needles or 3 of each in every bundle or 3,2 or 1 of each in anterior, middle and posterior segments respectively; hairs long, bayonet-shaped with distal nodulus; ventral setae 4-6 per bundle, bifid crotchets, nodulus distal; in IInd to Vth segment setae 4-5 per bundle, thinner and straighter, nodulus median and diverging teeth. Branchial organ with flat anterior and posterior margin; 4 pairs of gills, foliate, one pair dorsal, one pair ventral and 2 pairs lateral. Nephridium begins from VIIth segment. Clitellum includes Vth - VIIth segment.

Habit : Live in soft mud along with ohter species of Naididae; rarely in tubes; swim by slow spiral movements.

Distribution : India : West Bengal - Bankura, Burdwan, Malda and Midnapore districts; Andhra Pradesh; Karnataka and Kerala. Outside India : Ceylon.

Genus *Nais* Muller, 1773

1773. *Nais* Muller, Vermium terrestrium et fluviatilium II. Hafniae et Lipsiae, pp. 23-24.

1980. *Nais* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 87.

Type species : *Nais barbata* Muller

Diagnosis : Prostomium simple, rounded. Hind end simple. Dorsal setae beginning in Vth segment, consisting of moderately long hair setae and simple or bifid needles. Ventral bundles consisting of double pronged crotchets, those of IInd to Vth segment well differentiated from those of the following segments. Pharynx in IInd and IIIrd segment. Pharyngeal and oesophageal glands present. Clitellum includes segments Vth to VIIth. Pineal setae present.

Distribution : Africa; Europe; Tibet; India; Sumatra; North America.

Key to the Species

1. Needle setae single pointed 2

   Needle setae double pointed ..... *N. elinguis*

2. Needles hair-like with sharp tip and nodulus slightly distal ..... *N. barbata*

   Needles not hair-like, short with fairly obtuse tip and nodulus 1/3rd from distal end ..*N. simplex*

14. *Nais elinguis* Muller, 1773

1773. *Nais elinguis* Muller, Vermium terrestrium et fluviatilium II Hafniae et Lipsiae, p.22.

1980. *Nais elinguis* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cock (Eds.) : 88.

Diagnosis : Size small, 2-10 mm, brown anteriorly. Dorsal bundle of setae wth 2-3 needles and 2-3 hard hairs, needles with curved tip, finely bifid; hairs three times the length of neeles; ventral setae 2-5 per bundle, bifid crotchets, those of IInd to Vth segments hardly longer, straighter and thinner than the rest, with nodulus 1/3rd - 1/2 from distal end, and with distal tooth about as twice as long as proximal; from VIth segment onward nodulus distal and distal tooth twice as long as proximal. Pineal setae 4-5 in number, Dorsal vessel mid-dorsal.

Habit : Frequently brakish water; swim by lateral movements. Sometimes live in association with fresh water sponges.

Distribution : India : West Bengal Calcutta. Outside India : Europe, brakish-water of North Sea and Baltik.

15. *Nais barbata* Muller, 1773.

1773. *Nais barbata* Muller, Vermium terrestrium et fluviatileum II. Hafniae et Lipsiae : 23-24.

1980. *Nais barbata* : Spencer, *In* Aquatic Oligochaete Biology, Brinkhurst and Cook(Eds.) : 120.

Diagnosis : Size small, 4-6 mm. yellowish brown anteriorly. Dorsal bundle of setae consist of 2-5 needles and 1-5 stiff hairs, needles with sharp long tip, single pointed; ventral setae 2-5 per bundle, bifid crotchets, those of IInd to Vth segment much longer, thinner and straighter than the rest, having distal tooth longer than proximal and slightly thinner with proximal nodulus, others having the teeth equally long and nodulus distal. Dorsal vessel to the left of the gut, Pineal setae 2-3 on each side with simple fork.

Habit : Swim with spiral movements in fresh water habitat.

Distribution : India : West Bengal - Calcutta; Uttar Pradesh. Outside India : Europe and N. America.

16. *Nais simplex* Pignet, 1906

1906. *Nais variabilis* var. *simplex* Pignet, *Rev. Suisse. Zool.* **14** : 260-266, pl.XI, fig. 22-24, pl.XII, fig 1-3, 14.

1909. *Nais simplex* Piguet, ibid, **17** : 202-204, pl. III, fig.12.

1980. *Nais simplex* : Spencer, *In* Aquatic Oligochaete Biology, Brinkhurst and Cook(Eds.) : 120.

Material : Bankura dist : 1 ex, Aral Bansi; 27.11.86; Howrah dist : 2 exs, Mourigram, 8.4.86; 24 Paraganas dist : 1 ex., Sonarpur, 12.9.87, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 8 mm, Pigmented. Dorsal bundle of setae begin in VIth segment, consisting of 1-2 hairs and 1-2 needles per bundle, needles single pointed; ventral setae beginning in IInd segment, 2-6 per bundle, those of IInd to Vth segment longer, straighter and thinner than the rest with proximal nodulus and having distal tooth twice the length of the proximal, others following have 2-5 per bundle, stouter and the teeth are about equally long. Dorsal vessel to the left of the middle line.

Habit : Swim with spiral movements, live among weeds in calm water.

Distribution : India : West Bengal Bankura, Howrah and 24 Parganas dists. Outside India : Europe; N. America.

Remarks : This is the first record of the species from India.

Genus *Slavina* Vejdovsky, 1883

1883. *Slavina* (part) Vejdovsky, *Sitz. ber. Bohm. Ges. Naturw. Prag.*, 1883, p.219.

1980. *Slavina* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst and Cook(Eds.) : 88.

Type species : *Slavina appendiculata* (d'udekem, 1855)

Diagnosis : Prostomium rounded. Body wall provided with rows of sensory papillae and usually sarrounded by adhering foreign matter. Eyes may be present. Dorsal setae begining in IVth or VIth segment with hair and single pointed distally curved needles. Ventral setae consist of double pronged crotchets. Clitellum embracing segment Vth and VIth. Oesophageal and pharyngeal glands present. Pineal setae present.

Distribution : Europe; E. Asia; India; N. & S. America.

17. *Slavina appendiculata* (d'udekem, 1855)

1855. *Nais appendiculata* d'udekem, *Bull. Ac. Belgique*, **22** : 552.

1883. *Slavina appendieulata* Vejdovsky, *Sitz. ber. Bohm. Ges. Naturw. Prag.* 1883 : 219.

1980. *Slavina appendiculata* : Spencer, *In* Aquatic oligochaete Biology, Brunkhurst and cook (Eds.) : 120.

Diagnosis : Size very small, upto 8 mm; segments upto 45; light brown, opaque due to an investment of extraneous particles. Prostomium rounded. Dorsal setae starts from VIth segment, consisting of 1-2 stout hairs and 1-2 needles per bundle, hairs of VIth segment much longer than others, sometimes reaching four times the diameter of the body; needles simple pointed, suddenly tapering toward the end; Ventral setae 2-5 per bundle bifid thinner in IInd to Vth segment and longest in IInd, all having proximal nodulus and angular proximal bend and distal tooth thinner and slightly longer than proximal. Stomach in VIIth or VIIIth. Dorsal vessel mid-dorsal. Clitellum embracing Vth to VIIth segment. Pineal setae 3 per bundle, with simple sharply curved hooks.

Habit : Live in association with bryozoans; not swimming.

Distribution : India : West Bengal - Calcutta. Outside India : Europe; Pakistan; East Asia; North and South America.

Genus *Stylaria* Lamarck, 1816

1816. *Stylaria* Lamarck, Historie naturalle des animaux sans Vertebres. 3, Pairs : 223-224.

1980. *Stylaria* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 90.

Type species : *Stylaria lacustris* (Linnaeus, 1767)

Diagnosis : Eyes normally present. Prostomium prolonged into a long filiform proboscis. Dorsal setae consist of hairs and straight simple pointed needles; ventral setae bifid crotchets having distal part straight while the proximal part angularly bent, proximal teeth weak. Pineal setae present.

Distribution : Europe; Pakistan; West and East Asia; India and North America.

18. *Stylaria fossularis* Leidy, 1852

1852. *Stylaria fossularis* Leidy, *Proc. Acad. nat. Sci. Philad.* **5** : 287.

1980. *Stylaria fossularis* : Spencer, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 120.

Material : Bankura dist : 1 ex., Bishnupur, 28.11.86; Burdwan dist : 1 ex., Katwa, 5.12.86; Howrah dist : 1 ex., Unsani, 6.4.86; Midnapore dist : 2 exs., Lalbag, 25.3.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 8-10 mm, delicate, pale white. Eyes present. Prostomium with a long conspicuous proboscis projected from its tip. Dorsal setae starts from VIth segment, consisting of 1-2 hairs and 1-3 needles in each bundle, hair simple and straight; ventral setae consisting of bifid crotchets, 5-10 per bundle, number decreasing to 2 per bundle in posterior segments, distal prong of crotchets very much longer, thinner and hooked while proximal prong is almost rudimentary. Nephridia begins from VIIth segment. Budding zone present.

Habit : Live among algal mass; swim by wriggling movements.

Distribution : India : West Bengal - Bankura and Burdwan districts; Andhra Pradesh; Uttar Pradesh. Outside India : Europe; Pakistan and North America.

Subfamily PRISTININAE Lastockin, 1924

Diagnosis : Prostomium often froming a proboscis. Eye absent. Dorsal setae beginning in IInd segment, consisting of hairs and needles. Pharyngeal glands present. Nephridia sometime invested with bladder-like peritoneal cells.

Genus ***Pristina*** Ehrenberg, 1828

1828. *Pristina* Ehrenberg, Phytozoa, Berlin, p.112.

1980. *Pristina* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst and Cook (Eds.) : 96.

Type species : *Pristina longiseta longiseta* Ehrenberg, 1828

Diagnosis : Prostomium may or may not form a proboscis. Dorsal setae begin from IInd, IIIrd or IVth segment, consisting of hairs and needles with simple and bifid tips; ventral setae are of one type. Septa and septal glands well developed. Nephridium begins from Xth segment. Budding zone present.

Distribution : South Africa; Europe; Pakistan; Russia; Turkistan; India; Japan; Sumatra; Australia; North and South America.

Key to the Species

1. Needle setae of dorsal bundle simple pointed 2

   Needle setae of dorsal bundle double pointed 3

2. Hair setae of IIIrd segment specially elongated ..... *P. longiseta longiseta*

   Hair setae not specially elongated in any segment ..... *P. proboscidea*

3. Giant ventral setae present in IVth segment, bifid ..... *P. aequiseta*

   Giant ventral setae absent ..... *P. sperberae*

19. ***Pristina longiseta longiseta*** Ehrenberg, 1828

1828. *Pristina longiseta* Ehrenberg, Phytozoa, Berlin, p.112.

1948. *Pristina longiseta longiseta* : Sperber, *Zool. Bidr. Uppsala*, **28** : 236, pl.XXI, fig. 2,6.

Diagnosis : Size very small, about 6 mm, slender, light yellow. Prostomium with a mobile proboscis. Dorsal bundle of setae starts from IInd segment and consist of 1-3 hairs and 1-3 needles;

hair setae of IIIrd segment specially elongated, straight, non-serrate and mobile, reaching beyond tip of proboscis when turned forward, those in others nearly straight; needles fine, straight, distal end simple, pointed, curved; ventral setae 4-5 per bundle anteriorly, longest in IInd segment, nodulus proximal in IInd and IIIrd segment, median to dorsal in others. Nephridium starts from Xth segment. Clitellum in 1/2 VIIth to 1/2 IXth (2 segments).

Habit : Live among algal masses in clear water; not swimming.

Distribution : India : West Bengal - Calcutta; Maharashtra; Madhya Pradesh; Kerala and Uttar Pradesh. Outside India : Europe; Pakistan and Australia.

20. ***Pristina aequiseta*** Bourne, 1891

1891. *Pristina aequiseta* Bourne, *Q. J. Mic. Sci.* (N.S.), **32** : 352.

1963. *Pristina aequiseta* : Yamaguchi, *J. Pacif. Sci. Hokkaido Univ.*, ser.6, **11** (2) : 284-285, fig. 4.

Diagnosis : Size very small, 2-3 mm, whitish. Prostomium with a long mobile proboscis snd slender hairs. Dorsal setae begin in IInd segment, consisting of 1-2 hairs and 1-2 fine needles, hairs longer than body diameter; needles bayonet-shaped having distal ends slightly curved, without nodulus and equal teeth; ventral setae 5-6 per bundle, (may be up to 8 per bundle), bifid crotchets, those of IInd segment much stouter than those of the middle and hind segments, with proximal nodulus and distal tooth twice as long as proximal; in segments III to V setae are shorter and thicker with distal nodulus and having distal teeth longer than proximal. Nephridium begins from IXth segment. Six pairs of vascular commissures in IInd to VIIth segments.

Habit : Usually live in association with freshwater sponges. Also live in oligohaline water (West India).

Distribution : India : West Bengal - Calcutta; Andhra Pradesh and Uttar Pradesh. Outside India : Europe; Pakistan; West Indies.

21. ***Pristina sperberae*** Naidu, 1963

1963. *Pristina sperberae* Naidu, *J. Bom. nat. Hist. Soc.*, **60** (1) : 219-221, fig. 35 A-D.

Material : Burdwan dist : 7 exs., Andal village, 3.12.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size very small; slender and whitish. Prostomium with a small proboscis. Dorsal setae begin from IInd segment, having one hair and one needle in each bundle; hairs are straight, that of segment III is little diffferent from others; needles bifid with distal nodulus, protion above nodulus curved with equal teeth; ventral setae 7-8 per bundle anteriorly, 4 posteriorly; nodulus proximal in IInd, median in IIIrd and distal in other segments, prongs equal in thickness and distal prongs longer than proximal in 7 anterior segments. Nephridium begins from IXth segment. Budding zone apparent.

Habit : Live among aquatic plants and algal filament; not swimming.

Distribution : India : West Bengal - Burdwan district; Andhra Pradesh. Outside India : Nil.

22. ***Pristina proboscidea*** Beddard, 1896

1896. *Pristina proboscidea* Beddard, Ergen Hamburger Malga-haensischem Sammelreise 1892/93, **3**, p.4, fig. 1-8.

1980. *Pristina proboscidea* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst and cook (Eds.) : 96.

Material : Bankura dist : 6 exs, Bishnupur, 28.11.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size very small, about 5 mm. Prostomium continuous as a proboscis of varying length. Dorsal setae begin in IInd segment consisting of hairs and needles, 1-4 of each per bundle; needles simple, pointed, straight and fine, nodulus absent, hairs serrated and none specially elongated; ventral setae vary in number, 2-4 anteriorly, may go upto 9 posteriorly, uniform all through, distal prongs longer than proximal, those of segment II longer and thinner than the rest. Nephridium begins from IXth segment.

Habit : Live in association with fresh water sponges, not swimming.

Distribution : India : West Bengal Bankura and Calcutta districts. Outside India : Africa; E. Asia; Java; S. America.

Family TUBIFICIDAE

Diagnosis : Small aquatic worms, upto 200 mm; usually reddish. Setae in four bundles; both dorsal and ventral bundles begin from segment II and consist of crotchet setae, dorsal bundle having bifid or pectinate crotchets and ventral bundles having single pointed or bifid crotchets, number of setae are variable in both. No mascular gizzard. Testes and ovaries in segments X and XI respectively. Asexual reproduction occurs.

Distribution : Tibet; China; India; Java; Malay; N. & S. America.

Key to the Genera

1. Gills present in dorsal and ventral series ..... ***Branchiura***
   Gills absent 2
2. Distal prong of crotchet setae shorter than proximal throughout ..... ***Aulodrilus***
   Distal prong of crotchet setae mostly equal to or longer than proximal 3
3. Hair setae absent in dorsal bundles 4
   Hair setae present in anterior segments only ..... ***Tubifex***
4. Needle setae present ..... ***Limnodrilus***
   Needle setae absent ..... ***Bothrioneurum***

Genus *Aulodrilus* Bretscher, 1899

1899. *Aulodrilus* Bretscher, *Rev. Suisse. Zool.*, **6**, p.388.

1980. Aulodrilus : Persia, *In* Aquatic oligochaete Biology, Brinkhust and Cook (Eds.) : 102.

Type species : *Aulodrilus remex* Stephenson, 1921.

Diagnosis : Crotchet setae of dorsal bundles sometimes accompanied by short capillary setae; Ventral crotchets having distal prong shorter and thinner than proximal. Clitellum from VIIth VIIIth or IXth, Xth segment. Pineal setae present.

Distribution : Europe; India; Sumatra; N. and S. America.

23. *Aulodrilus remex* Stephenson, 1921

1921. *Aulodrilus remex* Stephenson, *Rec. Ind. Mus.*, Calcutta, **22** : 753-754, pl.XXVIII, fig. 2-6.

1965. *Aulodrilus remex* : Naidu, *Hydrobiologia*, **26**(3-4) : 470-473, fig. 3a-e.

Material : Midnapur dist : 1 ex, Lalbag. 25.3.86, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 10-15 mm; pale red. Posterior third is achaetous gill, which is protruded out of the tube and waved about. Dorsal bundle of setae starts in IInd segment, consisting of hair and crotchet setae; hairs bayonet-shaped, crotchets of three different kinds, single pointed, bifid and oar shaped i.e. having the proximal portion swelled out like the oars of boatmen; from segments IInd to Xth the single pointed crotchets gradually change to the oar shape; Ventral bundles with 6-8 bifid crotchets having proximal prongs longer and thicker than distal. nephridium begins from IXth segment. Clitellum covers 1/2 Vth to 1/2 VIIIth segments.

Habits : Mud and tube dwellers. Live along with other naids and tubificids. The gill region is protruded out and waved.

Distribution : India : West Bengal - Midnapore district; Kerala; Madhya Pradesh. Outside India : Nil.

Genus ***Bothrioneurum*** Stolc, 1888

1888. *Bothrioneuron* Stole, *Abh. K. Bohm. Ges.*, p.43

1980. *Bothrioneurum* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 103.

Type species : ***Bothrioneurum iris*** Beddard, 1901

Diagnosis : Prostomium with a sensory pit. Dorsal and ventral setal bundle with bifid crotchets; hair setae and gills absent.

Distribution : Europe; India; Malay and North America.

24. ***Bothrioneurum iris*** Beddard, 1901

1901. *Bothrioneurum iris* Beddard, *Proc. zool. Soc., Lond.*, p.81, figs. 8-10.

1965. *Bothrioneurum iris* : Naidu, *Hydrobiologia*, **25** (3-4) : 475-477.

Material : West Dinajpur dist : 1 ex., Bangar, 4.4.87, Coll. S. K. Mukhopadhyay.

Diagnosis : Size small, 20 mm. Prostomium semicircular. Both dorsal and ventral bundles of setae begin from IInd segment and composed of 4 bifid crotchet setae mostly. Dorsal crotchets having distal prongs thinner and shorter than proximal while ventral crotchets having distal prong much thinner and longer in outer but shorter in inner bundles than the proximal prongs. Nephridium begin from VII th segment. Clitellum includes Xth to XIIth segments.

Habit : Live in soft mud of ponds and lakes. Usually coil up when disturbed.

Distribution : India : West Bengal - West Dinajpur district; Kerala and Tamil Nadu. Outside India: China; Malay; South America.

Genus ***Branchiura*** Beddard, 1892

1892. *Branchiura* Beddard, *Q. J. Mic. Sci.*, **33** : 325

1980. *Branchiura* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.) : 103.

Type species : ***Branchiura sowerbyi*** Beddard, 1892

Diagnosis : Dorsal bundle with hair setae along with single pointed or bifid crotchets. Posterior segments with paired gills on dorsal and ventral sides.

Distribution : Africa; Pakistan; Great Britain; Ireland; France; Germany; India; Japan; China; North and South America.

25. ***Branchiura sowerbyi*** Beddard, 1892

1892. *Branchiura sowerbyi* Beddard, *Q. J. Mic. Sci.*, **33** : 325-340.

1980. *Branchiura sowerbyi* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cock (Eds.) : 103.

Material : Burdwan dist : 5 exs., Andal village, 3.12.86, 12 exs., Katwa, 5.12.86; 1 ex., Raina, 7.12.86; 11 exs., University campus, 8.12.86; Coochbihar dist : 5 exs., Dinhata, 15.4.87; 4 exs., Toofangunje, 18.4.87; Hooghly dist : 2 exs., Janai, 11.12.86; 7 exs., Kamarpukur, 1.12.86; 5 exs., Pandooah, 10.12.86; Malda dist : 3 exs., Kaliachawk, 12.11.87; 1 ex., Malda town, 15.11.87; Purulia dist : 2 exs., Saheeb bandh, Purulia town, 1.4.86; Coll. S. K. Mukhopadhyay.

Diagnosis : Size large 50-80 mm; robust, dark brown. Posterior third with hollow mid-dorsal and mid-ventral gills serially arranged, a pair per segment, gradually increasing in length to reach a length of the widest diameter of the body, about 50-150 pairs; these are contractile and each enclose in it a vascular loop. Dorsal bundle of setae begin in IInd segment, having 2-4 hairs and 2-6 crotchets per bundle, hairs bayonet-shaped, longest anteriorly, decreasing gradually in the branchial region; crotchts bifid with proximal prongs longer than distal, sometimes pectinate, ventral setae 4-6 per bundle anteriorly, 1-2 posteriorly, nodulus distal, simple pointed or bifid. Nephridium begins in IXth segment. Clitellum covers Xth-XIIth segment. Pineal setae absent.

Habits : Worms live in clayey silt at bottoms of tanks. lakes, canals and even drains alsong with *Limnodrilus hoffmeisteri,* when disturbed coil them to spirals immediately. The branchial region is easily detachable.

Distribution : India : West Bengal - Burdwan, Coochbihar, Hooghly, Malda and Purulia districts; Madras; Manipur and Uttar Pradesh. Outside India : Africa; Europe; China; Japan and N. America.

Genus ***Limnodrilus*** Claparede, 1862

1862. *Limnodrilus* Claparede, *Mem. Soc. Phys. Hist. nat.* Geneva, **16** : 248, Pls, I, fig.1-3, II fig.12, IV.fig.6.

1980. *Limnodrilus* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook (Eds.).

Type species : *Limnodrilus hoffmeisteri*

Diagnosis : Dorsal and ventral bundles of setae are bifid crotchets of same type; hair setae absent. Vascular net work in posterior part of the body. Lateral pulsatile heart in VIIIth, segment. Testes in Xth and ovaries in XIth segment.

Distribution : Pakistan; Tibet; Ceylon; India; Japan and N. America.

26. ***Limnodrilus hoffmeisteri*** Claparede, 1862

1862. *Limnodrilus hoffmeisteri* Claparede, *Mem. Soc.Phys. Hist. nat.* Geneva, 6 : 248-252, pls.I, 1-3, II, 12, IV, 6.

1912. *Limnodrilus socialis* : Stephenson, *Mem. As. Soc. Bengal,* 6, p. 93, pl.IV, figs. 6-7.

1980. *Limnodrilus hoffmeisteri* : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst and Cook(Eds.) : 99.

Material : Burdwan dist : 5 exs, Katwa, 5.12.86; 7 exs., University campus, 8.12.86; Coochbihar dist; 5 exs., Dinhata, 15.4.87; 6 exs., Mathabhanga, 16.4.87; 4 exs, Domjur, 9.3.86, Jalpaiguri dist; 3 exs., Alipurduar, 17.4.87; Malda dist : 2 exs., Kaliachawk, 12.11.87; Midnapur dist : 15 exs., Midnapur town, 30.3.86; Nadia dist : 4 exs., Paraz, 17.11.87; Purulia dist : 10 exs., Bagmundi, 3.4.86; 5 exs., Sahib Bandh, Purulia town, 1.4.86; Coll. S. K. Mudhopadhyay.

Diagnosis : Size large, 70-80 mm, brown anteriorly and lighter posteriorly. Posterior portion whip-lke and without setae(achaetous). Both dorsal and ventral bundles of setae start from IInd

segment, and are bifid crotehets of one type only, having both prongs equal in length, the distal prong thinner; dorsal bundles consisting of 6-7 setae in anterior, 3-5 setae in the middle and 1-2 setae in hind segments, thinner and shorter than the setae of the ventral bundles. Nephridium begins between VIIth and IXth segment. clitellum embraces XIth-XIIth segment, opaque white.

Habit : These worms live buried in soft clay or mud in clear, turbid even foul water and perform wavy movements of the hind portion and disappear in the mud the moments they are disturbed.

Diagnosis : India : West Bengal - Burdwan, Coochbihar, Howrah, Jalpaiguri, Malda, Midnapur, Nadia, Purulia districts; Andhra Pradesh; Karnataka. Outside India : Europe; Pakistan; Turkey; China; Java; Japan Malay; N. and S. America.

Genus ***Tubifex*** Lamarck, 1816

1816. *Lumbricus* Lamarck, Historie naturalle des animaux Sans vertebres. 3, Paris. P. 225.

1900. *Tubifex* Michaelsen : Oligochaeta : *In Das Tierreich*, 10, XXIX, p. 48.

1980. Tubifex : Persia, *In* Aquatic Oligochaete Biology, Brinkhurst & Cook(Eds.) : 99.

Type species : *Tubifex rivulorum* Lamarck.

Diagnosis : Both dorsal and ventral bundle of setae consist of bifid crotchets, in the later the crotchets are often modified into the pectinate type; dorsal crotchets are supplemented by hair setae at least in the anterior segments. Surface of the body smooth, without papillae.

Distribution : N. Africa; Europe; India and N. America.

27. ***Tubifex tubifex*** (Miller, 1774)

1774. *Lumbricus tubifex* O.F.Muller, Vermium Terrestrium et Fluviatilium & C. Historia; Hafni. et Lips, p. 27.

1900. *Tubifex tubifex* Michaelsen, Oligochaeta : In Das Tiereich, 10, xxx, p.48.

1980. *Tubifex tubifex* : Persia, In Aquatic Oligochaete Biology, Brinkhurst & Cook(Eds.) : 99.

Material : Malda dist : 1 ex, Kaliachawk, 12.11.87, Coll. S. K. Mukhopadhyay.

Diagnosis : Size moderate, 25 mm; reddish brown anteriorly, lighter posteriorly. Prostomium bluntly conical. Dorsal bundles of setae begin in IInd. segment, consisting of 3-4 hairs and 4-5 crotchets in anterior segments, hair absent in the middle segments and setae absent altogether in posterior segments; hairs bayonet-shaped, crotchet setae having distal nodulus, distal prongs thinner and longer than proximal, with pectinate outgrowths in between the prongs in posterior segments; ventral bundles have 3-5 bifid crotchet setae with distal nodulus and having distal prongs either equal to or thinner and longer than proximal. Nephridium begins VIIth segment, paired, unpaired from XIVth segment, clitellum opaque white and covers 1/2Xth to XIIth segment.

Habit : Live in soft mud and remain coiled with *Limnodrilus hoffmeisteri.* Keep anterior end buried in mud and wave the rest in water. Always remain crowded.

Distribution : India : West Bengal Malda district; Karnataka, Tamil Nadu. Outside India : Africa; Europe; Japan; New Zealand; N. and S. America.

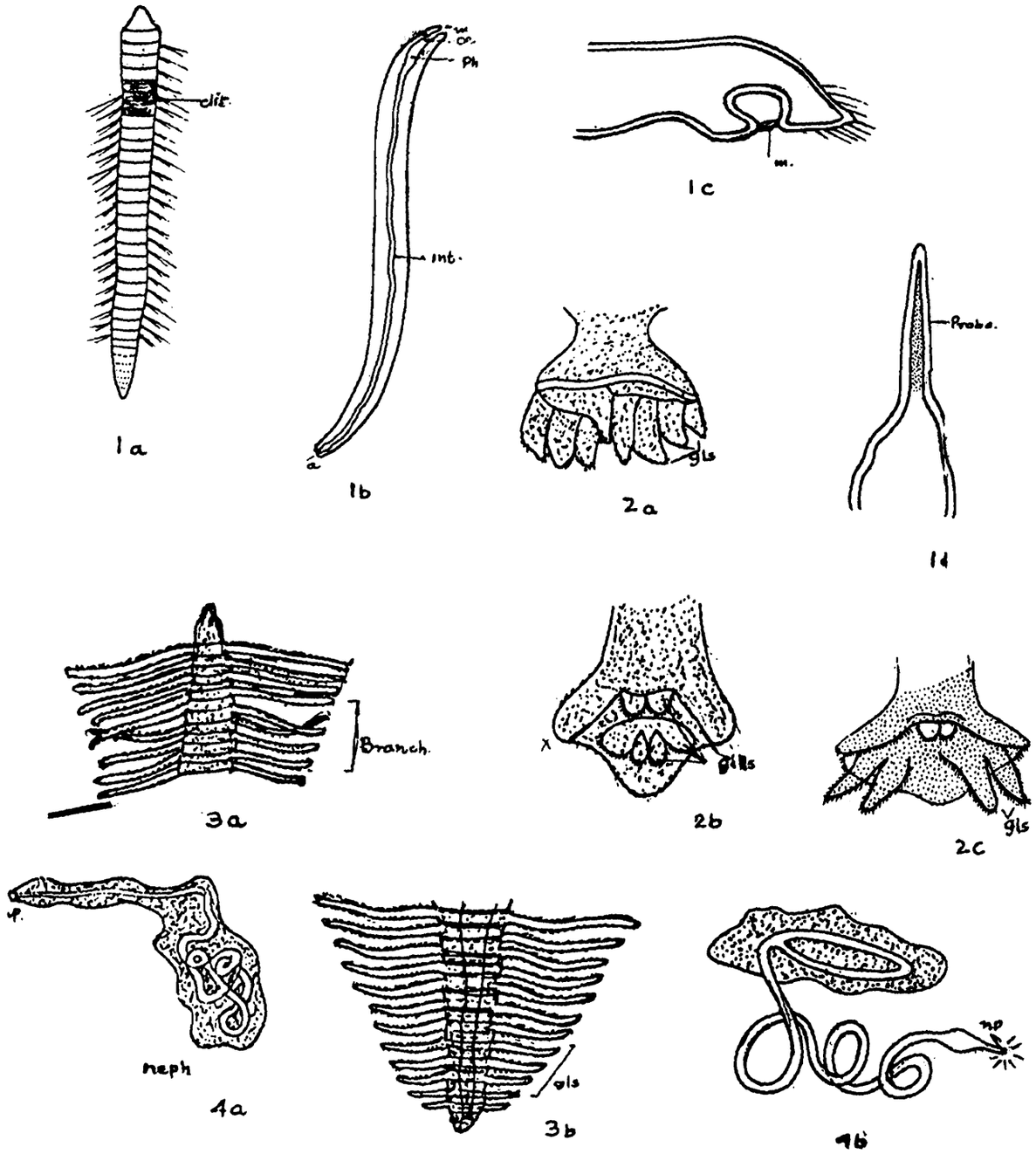


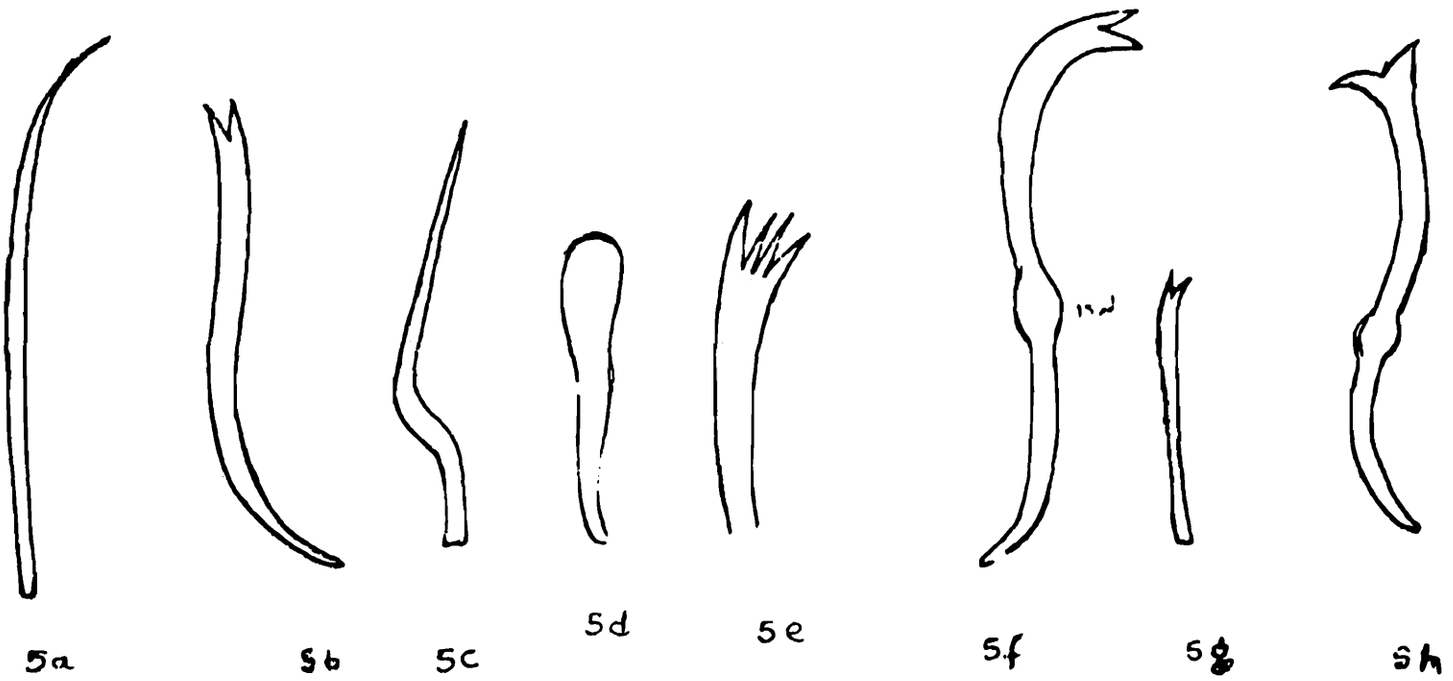
Fig. 1. a. The entire worm (Hypothetical); b. The same showing the alimentary canal; c. Enlarged view of the anterior portion; showing the position of mouth; d. Anterior end showing the proboscis.

Fig. 2. a. Posterior end of *Dero dorsalis* showing the shape of the gills when fully expanded; b. The same when gills are contracted; c. The same when gills are partly contracted.

Fig. 3. a. Arrangement of branchial processes in *Branchiodrilus semperi* (Naididae); b. Arrangements of branchial processes in *Branchiura sowerbyi* (Tubificidae).

Fig. 4. a & b. Nephridia of *Chaetogaster* and *Nais*.

Abbreviations : a, anus; branch, branchiae; int, intestine; m, mouth; oe, oesophagus; np, nephridiopore; ph, pharynx; probos, proboscis; clit, clitellum gls, gills; neph, nephridium.



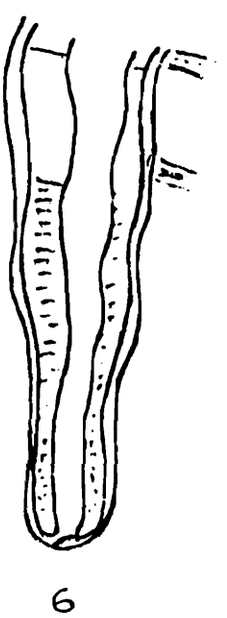
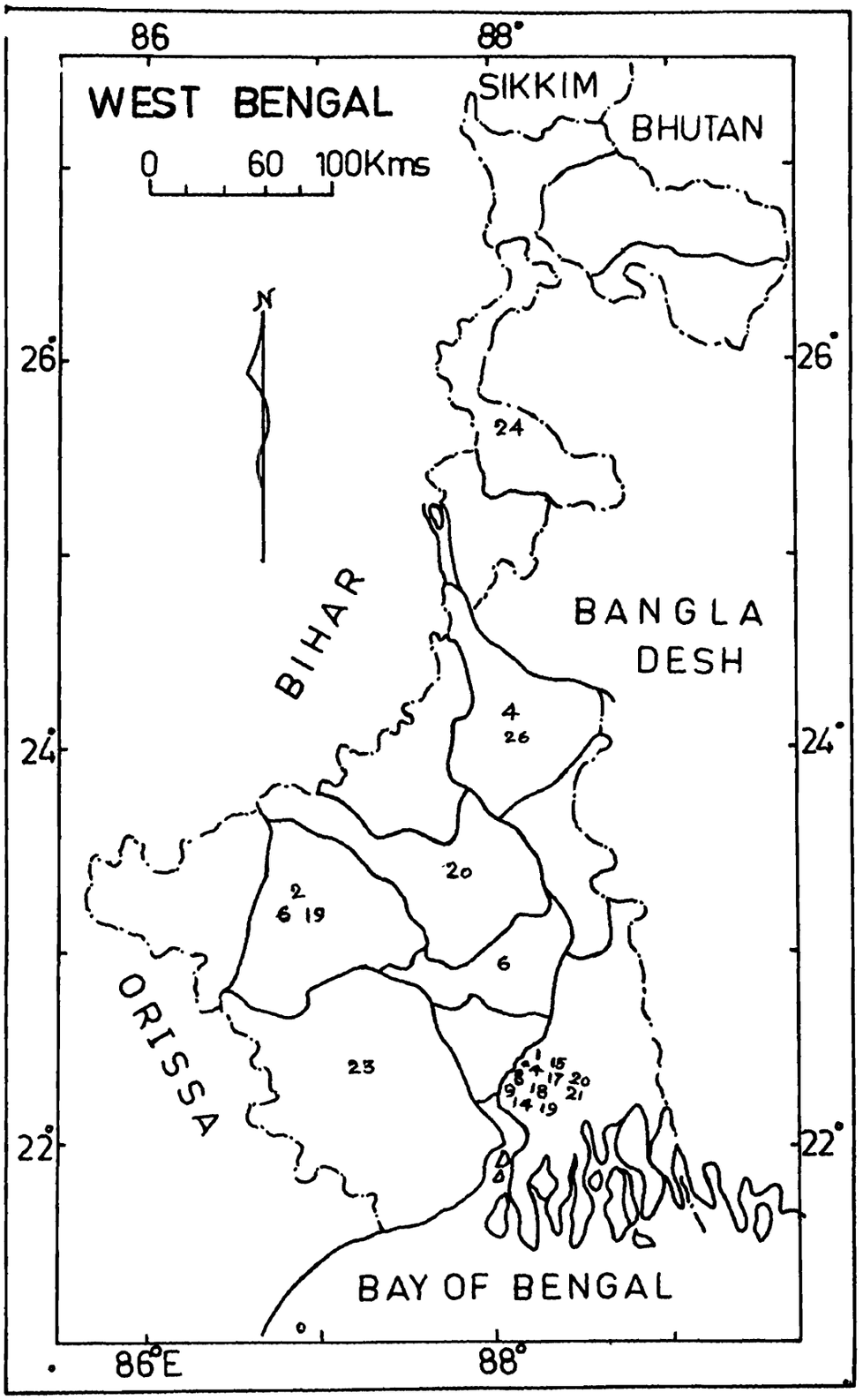


Fig. 5. a. Typical hair seta of Naididae; b. Ventral crotchet seta of *Dero dorsalis;* c. Bayonet shaped hair seta of *Dero dorsalis;* d. Oar-shaped dorsal seta of *Aulodrilus remex;* e. Pectinate needle of *Allonais;* f. Typical crotchet seta of tubificids; g. Double pointed ventral needle seta of *Aulodrilus remex;* h. Crotchet seta of tubificids, showing prongs diverging widely.

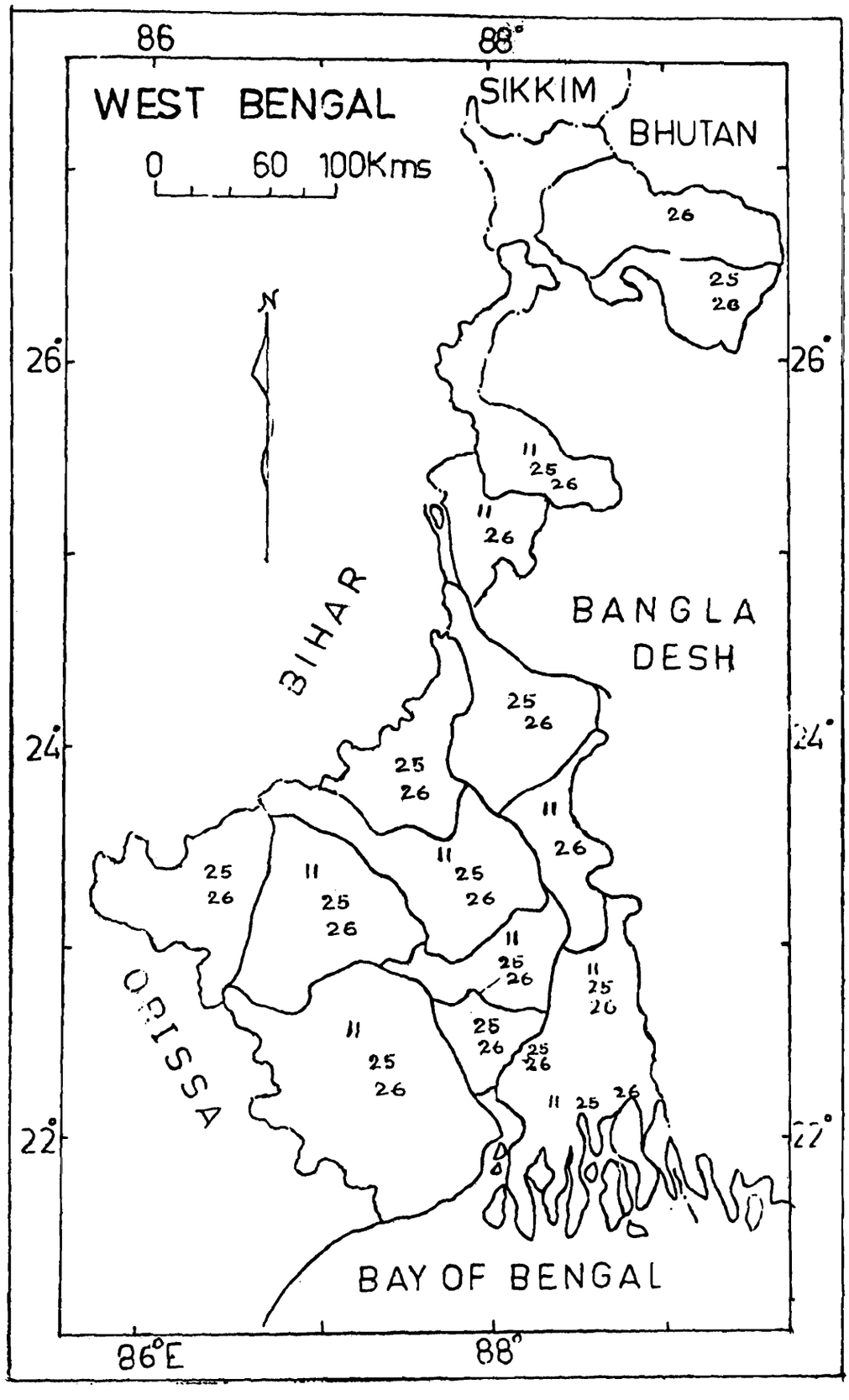
Fig. 6. Achaetous unsegmented tail end of *Aulodrilus remex.*

Abbreviations : a, anus; branch, branchiae; int, intestine; m, mouth; oe, oesophagus; np, nephridiopore; ph, pharynx; probos, proboscis; clit, clitellum gls, gills; neph, nephridium.



Map. No. 1. Showing the distribution of rare species

1. *Aelosoma bengalense* 2. *Allonais gawaliorensis* 4. *A. paraguayensis paraguayensis* 6. *Branchiodrilus hortensis* 8. *Chaetogaster langi* 9. *C. limnae bengalensis* 14. *Nais barbata* 15. *N. elinguis* 17. *Pristina longiseta longiseata* 19. *P. proboscidea* 20. *P.sperberae* 21. *Slavina appendiculata* 23. *Aulodrilus remex* 24. *Bothrioneurum iris* 26. *Tubifex tubifex.*



Map No. 2. Showing widely distributed species
11. *Dero dorsalis* 25. *Branchiura sowerbyi* 26. *Limnodrilus hoffmeisteri.*

SUMMARY

The paper deals with the description and distribution of 27 species under 14 genera of aquatic oligochoeta hitherto known from the state of West Bengal. 13 species and 5 genera have been surveyed out and reported for the first time from the state. A classified upto date list of aquatic oligochaetes of West Bengal has also been furnished.

ACKNOWLEDGEMENTS

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TABLE 1
Districtwise distribution of fresh-water oligochaetes of West Bengal

Sl. No.	Name of Species / Names of districts of West Bengal	Bankura	Bardhaman	Birbhum	Calcutta	Coochbihar	Darjeeling	Hooghly	Howrah	Jalpaiguri	Malda	Midnapore	Murshidabad	Nadia	Purulia	W. Dinajpur	South 24 Parganas	North 24 Parganas
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Family Aelosomatidae																	
1.	*Aelosoma bengalense*				+													
	Family Naididae																	
2.	*Allonais gwaliorensis*	+																
3.	*A. inaequalis*		+		+			+	+							+	+	
4.	*A. paraguayensis paraguayensis*										+							
5.	*Aulophorus tonkinensis*		+															
6.	*Branchiodrilus hortensis*	+						+										
7.	*B. semperi*	+	+									+		+				
8.	*Chaetogaster langi*				+													
9.	*C. limnae bengalensis*				+													
10.	*Dero cooperi*	+	+								+	+		+				
11.	*D. dorsalis*	+	+					+			+	+		+		+	+	+
12.	*D. indica*	+						+			+	+						
13.	*D. zeylanica*	+	+												+		+	+

TABLE 1

Districtwise distribution of fresh-water oligochaetes of West Bengal

Sl. No.	Name of Species / Names of districts of West Bengal	Bankura	Bardhaman	Birbhum	Calcutta	Coochbihar	Darjeeling	Hooghly	Howrah	Jalpaiguri	Malda	Midnapore	Murshidabad	Nadia	Purulia	W. Dinajpur	South 24 Parganas	North 24 Parganas
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
14.	*Nais barbata*				+													
15.	*N. elinguis*				+													
16.	*N. simplex*	+							+									+
17.	*Pristina awquiseta*				+													
18.	*P. longiseta longiseta*				+													
19.	*P. proboscidea*	+			+													
20.	*P. sperberae*		+		+													
21.	*Slavina appendiculata*				+													
22.	*Stylaria fossularis*	+	+						+									
23.	F Family Tubificidae																	
24.	*Bothrioneurum iris*															+		
25.	*Branchiura sowerbyi*	+	+	+	+	+		+	+			+	+		+	+	+	+
26.	*Limodrilus hoffmeisteri*	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
27.	*Tubifex tubifex*										+							

TABLE 2

Freshwater oligochaetes of West Bengal-Distribution in other states of India

Sl. No.	Name of species / Name of States of India	Andhra Pradesh	Bihar	Karnataka	Kerala	Madhya Pradesh	Maharastra	Manipur	Punjab	Tamil Nadu	Uttar Pradesh
		1	2	3	4	5	6	7	8	9	10
	Family Aelosomatidae										
1.	*Aelosoma bengalense*				+						
	Family Naididae										
2.	*Allonais gwaliorensis*	+				+					
3.	*A. inaequalis*	+			+						+
4.	*A. paraguayensis paraguayensis*		+			+					
5.	*Aulophorus tonkinensis*	+		+							+
6.	*Branchiodrilus hortensis*										+
7.	*B. semperi*	+								+	
8.	*Chaetogaster langi*	+									
9.	*C. limnae bengalensis*					+			+		
10.	*Dero cooperi*	+		+					+		
11.	*D. dorsalis*	+			+						
12.	*D. indica*	+		+							
13.	*D. zeylanica*	+		+	+						
14.	*Nais barbata*										
15.	*N. elinguis*										
16.	*N. simplex*										
17.	*Pristina aequiseta*	+									+
18.	*P. longiseta longiseta*				+		+				+
19.	*P. proboscidea*										
20.	*P. sperberae*	+									
21.	*Slavina appendiculata*										
22.	*Stylaria fossularis*	+									
	Family Tubificidae										
23.	*Aulodrilus remex*				+	+					
24.	*Bothrioneurum iris*				+					+	
25.	*Branchiura sowerbyi*							+		+	+
26.	*Limnodrilus hoffmeisteri*	+			+						
27.	*Tubifex tubifex*			+							

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POLYCHAETE

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INTRODUCTION

Since the dawn of man's interest in natural history, polychaetes, commonly known as bristle worms, are recognised as a very important and significant group among the marine organisms. The majority of these worms are benthic, only a few are pelagic. Benthic polychaetes mostly prefer sandy or muddy substratum extending from the sea shore to the greatest depths of the hadal zone; some are found to be comfortable in the crevices of rocks or coral reefs. Basically being inhabitants of marine environments, the polychaetes are also common in the estuaries enjoying an everchanging brackish-water environment, and a few tolerant species may even extend up to the freshwater zone.

Among the estuaries of India, the Hoogly-Matla estuarine system in the State of West Bengal occupies the most prominent position in respect of its fishery resources. This is very extensive in area covering a major part of lower Bengal basin and is covered mostly by beautiful and luxuriant mangrove canopy interspersed by grassy salt marshes. The polychaetes are quite common in the intertidal areas particularly in the lower reaches of this estuarine complex. Whenever a sample is taken from the littoral sediments polychaetes are almost certainly to be present. Despite their abundance in this ecosystem, hitherto no detailed investigation of this group of animals has been carried out from this region.

Most important works on the taxonomy of polychaetes pertaining to Indian waters are those of Fauvel (1932, 1953). But taxonomic literature on the brackish-water polychaete fauna of India is poor in comparison to that of its marine component. In a comprehensive account of the polychaete fauna of India and its neighbouring countries, Fauvel (1953) recorded 283 species from Indian waters including only 30 species from the Gangetic delta. Further, he contended that this number might only represent one half of the expected total.

Perusal of literature indicates that 45 species under 33 genera and 19 families are hitherto known from the brackish-water environments in the state of West Bengal (Southern, 1921; Fauvel, 1932 and Misra *et al.*, 1984). However, most of the recent ecological investigations on the macrobenthos of the area indicate that this group is one of the most important components of the benthic fauna (Dutta & Sarangi, 1980; Bhuniya & Choudhury, 1981; Nandi & Choudhury, 1983; Choudhury *et al.*, 1984a, b; Misra & Choudhury, 1986; Anonymous, 1987).

With the initiation of the Ganga Action Plan in India, in recent years, increasing ecological studies on the estuaries and mangrove belt of the deltaic region of Bengal seem imperative. Such investigations cannot successfully be carried out without a comprehensive knowledge of the faunal resources. Hedgpeth (1957) recommends that the first procedure in any ecological research is the 'exercise in systematics' It is, therefore, imperative that taxonomic studies of the organisms of the Hoogly-Matla estuary, especially of the particular group of animals which constitutes one of the major components both numerically and qualitatively, of macrobenthic fauna of the area, shall

ultimately be helpful to ecological works for the assessment of the benthic condition as well as the quality of the environment.

Stimulated by these elucidations the present author has been encouraged to undertake this task to carry out a systematic survey of the polychaetes in one of the gigantic estuarine environments of the tropical world.

The present investigation enjoys the privilege to project 72 species of polychaetes including 5 undetermined species, erantiates and sedentarians, spread over 50 genera and 27 families.

MATERIAL AND METHODS

The material dealt with in the present paper was collected mainly by the present author from the Hoogly-Matla estuarine complex. All the field observations and collections were made during the low tide periods when sufficient exposure was available. Qualitative samples of the macrobenthic polychaetes were collected on the intertidal regions down the shore starting from High Water mark (HWM) to Low water mark (LWM) as well as along the shore following the river course. The soft substratum was generally dug out in small blocks which was then broken up by hand and visible organisms were picked up. After hand sorting, the samples were screened through 1 mm sieve. After collection, the material was washed and allowed to relax in river water with the gradual addition of 7% $MgCl_2$ solution for about half an hour to avoid twisting or breaking of the specimens. Further narcotization was done by addition of 70% alcohol drop by drop at certain intervals. Before fixation, polychaetes of the family Phyllodocidae, Nereididae and Glyceridae were treated with sudden addition of strong alcohol for everting their pharynx. Standard fixing agent used for polychaetes was 10% neutral estuarine water formalin.

For taxonomic study it was necessary to dissect out the pharynx and the parapodia for examining the detailed structures, such as jaws, paragnaths, setae, parapodial rami, cirri, branchiae, etc. The dissected parts were mounted on the flat or depression slides with glycero-alcohol (1 : 1) medium. Since the position of different kinds of pharyngeal organs is of considerable taxonomic importance, studies were made keeping the pharyngeal organs *in situ* as much as possible. In the families under Sedentaria some of the setae termed as uncini are placed on flattened plates. These structures were dissected and treated with KOH solution for a detailed study.

SYSTEMATIC ACCOUNT

The nomenclature, followed in the present dissertation, is that of Hartman (1959, 1965) although later revisions by various authors have been considered. The species determination, diagnosis and description are based mainly on the works of Fauvel (1953) and Day (1967), though relevant literature has also been carefully consulted for the critical assessment of the taxonomy of the group. As the present author has collected most of the material, the collector's name is omitted in the material column to avoid repetition. Where, however, the material was collected by someone else, it has been so stated. The registration numbers of the material included here, pertain to the extensive collections of National Zoological Collection of India kept at the Zoological Survey of India, Calcutta. Salinity ranges for the species, whenever recorded, is given in the habitat column.

9—B—187/Z3I/Cal/93

Classified list of taxa

Phylum ANNELIDA
Class POLYCHAETA
Family Polynoidae
Subfamily Lepidonotinae

1. *Lepidonotus tenuisetosus* (Gravier)
2. *Lepidonotus* sp.

Subfamily Harmothoinae

3. *Gattyana fauveli*, new species
4. *Gaudichaudius cimex* (Quatrefages)

Family Polyodontidae

5. *Eupanthalis edriophathalma* (Potts)

Family Sigalionidae

6. *Thalenessa djiboutiensis* (Gravier)

Family Amphinomidae

7. *Chloeia parva* Baird

Family Phyllodocidae

8. *Anaitides madeirensis* Langerhans
9. *Eteone barantollae* Fauvel
10. *Eteone ornata* Grube

Family Pilargidae

11. *Sigambra constricta* (Southern)
12. *Sigatargis commensalis*, new genus & new species
    Talehsapiidae, new family
13. *Talehsapia annandalei* Fauvel

Family Hesionidae

14. *Hesione splendida* Savigny

Family Nereididae
Subfamily Namanereidinae

15. *Namalycastis fauveli* Rao
16. *Namalycastis indica* (Southern)
17. *Namalycastis meraukensis* (Horst)

Subfamily Nereidinae

18. *Ceratonereis burmensis* Monro
19. *Dendronereides gangetica*, new species
20. *Dendronereides heteropoda* Southern
21. *Dendronereis aestuarina* Southern
22. *Dendronereis dayi*, new species
23. *Ganganereis sootai*, new genus & new species
24. *Lycastonereis indica* Rao
25. *Neanthes chingrighattensis* (Fauvel)
26. *Neanthes glandicincta* (Southern)
27. *Neanthes meggitti* (Monro)
28. *Perinereis cavifrons* Ethlers
29. *Perinereis cultrifera* Grube
30. *Perinereis nigropunctata* Horst

Family Nephtyidae

31. *Nephtys oligobranchia* Southern
32. *Nephtys polybranchia* Southern

Family Glyceridae

33. *Glycera convoluta* Keferstein
34. *Glycera lancadivae* Schmarda
35. *Glycera longipinnis* Grube
36. *Glycera rouxii* Audouin & Milne-Edwards
37. *Glycera tesselata* Grube

Family Goniadidae

38. *Glycinde oligodon* Southern
39. *Goniada emerita* Audouin & Milne-Edwards

Family Onuphidae

40. *Diopatra cuprea* Bose
41. *Hyalinoecia tubicola* (Müller)

Family Eunicidae

42. *Eunica aphroditois* (Pallas)
43. *Lysidice natalensis* Day
44. *Marphysa mossambica* peters
45. *Marphysa sanguinea* Montagu
46. *Marphysa* sp.

Family Lumbrineridae

47. *Lumbrineris bilabiata*, new species
48. *Lumbrineris heteropoda* (Marenzeller)
49. *Lumbrineris notocirrata* Fauvel
50. *Lumbrineris polydesma* Southern

Family Orbiniidae

51. *Leitoscoloplos* sp.
52. *Scoloplos* (*Scoloplos*) *Sagarensis*, new species

Family Spionidae

53. *Minuspio cirrifera* (Wirén)
54. *Polydora normalis* Day
55. *Polydora* sp.
56. *Pseudopolydora kempi* (Southern)
57. *Spio bengalensis* Willey

Family Flabelligeridae

58. *Pherusa bengalensis* (Fauvel)

Family Capitellidae

59. *Barantolla sculpta* Southern
60. *Capitella capitata* (Fabricius)
61. *Mastobranchus sp.* (cf. *indicus* Southern)
62. *Parheteromastus tenuis* Monro

Family Maldanidae

63. *Asychis gangeticus* Fauvel

Family Oweniidae

64. *Owenia fusiformis* delle Chiaje

Family Sternaspidae

65. *Sternaspis scutata* (Renier)

Family Sabellaridae

66. *Sabellaria pectinata intermedia* Fauvel
67. *Sabellaria alcocki* Gravier

Family Terebellidae

68. *Loimia medusa* (Savigny)
69. *Pista typha* Grube

Family Ampharetidae

70. *Isolda pulchella* Müller

Family Sabellidae

71. *Potamilla leptochaeta* Southern

Family Serpulidae

72. *Ficopomatus macrodon* Southern

Key to Families of Polychaetes occurring in West Bengal

1. Dorsum with series of elytrae (Scales) or distinct elytral scars present at the dorsal side of notopodial bases in several segments 2

   Dorsum without elytrae or elytral scars 4

2. Neurosetae composite ..... Sigalionidae

   Neurosetae simple 3

3. Spinning glands present; median antenna, if present, attached near the posterior or middle of the prostomium; notosetae absent ..... Polydontidae

   Spinning glands absent; median antenna attached at the anterior margin of the prostomium; notosetae usually present ..... Polynoidae

4. Posterior end covered ventrally by a chitinized shield ..... Sternaspidae

   Posterior end not covered by a shield 5

5. Anterior setigers with one or several series of long, specialised setae either covering the retractable anterior end or forming an operculum or a series of long protective spines (paleae) . 6

   Anterior setigers without long, specialised setae (note: short, strong hooks may be present) 9

6. Specialised setae long chambered, forming a protective cage around the retractable anterior end; body with numerous epithelial papillae ..... Flabelligeridae (in part)

   Specialised anterior setae do not form a protective cage; anterior end not retractable; skin-papillae few and small, or absent 7

7. Specialised setae slender, distally curved, often spinous; prostomium with antennae ..... Onuphidae (Part)

   Specialised setae stout, smooth and not distally curved; prostomium without appendages or with numerous tentacles 8

8. Specialised setae form paleae; anterior end with two to four pairs of branchiae ..... Ampharetidae

   Specialised setae form an operculum; anterior end without branchiae ..... Sabellaridae

9. Anterior end, including the prostomium (in part), transformed into a tentacular crown 10

   Anterior end not transformed into a tentacular crown 12

10. Tube calcareous; thoracic membrane present ..... Serpulidae

    Tube mucoid or horny, often covered with sand grains; thoracic membrane absent 11

11. Parapodia with uncini in one or a few distinct rows; tentacular crown with smooth or pinnate tentacles ..... Sabellidae

    Parapodia with small uncini massed in dense fields in the neuropodia only; tentacular crown with branching tentacles ..... Oweniidae

12. Prostomium or peristomium with numerous tentacles on the lower side..... Terebellidae

    Prostomium with a limited number (10 or fewer pairs, usually) of antennae and tentacular cirri, or without appendages 13

13. Prostomium with at least one pair of antennae; peristomium usually with paired palps or tentacular cirri 14

    Prostomium without appendages; peristomium with paired dorsal palps, maximally two pairs of tentacular cirri or without appendages 24

14. Prostomium continued posteriorly in a caruncle; large notosetae furcate; others smooth or serrated..... Amphinomidae

    Caruncle absent, notosetae furcate, small, if present 15

15. Palps absent..... 16

    Palps present..... 19

16. Prostomium long and conical, usually annulated, with two pairs of short antennae..... 17

    Prostomium not more than twice as long as wide, never annulated; long or short 18

17. Pharynx eversible with four jaws in a cross; parapodia either all uniramous or all biramous.....

    ..... Glyceridae (in part)

    Pharynx eversible with more than four jaws; parapodia uniramous anteriorly and posteriorly.....

    .....Goniadidae (in part)

18. Dorsal cirri large and foliose..... Phyllodocidae

    Dorsal cirri, if present, small and cirriform..... Nephtyidae

19. Palps biarticulated 20

    Palps simple, sometimes fused to the prostomium so the latter appears cleft, or forming ventrolateral pads on the peristomium 21

20. Pharynx with paired jaws; paragnaths or soft papillae or both on the surface of the everted pharynx or pharynx smooth, parapodia usually biramous..... Nereididae

    Pharynx usually without jaws; paragnaths or pharyngeal papillae always absent; everted pharynx often with a circlet of distal papillae or lappets; parapodia often sub-biramous or uniramous..... Hesionidae

21. Palps ventrolateral pads on the peristomium; five occipital and two frontal antennae . Onuphidae

    Palps fused anteriorly to the prostomium; maximally five antennae..... 22

22. Pharynx eversible, unarmed ..... Pilargidae

Pharynx eversible, armed 23

23. Pharynx eversible, armed with four pairs of upper and one pair of lower jaws ..... Eunicidae

Pharynx eversible, armed with one pair of jaws ..... Talehsapiidae

24. Anterior end, including both pro- and peristomium, without appendages 25

Peristomium with paired palps or tentacular cirri, or both pro- and peristomium with palps and tentacular cirri 32

25. Parapodia strongly reduced, so that the setae appear to arise from the body wall; all setae simple, true capillary setae absent ..... Flabelligeridae (in part)

Parapodia usually well developed or at least present as low folds; setae usually of several kinds, including in most cases true capillary setae 26

26. Prostomium an oblique plaque, usually bordered by a flange ..... Maldanidae

Prostomium pointed, rounded or blunt, without any flange 27

27. Body separated into two regions, thorax and abdomen, with different kinds of setae 28

Body not separated into regions, setal distribution and parapodial shapes grade along the body 29

28. Thorax with lateral parapodia, abdomen with both noto- and neuropodia in dorsal positions .....

Orbiniidae

All parts of the body with lateral parapodia; notopodia often reduced in posterior segments and neuropodia may from nearly complete cinctures ..... Capitellidae

29. Jaw apparatus present ..... Lumbrineridae

Jaw apparatus absent 30

30. Setae include anterior spines, rostrate long-shafted uncini and spinose or smooth uncini and spinose or smooth capillaries; segments usually elongated ..... Maldanidae

Setae include capillaries, acicular, simple hooks or composite spinigers; segments rarely elongated 31

31. Pharynx eversible with four jaws, parapodia either all uniramous or all biramous .....

Glyceridae (in part)

Pharynx eversible with more than four jaws; parapodia uniramous anteriorly and biramous posteriorly ..... Goniadidae (in part)

32. Uncini in multiple rows, in the neuropodia ..... Oweniidae (in part)

Uncini in single row, at least in the neuropodia ..... Spionidae

Family POLYNOIDAE Malmgren, 1867

Key to Subfamilies

Lateral antennae attached distally on prostomium ..... Lepidonotinae

Lateral antennae attached subdistally or ventrally on prostomium ..... Harmothoinae

Subfamily LEPIDONOTINAE Horst, 1917

Genus ***Lepidonotus*** Leach, 1916

Diagnosis : Body short with 26 segments and 12 pairs of elytra. Median and lateral antennae all attached distally on prostomium. Notosetae finer than neurosetae, all tapering with whorls of spines; neurosetae with rows of coarse teeth, usually unidentate, rarely bidentate.

Type Species : *Aphrodita clava* Montagu, 1808

Remarks : Six species in the genus are hitherto known from India, of which only one, *L. tenuisetosus* (Gravier), has been recorded from the Hooghly estuary. Presently, one more species in the genus, till not named, is described hereunder.

Key to Species

Prostomium wider than long, without anterior cleft; elytra with well-developed lateral fringes of papillae.....*L. tenuisetosus* (Gravier)

Prostomium as long as wide, with anterior cleft; elytra with very small lateral fringes of papillae. .....*Lepidonotus* sp.

1. ***Lepidonotus tenuisetosus*** (Gravier, 1901)

1901. *Euphione tenuisetosa* Gravier, *Nouv. Archs. Mus. Hist. nat., Paris* (Sr. 4), **3** : 22, pl.8, figs. 123-126. text figs. 228-231.

1985. *Lepidonotus tenuisetosus*. Misra & Choudhury, *Proc. Nat. Symp. Biol. Util. Cons. Mangroves, Kohlapur*, p. 451.

Material : 2 ex., Kachuberia, Sagar Island, 5.7.1975; 4 ex., Bakkhali, 10.4.1978; 1 ex., 4 no. Kheyaghat, Chhotomollakhali, Sundarbands, 13.9.1984.

Diagnosis : Prostomium slightly wider than long, lateral antennae attached distally on prostomium, median antenna longer than laterals and inserted in anterior notch. Elytra 12 pairs, oval or nearly reniform, with well-developed lateral fringes of papillae; surface covered with innumerable papillae being small and conical at the periphery, and large, bluntly projected with cup-shaped elevations of different grades at the centre. Parapodia sub-biramous; notopodia reduced, without any projection but each with an aciculum and several setae having transverse spinous rows; neuropodia each with a conical presetal lobe projecting into acicular process and a short rounded postsetal lobe. Notosetae finer that neurosetae, numerous, long, slender and of 1 kind, arranged in radiating bundles, neurosetae stout, either smooth or spinous, with blunt tips.

Remarks : In India the species was recorded for the first time from Madras (Fauvel, 1930) and later from Port Canning, West Bengal (Fauvel, 1932). Since then it has been reported from various localities of marine as well as estuarine habitats of India.

Habitat : Crevices of wooden posts and pillars of jetty towards LWM; salinity 8‰ 19‰.

Type Locality : Red Sea.

Distribution : Indo-west Pacific and eastern Atlantic. *India* : Lower reaches of Hooghly estuary, Matla river (W.B.); off Puri (Bay of Bengal); Mahanadi estuary (Orissa); Madras (T.N.); Andamans; Vembanad Lake (Kerala); Kalangut, Dona Paula, Marmagao Harbour (Goa); Gholghad, Tarapur, Arnala, Bombay, Alibag, Ratnagiri, Vijaydurg, Devgad, Malvan, Vengurla, Redi (Maharashtra);

Diu; Veraval (Gujarat). *Elsewhere* : Red Sea; Persian Gulf; Mocambique; Madagascar; South Africa; Mergui; Japan, tropical West Africa.

2. ***Lepidonotus*** sp.

Material : 1 ex., Gangasagar, Sagar Island, 18.8.1983.

Description : Body complete, 14 mm long, 6 mm wide, with 26 setigers; oblong and flattened. Prostomium globular, as long as wide with a median cleft. Antennae 3, small, with short ceratophores—lateral pair slightly shorter than median and attached terminally, styles gradually tapering. Palps stout, as long as median antenna. Eyes 2 pairs, posterior pair smaller, partly hidden under posterolateral margin of prostomium, and anterolateral pair larger. Elytra 12 pairs, oval, with very small lateral fringes of papillae; surface covered with densely packed small uniform papillae, more on lower half.

Parapodia sub-biramous, with reduced notopodia and large bilobed neuropodia. Notopodia represented by very small projections each with an aciculum and numerous fine setae; neuropodia large each with a conically projecting presetal acicular lobe and a rounded postsetal lobe. Dorsal cirri long, slender, not extending beyond the tip of setae; ventral cirri short but those of the first elytrigerous setiger being slightly longer.

Notosetae very fine capillaries, spinulose throughout, with bare distal part; neurosetae stout, unidentate, with enlarged middle part having 5-6 teeth in supra-acicular position but with none in infra-acicular position. Pygidium with a pair of small anal cirri.

Remarks : The material is placed in the genus *Lepidonotus* Leach for the characteristic terminal position of the lateral antennae, 12 pairs of elytra and typical setal characters. The material seems to be interesting but its species determination could not be established at the moment since it is represented by a single specimen. On the basis of closer examination it has been observed that the species is closely allied to *L. tenuisetosus* (Gravier), but differs from it by the globular prostomium, less hairy elytra, uniformly distributed papillae on the elytral surface, and uniform setal serrations along the body.

Habitat : Attached to a submerged brick at LWM; salinity 12‰.

Subfamily HARMOTHOINAE Horst, 1917

Key to Genera

Elytra covered with honey-combed polygonal areas; lateral fringes of papillae present ..... *Gaudichaudius* Pettibone

Elytra without any honey-combed polygonal areas; lateral fringes of papillae absent ..... *Gattyana* ..... McIntosh

Genus ***Gattyana*** McIntosh, 1900

Diagnosis : Body short with 40 to 45 segments, covered with 15 pairs of elytra. Elytra without any honey-combed polygonal areas and lateral fringes of papillae. Prostomium with frontal peaks and lateral antennae attached sub-distally. Notosetae capillaries with fine dentitions; neurosetae thicker than notosetae, serrated, distally unidentate.

Type Species : *Aphrodita cirrosa* Pallas, 1977

Remarks : So far only one species, *G. deludens* Fauvel, 1932, in the genus was known from India.

3. *Gattyana fauveli*, new species

(Fig. 1A-J)

1932. *Harmothoe sinagawaensis*. Fauvel, *Rec. Indian mus.*, **12** : 23, fig. 3, pl. 1, figs. 1-2. Non Izuka, 1912.

1953. *Harmothoe sinagawaensis*. Fauvel, *Fauna of India, Annelida Polychaeta*, p. 48, fig. 21 a-b. *Non* Izuka, 1912.

Description : Holotype complete, 11.5 mm long, 4.5 mm wide, with 30 setigers. Body short, oval, very much flattened dorsoventrally; light coloured with transverse black streaks forming crescentic patch on lower half of each elytra. Prostomium bilobed, heart-shaped, with a wide anterior notch (Fig. 1A); median antenna longer than laterals, attached partly ventrally at the notched end of prostomium; lateral antennae shorter, subventral to median antenna. Palps broad, smooth, with subterminal swellings and fine tips, 3 times as long as prostomium. Eyes 2 pairs, small, anterior pair laterally placed. Tentacular cirri narrow, slender, with fine tips, subequal to median antenna, and arising from common short bases. Elytra 15 pairs, oval, soft and devoid of any fringe of papillae or tubercles, covering body almost completely. Pigments on elytra concentrating to form black crescentic markings on posterior half (Figs. 1 D, D').

Parapodia sub-biramous; anterior notopodia represented by small rounded lobes on anterodorsal faces of neuropodia, each with an aciculum and several setae; neuropodia long, tepering, each with a conical presetal lobe projecting into an acicular process and a short rounded postsetal lobe (fig. 1B). Middle and posterior setigers with notopodia gradually reducing in size; neuropodia remaining unaltered throughout (Fig. 1C). Dorsal cirri long, slender, extending beyond the tips of setae, with short cirrophores; ventral cirri short, finely tapering, but longer in first setiger; both cirri reducing in size posteriorly in proportion with the setigers.

Notosetae all slender capillaries, either smooth or very finely spinous (Fig. 1E, F), tapering to sharply pointed tips. Neurosetae numerous, stout and spinous having bare distal parts with unidentate tips, of 2 kinds : (i) supra-acicular setae long slender and straight with long spinous regions bearing coarse spines arranged in double rows, ending in sharp tips (Fig. 1G), and (ii) infra-acicular setae short with enlarged middle portions bearing 2-3 spines (Fig. 1H-J). Pygidium with a pair of very small anal cirri.

Remarks : Fauvel (1932) recorded a broken as well as posteriorly incomplete polynoid specimen from the Rameswaram island, Tamil Nadu (India) as *Harmothoe sinagawaensis* Izuka, 1912, but with reservation. Subsequently, Fauvel (1953) stated that the specimen from India belonged to a different species as it had only one kind of notosetae and 15 pairs of elytra, in contrast to two kinds of notosetae and 16 pairs of elytra of Izuka's species, *H. sinagawaensis* from Japan. The nomino-typical species with fine, slender notosetae and stout unidentate neurosetae has been placed in the genus *Gattyana* McIntosh (Hartman, 1959a). But the type designation of the Fauvel's material was not established, evidently because of the paucity of material.

During the present investigation the author has collected two examples of polynoids, living in close association with the echiuran, *Anelassorhynchus branchiorhynchus* (Annandale and Kemp, 1915), which agree mostly with the Fauvel's material from Tamil Nadu. As the Fauvel's material is not in a very good condition for detailed study, his figures are compared. On examination it appears that both the materials belong to the genus *Gattyana*, diagnosed by 15 pairs of elytra, subterminal lateral antennae, finely ciliated notopodial capillaries and distally unidentate thick neurosetae. A new species name, *G. fauveli*, is proposed here for these specimens.

Gattyana fauveli is closely allied to *G. sinagawaensis* (Izuka) in having the black crescentic patches of pigments on the lower half of each elytra, but differs from it by the number of elytra and the nature of notosetae. *Gattyana fauveli* is also similar to *G. cirrosa* (Pallas, 1766) and *G. mossambica* Day, 1962. All these three species, living in the burrows of other invertebrates, are commensal in habit. The last two species differ from the first one by the presence of small tubercles on elytral surface and several rows of spinules on neurosetae extending almost to the tip.

The species is named after P. Fauvel who has made the original study.

Habitat : Burrows of the echiuran worm *A. branchiorhynchus* in the zone towards LWM; salinity 18‰.

Distribution : Endemic in India. *India* : Lower reaches of Hooghly estuary (W.B.); Rameswaram (T.N.).

Genus *Gaudichaudius* Pettibone, 1986

Diagnosis : Body short, less than 40 segments. Elytra 15 pairs, covered with honey-combed polygonal areas and with lateral fringes of papillae. Prostomium bilobed without distinct cephalic peaks. Notosetae of 2 types : short with blunt tips, and long, slender, tapering to fine tips. Neurosetae stouter than notosetae and of 1 type.

Type Species : *Iphione cimex* Quatrefages, 1966.

Remarks : The genus *Gaudichaudius* was established with the type species *Iphione cimex* Quatrefages, 1866 chiefly on the basis of elytral features. So far only two species in the genus are known from the globe, of which one has been described earlier from India as *Gattyana deludens* Fauvel, 1932 (*Vide infra*).

4. *Gaudichaudius cimex* (Quatrefages, 1866)

1866. *Iphione cimex* Quatrefages, *Histoire naturelle .....douce. Annelides et Gephyriens, 2-3* : 270.

1986. *Gaudichaudius cimex*.- Pettibone, *Smithson. Contr. Zool.*, 428 : 34, figs. 16-17.

Material : 3 ex., Bakkhali, 10.4.1978; 5 ex., Gangasagar, 22.3.1981, 10 ex., 20.4.1985.

Diagnosis : Prostomium oval, bilobed with blunt cephalic peaks and 2 pairs of small eyes. Median antenna long with a large bulbous ceratophore, lateral antennae shorter, tapered and ciliated. Elytra 15 pairs, yellow, tough, smooth and strongly imbricated, with short lateral fringes of cylindrical papillae. Elytral surface divided into conspicuous close-fitting, honey-combed polygonal areoles, with some stomata-like rounded spots between some of the areoles towards fringed border. Parapodia sub-biramous; notopodia reduced, conical, without any projecting acicular process;

neuropodia diagonally truncate each with a conical presetal lobe extending into an acicular process having a small supra-acicular digitiform extension, and a shorter rounded postsetal lobe. Notosetae numerous with spinous rows, of 2 types; Neurosetae numerous, of one type.

Remarks : The present material agrees well with the type material of *G. deludens* fauvel, 1932. On review of literature it appears that it also agrees with the description of *G. cimex* (Quatrefages) with the addition that the cephalic peaks are somewhat distinct, dorsal tubercles of the cirrigerous setigers are not ciliated and the notopodia are without any projecting acicular process on the lower side. Studies on more material are needed to justify these differences taxonomically significant.

Habitat : External surface of hermit-crab shells towards LWM; salinity 19‰ to 22‰.

Type Locality : Malacca Strait.

Distribution : Indo-west Pacific. *India* : Lower reaches of Hooghly estuary (W.B.); Chandipur (Orissa); off Paradwip (Bay of Bengal); Kakinada (A.P.); Pondichery; Madras, Nagapattinam (T.N.); Azhikode, Calicut, Quilon (Kerala); Mangalore (Karnataka); Bombay, Ratnagiri, Malvan (Maharashtra). *Elsewhere* : Burma; Malacca Strait; Indo-China, Yellow Sea.

Family POLYODONTIDAE Buchanan, 1894.

Genus ***Eupanthalis*** McIntosh, 1876

Diagnosis : Antennae 3 - median antenna attached dorso-posteriorly. Ommatophores absent. Notosetae restricted anteriorly, later replaced by spinning glands. Neurosetae include a superior group of tapered and spinulose setae, a middle group of stout aristate setae with hairy patch on the blunt tip, and an inferior group of serrated and tapering setae.

Type Species : *Eupanthalis kinbergi* McIntosh, 1876.

Remarks : This is the first record of the genus from Indian waters.

5. ***Eupanthalis edriophthalma*** (Potts, 1910)

1910. *Panthalis edriophthalma* Potts, *Trans. Linn. Soc. London (Zool), 13* : 345, pl.XIX, figs. 56-57.
1953. *Eupanthalis edriophthalma*.- Fauvel, Fauna of India, Annelida — Polychaeta, p. 76, fig. 33 h, i.

Material : 1 ex., Digha coast, W.B., 25.2.1986; coll. A.K. Mondal & Party.

Diagnosis : Prostomium spherical with 2 pairs of small sessile eyes and 3 antennae — median antenna postero-terminal in origin, laterals longer than median. Palps stout, 3-jointed. Elytra colourless. Notosetae few, serrated capillaries. Neurosetae of 3 kinds : (a) a superior group of spinulose setae, (b) a middle group of stout aristate setae with long appendix, (c) an inferior group of curved spinulose setae. Superior group of setae with spines arranged in whorls after eleventh segment.

Remarks : The material agrees well with the earlier description of the species. This is the first record of the species from Indian waters.

Habitat : Fine sandy soil towards the MTL.

Type Locality : Maldives.

Distribution : Indo-west Pacific. *India* : Digha coast (W.B.). *Elsewhere* : Ceylon; Burma.

Family SIGALIONIDAE

Genus ***Thalenessa*** Baird, 1868

Diagnosis : Antennae small, 3; ceratophores absent. Eyes small, 2 pairs. Dorsal cirrus on setiger 3 only. Dorsal cirriform branchiae on all setigers from 5th. Notopodia and Neuropodia with bract-like lamellae bearing digitiform stylodes. Notosetae spinulose capillaries; neurosetae composite falcigers and a few simple spinose setae.

Type Species : *Sigalion edwardsi* Kinberg, 1855.

Remarks : Only one species in the genus has so far been known from Indian waters. This is the first record of the genus from West Bengal coast.

6. ***Thalenessa djiboutiensis*** (Gravier, 1901)

1901. *Thalenessa djiboutiensis* Gravier, *Nouv. Archs. Mus. Hist. nat., Paris* (Sr. 4), *3* : 231, pl. VII, figs. 114-117.

1959. *Thalenessa djiboutiensis*. Hartman, *occ. Pap. Allan Hancock. Found. Publ.*, No. 2, P. 122.

Material : 1 ex., Digha coast, W.B., 15.2.1987; 1 ex., Digha coast, W.B., 14.5.1987; coll. A.K. Mandal & Party.

Diagnosis : Prostomium with 2 pairs of eyes and 3 small antennae. Dorsal cirrus on third setigerous segment only with a large ceratophore and a small ceratostyle. Elytra reniform, with long digitiform multifid papillae on the external margin. Notopodium with 3 ciliated ctenidial ridges. Digitiform stylodes numerous on anterior setigers, and foliaceous parapodial bracts on posterior setigers. Notosetae slender, tuft of spinulose capillaries. Neurosetae composite, with simple or multi-articulate blades having bidentate apex.

Remarks : The material agrees well with the earlier description of the species. This is the first record of the species from West Bengal coast.

Habitat : Sandy mud in the LWM.

Type Locality: Red Sea.

Distribution : Indo-Pacific. *India* : Digha coast (W.B.); Off Puri (Orissa); Madras coast (T.N.). *Elsewhere* : Persian Gulf; Sri Lanka; Mergui; Pedrò Shoal; Australia; Red Sea.

Family AMPHINOMIDAE Savigny, 1818

Genus ***Chloeia*** Savigny, 1818

Diagnosis : Body ovate, caruncle large, with indistinct lateral folds, much longer than wide; eyes present. Branchiae pinnate. Dorsal cirri single per setiger.

Type Species : *Aphrodita flava* Pallas, 1766.

Remarks : Five species in the genus have so far been known from Indian waters, of which only one has been recorded earlier from the Hooghly estuary.

7. ***Chloeia parva*** Baird, 1870

1870. *Chloeia parva* Baird, 233, pl. 4, figs.8 a-b.

1953. *Chloeia parva*.- Fauvel, *Fauna of India, Annelida Polychaeta* p.96, fig.46.

Material : 2 ex., Lykani Khal, Digha, 20.2.88, coll. D.R.K. Sastry & R.K. Chakraborty.

Diagnosis : A mid-dorsal row of dark marks in the form of Roman T. Caruncle with crest surmounted by a black wavy line extending up to setiger 6. Branchiae from setiger 4, extending up to posterior end. Notosetae short and serrated; neurosetae long and smooth.

Remarks : Material agrees well with the earlier descriptions.

Habitat : Pelagic.

Type Locality : Not definitely known, but Indo-west Pacific.

Distribution : Indo-west Pacific. *India* : Mouth of Hooghly estuary (W.B.); Chandipur (Orissa); Vishakhapatnam (A.P.); Andamans; West coast of India. *Elsewhere* : Gulf of Oman; Sri Lanka, Malay; Mergui; Sumatra, Java; New Guinea.

Family PHYLLODOCIDAE Williams, 1851

Key to Genera

Tentacular cirri 4 pairs ..... *Anaitides* Czerniavsky

Tentacular cirri 2 pairs ..... *Eteone* Savigny

Genus *Anaitides* Czerniavsky, 1882

Diagnosis : Prostomium heart-shaped with 2 pairs of antennae and a nuchal papilla in the crevice between lobes. First segment dorsally reduced, particularly fused to the second; tentacular cirri cylindrical. Papillae in rows on the base of the eversible pharynx. Parapodia uniramous.

Type Species : *Phyllodoce groenlandica* Orsted, 1843

Remarks : This is a moderately large genus, but represented by only one species in Indian waters including the Hooghly estuary.

8. *Anaitides madeirensis* (Langerhans, 1880)

1880. *Phyllodoce madeirensis* Langerhans, *Z. wiss. Zool.*, *33* : 307, pl. 17, fig.44.

1974. *Anaitides madeirensis*.- Hartman, *J. mar. biol Ass. India*, *16*(2) : 613.

1984. *Phyllodoce* (*Anaitides*) madeirensis.- Misra *et. al.*, *Rec. zool. Surv. India*, *81* : 42.

Material : 2 ex., Canning, 17.11.82; 1 ex., Jhingakhali, Sundarbans, 12.9.1983; 4 ex., Kakdwip, 10.3.1985.

Diagnosis : Body long, slender, tapering posteriorly; brightly coloured with greenish tinge, sometimes not much coloured. Prostomium heart-shaped with a deep posterior notch sheltering an occipital papilla, 4 frontal antennae, and a pair of large eyes. Pharynx eversible with 6 lumpy ridges on distal part and 6 lateral rows of papillae on basal part- each row with 8-12 small conical papillae, a dorsomedian row of 2-3 papillae also present. Tentacular segments 3, first one partly hidden under prostomium and the rest distinct, with 4 pairs of long and cylindrical tentacular cirri, longest pair reaching setiger 7-8; tentacular formula : $1 + 0\frac{1}{1} + 0\frac{1}{N}$

Parapodia uniramous; setigerous process with rounded presetal lobe and a bifid postsetal one. Dorsal cirri brightly coloured with radiating rows of brown pigments, broadly lanceolate anteriorly;

obliquely truncate near posterior end; ventral cirri conical,'pointed, slightly longer than setigerous lobe. Setae all composite spinigers arranged in fan-shaped manner; shaft-heads expanded, strongly striated; blades long, tapered with coarsely serrated margins.

Remarks : The material agrees well with the earlier descriptions of the species. The review of literature reveals that the species is highly variable with respect to the colour pattern, the shape of the prostomium and that the dorsal and ventral cirri, but these features were considered by Day (1957) as taxonomically less significant.

Habitat : Soft mud in the zone between MTL and LWM; sometimes on the surface of the substratum; salinity 8‰ to 15‰.

Type Locality : Madeira Island, Atlantic ocean.

Distribution : Widely distributed in temperate and tropical waters. *India* : Lower reaches of Hooghly estuary, Sundarbans (W.B.); Bhitarkonika estuary (Orissa); Andamans; Bombay, Alibag (Maharashtra); Lakshadweep Sea. *Elsewhere* : Red Sea; Persian Gulf; Mocambique; South Africa; Madagascar; Sri Lanka; Mergui; Malacca; Malay; China; Vietnam; Philippines; West Mexico; Bermuda; Mediterranean Sea.

Genus *Eteone* Savigny, 1818

Diagnosis : Prostomium triangular or trapezoidal with 4 antennae and a small nuchal papilla. Tentacular segments all complete and free from one another; tentacular cirri 2 pairs. Pharynx eversible with papillated or smooth base. Parapodia uniramous.

Type Species : *Nereis flava* Fabricius, 1780.

Remarks : Only three species in the genus have so far been reported from Indian waters. In the Hooghly estuary the genus is represented by two species of which one, described from this region, has also been collected during the present survey.

Key to Species

Body Yellowish-white; pharynx with 5 rows of distal swollen papillae ..... *E. barantollae* Fauvel

Body with three rows of dark spots; pharynx with 3-4 rows of swollen papillae ...*E. ornata* Grube

9. *Eteone barantollae* Fauvel, 1932

1932. *Eteone barantollae* Fauvel, *Mem. Ind. Mus.*, **12** : 72, fig. 13 a-d.

1987. *Eteone barantollae*.- Sunder Raj & Sanjeeva Raj, *J. Bombay nat. Hist. Soc.*, **84**(1) : 91.

Material : 4 ex., Gangasagar, Sagar Island, 28.2.1979, 6 ex., 12.10.1979, 4 ex., 12.7.1983.

Diagnosis : Body complete, 35-40 mm long, 1.5-2 mm wide, with about 135-155 setigers; filiform, yellowish-white with scattered brown pigments in life, uniformly brown in the spirit. Prostomium oval, as long as wide, with 2 pairs of short antennae and a pair of small, black, subdermal eyes. Peristomium apodous and achaetous; tentacular cirri 2 pairs, subulate, subequal, reaching backwards to setiger 3. Pharynx eversible, smooth and transparent at base; distal part longer with 5 longitudinal rows of large, soft papillae–middorsal row broader than lateral ones.

Parapodia uniramous, conical and projecting. Dorsal cirri absent in first setiger, oval anteriorly, more or less rounded posteriorly, and ventral cirri well developed, lamellar and subequal to parapodial lobes. Setae all composite spinigers (Fig. 9J) arranged in fan-shaped rows; shaft-head expanded and striated with 2 unequal prongs, and a large curved, blunt tooth.

Remarks : The original description of the species, collected from the bank of a canal near Barantolla, Salt Lake, east of Calcutta, is based on a single specimen. Owing to the poor state of preservation of the type specimen, the present author is unable to examine it in detail. Moreover, attempts to collect the material from the type locality were unsuccessful, as the area is no longer under the influence of estuarine flow.

However, the present material agrees well with the original description with the addition that the ventral cirri are well developed and the shaft-head of the setae bears a stout, curved spine just like that in *Eteone foliosa* Quatrefage, 1865.

Habitat : Mud impregnated with fine sand in the zone between MTL and LWM; sometimes on the surface of the soil during low-tide period; salinity 12‰ to 19‰.

Type Locality : Barantolla, Salt Lake (east of Calcutta).

Distribution : Endemic in east coast of India. *India* : Lower reaches of Hooghly estuary (W.B.); Bhitarkonika estuary (Orissa); Pulicat Lake (T.N.).

10. *Eteone ornata* Grube, 1878

1878. *Eteone ornata* Grube, *mem. Acad. Sci., S. Peterb.*, *25* : 106.

1974. *Eteone ornata*. Hartman, *J.mar. biol. Ass. India*, *16* (2) : 613.

Diagnosis : Body long and narrow, pale yellow with 3 longitudinal rows of brown pigment spots, blend into a single streak in middle setigers, disappeared in posterior setigers. Prostomium oval, longer than wide, notched laterally, with 2 small subdermal eyes on posterior border. Tentacular cirri cylindrical, 2 pairs on segment 1. Pharynx eversible with 4 rows of large soft papillae proximally, and 3 rows distally.

Parapodia uniramous with conical setigerous lobes. Dorsal cirri small, oval, wider than long, arising from broad cirrophores. Ventral cirri oval, slightly pointed, longer than conical setigerous lobe. Setae all composite spinigers arranged in fan-shaped row. Shaft-heads expanded, toothed; blades tapered and smooth.

Remarks : From India this species has been collected only once, that too, from the Sandheads in the Hooghly river mouth (Fauvel, 1932). Repeated attempts were made to collected it from the area under the present investigation, but were unsuccessful. Hence, the diagnosis is based on earlier description.

Type Locality : North Japan Sea.

Distribution : Indo-west Pacific. *India* : Mouth of Hooghly estuary (W.B.). *Elsewhere* : Mocambique; Philippines; North Japan Sea.

Family PILARGIDAE Saint-Joseph, 1899

Key to Genera

Antennae 3, longer than palps; notopodial hooks without basal swellings; free-living .....
.....*Sigambra* Müller

Antennae 2, subequal to palps; notopodial hooks with basal swellings; commensalic.....
.....*Sigatargis* n. gen.

Genus ***Sigambra*** Müller, 1858

Diagnosis : Body flattened with 3 antennae, a pair of biarticulate palps and 2 pairs of tentacular cirri. Antennae longer than palps. Dorsal cirri of first setiger longer than those of subsequent setigers. Notopodial hooks emergent.

Type Species : *Sigambra grubii* Müller, 1858.

Remarks : Eleven species of *Sigambra* are hitherto known from the Globe, of which only one species, *S. constricta* (Southern, 1921), described from the brackish-water habitat of India, is known from Indian waters. This is the first record of the genus from the Hooghly estuary.

11. ***Sigambra constricta*** (Southern, 1921)

1921. *Ancistrosyllis constricta* Southern, *Mem. Indian Mus.*, **5** : 523, pl. 19, fig. 1A-G.

1966. *Sigambra constricta.*—Pettibone, *Proc. U.S. natn. Mus.*, **118**(3525) : 181.

Material : 1 ex., Bakkhali, South 24 Parganas, 7.3.1985.

Diagnosis : Prostomium with biarticulate palps and three antennae—the median one originating slightly anteriorly and longer than laterals. Tentacular segment achaetous and apodous, completely fused with the first setiger, indistinctly separated from prostomium by a very thin margin, with 2 pairs of tentacular cirri. Dorsal cirri of first setiger longer than those of the rear ones. Parapodia subbiramous; notopodia indistinct with stout, emergent hooks, single per setiger from setiger 39 onwards. Neuropodia conically projecting with large triangular postsetal lobes and small rounded presetal ones. Notosetae emergent, stout hooks, single per setiger from 39th onwards. Neurosetae variable in length, arranged in supra-acicular group of long, slender capillaries and also short, coarsely serrated capillaries, and in infra-acicular group of only short, coarsely serrated capillaries.

Remarks : Southern (1921) described *Ancistrosyllis constricta* from Chilka Lake, Orissa. This is the first record of the species from the Hooghly estuary.

Sigambra constricta may readily be recognised by the shape of its anterior end, papillae at the base of the median dorsal cirri and hooked setae beginning from setiger 30-40. The present material agrees well with the type specimens with the addition of short coarsely serrated neuropodial capillaries in infra-acicular position.

Habitat : Soft muddy substratum admixed with very fine sand on the sheltered area below LWM; salinity 10‰.

Type Locality : Balugaon, Chilka Lake, Orissa.

Distribution : Indian Ocean. *India* : Lower reaches of Hooghly estuary (W.B.); Chilka Lake (Orissa); Kakinada Bay, Vishakhapatnam (A.P.); Vellar estuary, Adyar estuary, Madras (T.N.); off Kakinada, off Porto Novo (Bay of Bengal); Vembanad Lake (Kerala); off Bombay; Arabian Sea. *Elsewhere* : Madagascar.

Sigatargis, new genus

Description : Body long, flattened with parapodia deeply incised. Prostomium with 2 biarticulate palps and 2 antennae subequal to palps. Tentacular segment achaetous, indistinctly separated from prostomium, with 2 pairs of tentacular cirri—anteroventral pair shorter, subequal to

antennae and posterodorsal pair slightly longer. First setiger distinct from peristomium. Dorsal sirri short and subequal to ventral cirri, but those of the first setiger longer than subsequent ones. Notosetae stout emergent hooks; neurosetae simple, of variable length, with capillary tips. Pygidium rounded with a pair of short anal cirri. Pharynx unarmed, cylindrical, with distal circlet of conical papillae. Epidermis smooth.

Type Species : *Sigatargis commensalis*, new species.

Remarks : *Sigatargis* n. gen. has been erected to share the characters of the two genera, viz., *Sigambra* Müller, 1858 and *Ancistargis* Jones, 1961. *Sigambra* is characterised by three antennae which are longer than the palps, longer tentacular cirri, dorsal cirri of the first setiger longer than subsequent dorsal cirri, and the neurosetae with fine capillary tips. *Ancistargis* was considered as a synonym of *Ancistrosyllis* McIntosh, 1879 (Pettibone, 1966), but Fauchald (1977) stated that the genus was characterised by two antennae which were shorter than the palps, tentacular cirri and dorsal cirri of the first setiger subequal to the subsequent dorsal cirri, three kinds of neurosetae with blunt and hooked tips (at least in some of them), and the notopodial hooks with basal swellings. *Sigatargis* n. gen. partly resembles *Sigambra* in having longer dorsal cirri of the first setiger, moderately long tentacular cirri and neurosetae with fine tips, and partly *Ancistargis* in having two short antennae and notopodial hooks with basal swellings.

The new generic name has been coined for its intermediate position between the two genera mentioned above.

Gender : Feminine.

12. ***Sigatargis commensalis***, new species

(Fig. 2A-H)

Material : Holotype- An2244/1, Birajmani char, Gosaba, Sundarbans, 27.5.1985; paratype- 1 ex., An2245/1, other data same as above.

Description : Holotype (few posterior setigers missing) 25 mm long, 1 mm wide, with 115 setigers. Body dark brown, dorsoventrally compressed. Prostomium broad with biarticulate palps consisting of large palpophores indistinctly set off from the rest of prostomium and small palpostyles (Fig. 2A); antennae short, paired, digitiform and subequal to palps. Peristomium partly fused with prostomium, but distinct from first setiger, bulging out laterally, 2 pairs of tentacular cirri of which anteroventral pair similar to antennae and posterodorsal pair slightly longer. Eye spots absent. Pharynx retracted.

Parapodia sub-biramous (Fig. 2B-D); notopodia indistinct, each with a digitate dorsal cirrus, aciculum and hooked seta; neuropodia each with a long, conical acicular lobe. Dorsal cirri preacicular, longer on first setiger; ventral cirri also digitate, beginning from setiger 3, subequal to dorsal cirri in anterior and middle setigers and smaller in posterior setigers.

Notopodial hooks (Fig 2F) beginning from setiger 3, single, emergent in anterior and middle setigers; hooks large, recurved, with basal enlargement on one side; other notopodial setae absent. Neurosetae simple throughout and of 2 types : (i) slender, smooth capillaries, and (ii) short limbate setae. Capillaries (Fig. 2H) long and short, mostly in supra-acicular position; short limbate setae (Fig. 2G) in infra-acicular position, with pointed unidentate tips, cutting edge having fine serrations in middle part.

Variations : Paratype complete, in 3 fragments, 28 mm long, 1 mm wide, with 125 setigers; with everted pharynx and intact pygidium. Pharynx long and cylindrical, with distal circlet of large and small conical papillae. Pygidium rounded with a pair of slender digitiform anal cirri (Fig. 2E).

Remarks : This new species differs from other pilargids as indicated for the genus. The species name is prosposed in view of its occurrence in close association with the estuarine hemichordate.

Habitat : Burrows of the hemichordate, *Saccoglossus* sp., below MTL; firmly attached to the gastric region of the hemichordate; salinity 25‰.

TALEHSAPIIDAE, new family

Description : Body filiform, cylindrical, with smooth epidermis. Antennae, tentacular cirri and eyes absent; palps present or absent. Parapodia sub-biramous; notopodia reduced to small blunt lobes supported by acicula and each with 1 or 2 smooth capillaries; neuropodia cylindro-conical, with embedded acicula and several spinous capillaries; dorsal and ventral cirri absent. Pharynx bulbous, eversible, unarmed or armed with a pair of jaws. Pygidium with a pair of lateral and a midventral anal cirri.

Type Genus : *Talehsapia* Fauvel, 1932.

Remarks : While erecting the genus *Talehsapia* with the type species *T. annandalei* Fauvel, 1932, on the basis of only two incomplete specimens, Fauvel (1932) felt the necessity of accommodating it in a new family but refrained from doing so evidently because of the paucity of material and left it under *incertae sedis*. Hartman (1947) referred the genus to Pilargidae while revising the family with a comprehensive account of the genus *Talehsapia* Fauvel. Subsequently, Fauvel (1953) placed the species in Hesionidae whereas Pettibone (1966) retained it in Pilargidae but with reservations. Later, Emerson and Fauchald (1971) while reviewing the genus *Loandalia* Monro, 1936 suggested that the genus did not belong to the family Pilargidae and referred it to *incertae sedis*.

Members of the family Pilargidae have flattened bodies, atennae, biarticulate palps, tentacular cirri and unarmed pharynx, in contrast to *Talehsapia* in which the body is filliform and cylindrical, without antennae, palps and tentacular cirri, whereas the pharynx is armed with a pair of jaws. Only a single genus, *Loandalia* Monro, 1936, of Pilargidae appears to be very close *Talehsapia*, differing only in having reduced palps and unarmed pharynx. Hence, the genus *Talehsapia* Fauvel is accommodated here in a new family for which the name Talehsapiidae is proposed. Considering its close affinity with *Talehsapia*, the genus Loandalia may also be transferred to this new family, which is also in conformity with the idea of Hartman (1947) who suggested that these two genera were very closely related.

Genus *Talehsapia* Fauvel, 1932

Diagnosis : Body long, slender and filiform; anterior region (first 5-6 setigers) inflated and tesselated. Prostomium small without antennae and palps; peristomium achaetous, without cirri. Parapodia sub-biramous; no dorsal and ventral cirri. Notopodia reduced to blunt projections, each with an aciculum and 1 or 2 smooth capillaries. Neuropodia blunt, conical projecting lobes, each with several spinous capillaries. Pharynx armed with a pair of jaws. Pygidial lobe plate-like with a pair of lateral and a midventral anal cirri.

Type Species : *Talehsapia annandalei* Fauvel, 1932.

Remarks : This monotypic genus, described from the brackish-water habitat of Thailand, occurs in Indian waters including the Hooghly estuary.

13. ***Talehsapia annandalei*** Fauvel, 1932

1932. *Talehsapia annandalei* Fauvel, *Mem. Indian Mus.*, *12* : 251, pl. 9, figs. 13-20.

1984. *Talehsapia annandalei*, —Misra *et al.*, *Rec. zool Surv. India*, *81* : 42.

Material : 2 ex., Kamalpur, Sagar Island, 19.10.1976; 1 ex., Kachuberia, 13.4.1978; 1 ex., Kakdwip, 12.7.1980; 2 ex., Gangasagar, 20.1.1981; 1 ex., Namkhana, 6.10.1982; 3 ex., Canning, 18.11.1982; 1 ex., Muriganga Creek, Sagar Island, 4.9.1983, coll. S. Chakraborty; 4 ex., Jhingakhali, 17.9.1983.

Additional Material : 1 ex., W2256/1, Taleh-sap, Sta 27, 26.10.1916, coll. N. Annandale, (type); 6 ex., An736/1, Baitarani river, Chandbali, Orissa, 4.1.1976, coll. B. Biswas.

Diagnosis : Body long, slender, filiform and cylindrical. Prostomium small conical, without eyes, antennae and palps. Peristomium apodous and achaetous, without tentacular cirri. Anterior 5-6 setigers inflated and bulbous with tesselated epidermis having polygonal areas; Parapodia subbiramous from second setiger onwards; notopodia reduced to small acicular bulgings, without dorsal cirri, but with 1 or 2 smooth capillaries in anterior and middle setigers, and stout, protruding acicular setae—single per setiger, in posterior setigers. Neuropodia blunt, cylindrical lobes, each with a very small posteroventral ligule resembling ventral cirrus and a neuroacicula. Neurosetae straight or slightly curved capillaries with several transverse rows of spines excluding the distal end. Pygidial lobe oval, plate-like, with 3 small cirri—a lateral pair and an unpaired midventral cirrus.

Remarks : The present material agrees well with the type specimen as well as with the subsequent material recorded by Soota & Rao (1977b). This species proximates to *Loandalia fauveli* Berkeley, 1941, but differs from it in having armed pharynx, and in the absence of palps on the prostomium and notopodial capillaries in posterior setigers.

Habitat : Solid clayey soil in the zone near MTL; comparatively hard soil substratum; salinity 5‰ to 17‰.

Type Locality : Taleh-sap, Thailand.

Distribution : Indo-west Pacific. *India* : Lower reaches of Hooghly estuary, Matla river (W.B.); Baitarani estuary (Orissa). *Elsewhere* : Thailand.

Family HESIONIDAE

Genus ***Hesione*** Savigny, 1818

Diagnosis : Antennae 2, palps absent, tentacular cirri 8 pairs. Pharynx eversible, distally smooth and without jaws. Parapodia uniramous with composite falcigers only. Dorsal cirri jointed.

Type Species : *Hesione splendida* Savigny, 1818.

14. ***Hesione splendida*** Savigny, 1818

1818. *Hesione splendida* Savigny, *Histoire naturelle des animaux sans vertebres*, p. 316.

1967. *Hesione splendida*.- Day, *A monograph on the Polychaeta of Southern Africa*, Part 1 : 228, fig.11.2.a-c.

Material : 1 ex., Kishorimohanpur, Sundarbans, 8.11.88., coll. A. Misra.

Diagnosis : Prostomium deeply notched posteriorly with 2 small antennae and 2 pairs of eyes. Pharynx eversible, smooth with an ovoid dorsal tubercle, without jaws or marginal papillae. Tentacular cirri and dorsal cirri jointed, the latter borne on long cirrophores. Setigerous lobe stout with small presetal and postsetal lips and a superior conical papilla. Setae heterogomph falcigers with long sickle-shaped blades having 2 strong apical teeth and a sub-apical fine accessory tooth.

Remarks : The material agrees well with the earlier description of the species. This is the first record of the species from the West Bengal coast.

Habitat : Soft mud towards the MTL.

Type Locality : Red Sea.

Distribution : India : Chilka Lake (Orissa), Godavari estuary (A.P.); Cochin backwater (Kerala); Krusadai Is., Rameswaram Is. (T.N.); Nankauri Harbour (Nicobar Is.), Andamans. *Elsewhere* : Arabian Sea; Sri Lanka; Banka Strait; Pacific; Atlantic.

Family NEREIDIDAE Johnston, 1865

Key to Subfamilies

Parapodia sub-biramous, without ligules ..... Namanereidinae

Parapodia biramous, with ligules ..... Nereidinae

Key to Genera

1. Some notopodia with branchiae 2

   Notopodia without branchiae 3

2. Branchiae arise from dorsal cirri, setae composite spinigers throughout..... *Dendroneresis* Peters

   Branchiae arise from notopodial lobes; setae composite spinigers and falcigers.....

   ..... *Dendronereides* Southern

3. Parapodia sub-biramous throughout, without ligules ..... *Namalycastis* Hartman

   Parapodia biramous from third setiger onwards, with well-developed ligules..... 4

4. Parapodia of first 2 setigers sub-biramous; pharynx with soft papillae having apically thickened cuticle..... *Ganganereis* n.gen.

   Parapodia of first 2 setigers uniramous; pharynx with soft papillae or chitinous paragnaths..... 5

5. Tentacular cirri 3 pairs; chitinous paragnaths absent..... *Lycastonereis* Rao

   Tentacular cirri 4 pairs; chitinous paragnaths present..... 6

6. Paragnaths absent from basal ring of pharynx ..... *Ceratonereis* Kinberg

   Paragnath present on basal ring of pharynx 7

7. Paragnaths on group VI transverse bars ..... Perinereis Kinberg

Subfamily NAMANEREIDINAE Hartman, 1959

Genus *Namalycastis* Hartman, 1959

Diagnosis : Pharynx eversible, without paragnaths or papillae (rarely present). Tentacular cirri 4 pairs. Parapodia sub-biramous or uniramous. Notopodia reduced; neuropodia with a single setal lobe only. Dorsal cirri prolonged in posterior setigers. Notosetae usually absent; neurosetae heterogomph spinigers and falcigers.

Type Species : *Paranereis abiuma* Müller in Grube, 1871.

Remarks : So far the genus was known to possess smooth pharynx. But very small papillae are observed by the present author on the maxillary ring of the pharynx of *N. fauveli* Rao, 1981, which has been redescribed below. This character is, therefore, included in the diagnoses of the subfamily as well as the genus.

Only two species in the genus have so far been known from India, but now one more species is reported for the first time from India (*vide infra*). All these three species are observed to occur in the Hooghly estuary.

Key to Species

1. Dorsal cirri short and conical, slightly enlarged in posterior setigers; antennae very small or indistinct; neuropodial falcigers modified, unusually heterogomph.....*N. fauveli* Rao

   Dorsal cirri slender, gradually enlarged in middle and posterior setigers; antennae distinct; neuropodial falcigers not modified.....2

2. Notosetae 2-5; neuropodium bilobed conical process..... ..... *N. meraukensis* (Horst)

   Notosetae 1-2; sometimes absent; neuropodium unilobed conical process ... *N. indica* (Southern)

15. *Namalycastis fauveli* Rao, 1981

(Fig. 3A-L)

1981. *Namalycastis fauveli* Rao, *Bull. zool. Surv. India*, *3*(3) : 215.

Material : 2 ex., Kachuberia, 12.6.1977; 2 ex., Kakdwip, 8.9.1979; 3 ex., Kakdwip canal, Kakdwip, 28.6.1980; 3 ex., Bhushighata, 12.8.1982; several ex., Diamond Harbour, 11-13.3.1983; several ex., Haldia, 16-17.3.1983; 9 ex., Patikhali, Haldia, 18.3.1983; 5 ex., Narayanpur, 9.3.1984; 10 ex., Geonkhali, 23.3.1985; several ex., Falta, 26-27.3.1985; 4 ex., Bally, 2.6.1986; 5 ex., Barrackpur, 3.6.1986; 2 ex., Salkia, Howrah, 10.6.1986, coll. G.C. Roy.

Description : Body complete, 55-120 mm long, 1.5-2.5 mm wide, with about 205-280 setigers; light brown or flesh-coloured in life, with greenish tinge posteriorly, colourless in spirit. Prostomium (Fig. 3A) wider than long, anterior border straight, no median groove; palps short and broad, slightly projected in front; antennae very small, hardly visible, obscured behind anterolateral margin of prostomium; eyes 2 pairs, small, almost in a line on posterior border of prostomium. Tentacular cirri 4 pairs, short, subequal and hardly reaching beyond setiger 1. Pharynx eversible with a row of 5-6 small fleshy papillae on maxillary ring; horny jaws (Fig. 3G) having 3-4 teeth.

Parapodia (Fig. 3B-F) sub-biramous throughout, each with 2 acicula, not protruding; notopodial lobes represented by small folds, each with an embedded aciculum, and 1-3 notosetae from setiger 3 onwards; neuropodia also small, each with an acicular lobe and several setae. Dorsal cirri short and

conical, more or less similarly developed throughout, increasing slightly in size on posteriormost setigers, never extending beyond the tip of setae. Ventral cirri very small throughout the length of body.

Notosetae absent in first 2 setigers, 1-3 in succeeding ones, rarely absent; hemigomph spinigers (Fig. 3H) anteriorly, composite falcigers (Fig. 3L) in middle and posterior setigers. Spinigers with short blades having minute, coarse serrations, and bluntly pointed tips; falcigers with long smooth blades. Neurosetae of 2 kinds : heterogomph spinigers and heterogomph falcigers; both types present in supra- and infra-acicular position. Falcigers unusually heterogomph, with one limb of lower piece very long; anterior row of falcigers with short, smooth blades (Fig. 3J), but posterior row with long, finely serrated blades (Fig. 3K). Heterogomph spinigers (Fig. 3I) few, 1 or 2 in both supra- and infra-acicular position; blades with blunt tips, coarse basal serrations and fine distal cilia. Pygidium with a pair of small anal cirri.

Remarks : This is the first record of the species from the Hooghly estuary. As the original description of *N. fauveli* Rao is very brief, the species is redescribed here. However, the material agrees well with the type specimens. Apart from the number of notopodial and neuropodial spinigers, and the length of the posterior dorsal cirri, other features are observed to be comparatively less variable.

Habitat : Soft, clayey soil in the zone between HWM and LWM, salinity 0‰ to 10‰.

Type Locality : Baitarani river, Chandbali, Orissa.

Distribution : Endemic in north-east coast of India. *India* : Upper and middle reaches of Hooghly estuary (W.B.); Baitarani river (Orissa).

16. *Namalycastis indica* (Southern, 1921)

1921. *Lycastis indica* Southern, *Mem. Indian Mus.*, *5* : 578, pl. 19, fig.2 a-j, tex fig. 2 a-d.

1989. *Namalycastis indica*- Misra *et al.*, *Rec. Zool. Surv. India*, *81* : 43.

Material : 3 ex., Kachuberia, 12.6.1977; 4 ex., Kakdwip, 9.9.1979; 5 ex., Muriganga Creek, 3.3.1980; 2 ex., Bakkhali, 5.10.1982; 6 ex., Bhushighata, 18.10.1982; 1 ex., Jhingakhali, 11.9.1983; 5 ex., Geonkhali, 9.3.1984; several ex., Haldia, 15.3.1985; several ex., Falta, 25.3.1985; 5 ex., Barrackpur, 3.6.1986; several ex., Salkia ghat, Howrah, 10.6.1986, coll. G. Roy.

Diagnosis : Prostomium wider than long, with a short anteromedian groove. Pharynx eversible, smooth. Parapodia sub-biramous throughout. Notopodia represented by an obscure fold with embedded aciculum and 1 or 2 setae from setiger 3. Notosetae all hemigomph spinigers with long, smooth blades. Neuropodia narrow, cylindrical with conical acicular lobe. Neurosetae of 3 kinds : hemi- and heterogomph spingers, and heterogomph falcigers. Dorsal cirri short in anterior setigers, gradually increasing in size - broad and flattened in middle and posterior setigers.

Remarks : The present material agrees well with the type specimens. Considerable variations with regard to the shape and position of the eyes, length of the tentacular cirri and the shape and size of the dorsal cirri, also noted earlier by Fauvel (1932), are observed in the present material.

Habitat : Clayey soil in the zone between HWM and MTL; salinity 0‰ to 10‰.

Type Locality : Salt Lake, east of Calcutta, India.

Distribution : Indo-west Pacific. *India* : Hooghly estuary (W.B.); Kespur, Chilka Lake (Orissa); Godavari estuary (A.P.); Adyar estuary, Pulicat Lake, Madras, Tiruchendur (T.N.); Andamans; Narakar, Vypin, Puttankari, Vembanad Lake (Kerala); Gujarat. *Elsewhere* : Mocambique; South Africa; Sri Lanka; Burma; Celebes; Solomon Island.

17. ***Namalycastis meraukensis*** (Horst, 1918)

1918. *Lycastis meraukensis* Horst, *Zool. Meded. Leiden, 4* : 246.

1961. *Namalycastis meraukensis*. -de Silva, *Spolia Zealon, 29*, pt.II, p.172.

Material : 1 ex., Geonkhali, 23.3.1985, A. Misra; 2 exs., Falta, 25.3.1985, A. Misra.

Diagnosis : Prostomium wider than long, with a long anteromedian groove, pharynx eversible, smooth. Parapodia sub-biramous throughout. Notopodia represented by small fold with aciculum and 2-5 notosetae from setiger 3. Notosetae hemigomph spinigers with long blades having smooth or very finely serrated margins. Neuropodia broad, cylindrical, with a conical acicular process bilobed distally. Neurosetae of 2 kinds : heterogomph spinigers and heterogomph falcigers. Dorsal cirri with large cirrophores anteriorly, gradually increasing posteriorly — flattened, leaf-like with broad base, surpassing far beyond the tip of setae.

This is the first record of the species from India.

Habitat : Patches of clayey soil at MTL; salinity nil.

Type Locality : New Guinea.

Distribution : Indo-west Pacific. *India* : Middle reaches of Hooghly estuary (W.B.). *Elsewhere* : Sri Lanka; Mergui; Thailand; New Guinea.

Subfamily NEREIDINAE Johnston, 1865 (Correa, 1948)

Genus ***Ceratonereis*** Kinberg, 1866

Diagnosis : Pharynx eversible with paragnaths on the maxillary ring only. Tentacular cirri 4 pairs. Parapodia biramous. Dorsal cirri attached basally to the superior notopodial lobe; inferior neuropodial lobe may be present. Notosetae include homogomph spinigers and falcigers; neurosetae homo- and heterogomph spinigers and heterogomph falcigers.

Type Species : *Ceratonereis mirabilis* Kinberg, 1866.

Remarks : Only five species in the genus has so far been recorded from Indian waters. However, this is the first record of the genus from W.B. Coast.

18. ***Ceratonereis burmensis*** Monro, 1937

1937. *Nereis (Ceratonereis) burmensis* Monro, *Ann. Mag. Nat. Hist. London.* Sr. 10, *19* : 532, fig.1.

1953. *Nereis (Ceratonereis) burmensis*. –Fauvel, Fauna of India, Annelida—Polychaeta, p.196, fig.97d-f.

Material : 3 ex., Birajmanichar, near Gosaba, Sundarbans, 25.5.85, coll. A. Misra; 2 ex., Digha coast, W.B. 7.2.1988; coll. A. Chakrabortv.

Diagnosis : Prostomium not incised, with small palpostyles and 4 small black eyes. Paragnaths arranged on eversible pharynx as follows : I = small cones; II = large cones in oblique clusters; oblique cluster. Notopodia with 3 triangular ligules; neuropodia with 3 lobes and a digitiform ventral cirrus, but with 2 lobes in posterior setigers. Notosetae spinigers only; neurosetae spinigers and falcigers, confined to a short mid-body region.

Remarks : The present material agrees well with the earlier description of the species. This is the first record of the species from W.B. coast.

Habitat : Clayey or sandy soil towards the LWM.

Type Locality : Maungmagan, Burma.

Distribution : Indo-west Pacific. *India* : Off Bombay. *Elsewhere* : Burma.

Genus ***Dendronereides*** Southern, 1921

Diagnosis : Pharynx eversible with soft papillae on both rings. Tentacular cirri 4 pairs. Parapodia biramous. Branchiae present as subdivisions of notopodial superior lobes. Neuropodial inferior ligule absent. Notosetae homogomph spinigers; neurosetae homo- and heterogomph spinigers, and homo- and heterogomph falcigers.

Type Species : *Dendronereides heteropoda* Southern, 1921

Remarks : Only two species in the genus have so far been known, of which *D. heteropoda* Southern, 1921, described earlier from the Hooghly estuary, is widely recorded from India. Presently, another species is described hereunder as new to science.

Key to Species

Branchiae formed as clusters of branched filaments; neuropodia with 3 digitate lobes .....
.....*D. heteropoda* Southern

Branchiae formed as whorls of several simple filaments; neuropodia with bilobed anterior process and a short rounded posterior lobe.....*D. gangetica* n.sp.

19. ***Dendronereides gangetica***, new species

(Fig. 4A-E, 5A-D, 6A-H)

Material : Holotype - An2246/1, Nurpur, Hooghly river, 7.12.83; Paratypes - 2 ex., An2247/1, Champa river, Ramnagar, Midnapur, 26.6.1983; 1 ex., An2248/1, Gangasagar, Sagar Island 15.8.1983; 1 ex., An2249/1, Muriganga creek, Sagar Island 18.8.1983, coll. S. Chakraborty; 1 ex., An2250/1, Jhingakhali, Sundarbans, 12.9.1983.

Description : Holotype incomplete (a few posterior setigers missing), 74 mm long, 2.5 mm wide, with about 165 setigers. Body light brown with uniform dark pigments over anterodorsal part. Prostomium (Fig.4A) deeply indented anteriorly, with 2 short tapered antennae, short palps having small globular styles, and 2 pairs of lightly pigmented eyes arranged on lower half of prostomium. Tentacular cirri 4 pairs, tapering; dorsal pairs broad basally, posterodorsal pair longest reaching up to setiger 4. Pharynx with a pair of dark brown jaws (Fig. 4E), each having 10 blunt teeth, and soft papillae on both maxillary and oral rings. Maxillary ring with 3 irregular rows of slender papillae forming a belt having lateral gaps; basal ring with V=3 short papillae in a vertical row, upper one larger; VI=4 papillae in a patch on each side; VII=2 papillae; VIII=5 papillae on one side and 6 on other side, in round patches.

Parapodia of first 2 setigers uniramous, succeeding ones biramous. Uniramous parapodia each with a notopodial ligule not supported by aciculum, other features similar to those of anterior abranchiate biramous parapodia. Biramous parapodia of anterior abranchiate region (Fig.4B) each with conical dorsal and ventral cirri, 3 conical notopodial ligules and a short anterior lobe; neuropodium cylindrical with bluntly bifid presetal lobe, short rounded postsetal lobe, and no inferior neuropodial ligule. Branchiae (Fig. 4C) commencing from setiger 10 and extending up to setiger 38, first in the from of simple filaments arising below dorsal cirrus, then gradually forming a whorl involving 2 superior notopodial ligules (Fig. 4D); Maximum development with 2 whorls on setigers 25-30 (Fig. 5A), reducing thereafter (Fig. 5B). Branchiate and posterior abranchiate parapodia each with only 1 notopodial ligule; neuropodial presetal lobes becoming unequal, upper one being longer and slender, gradually reducing to form a single conical process (Fig. 5C, D).

Notosetae all homogomph spinigers with long and short blades having very fine serrations (Fig. 6A). Blades of notopodial spinigers in middle and posterior setigers occasionally with long outgrowths (algal?) [Fig. 6B.]. Neurosetae of 3 kinds; homo- and hemigomph spinigers and homogomph falcigers, arranged in supra-acicular group of several homogomph spinigers dorsoposteriorly and a few homogomph falcigers anteriorly, and in infra-acicular group of several homogomph spinigers ventroposteriorly and several homogomph falcigers anteriorly. Hemigomph spinigers (Fig. 6G) appearing in infra-acicular group of middle and posterior setigers along with homogomph spinigers. Blades of spinigers long and short, (Fig. 6C,D), mostly with coarse serrations (Fig. 6E) rarely with long cilia (Fig. 6F) in middle and posterior setigers; occasionally with apical outgrowths (algal?) (Fig. 6G). Falcigers (Fig. 6H) with short, unidentate, smooth blades, decreasing in number posteriorly.

Variations : Paratypes all incomplete posteriorly, 20-65 mm long, 1-2 mm wide, with about 65-145 setigers. Variations observed in paratypes include longest tentacular cirri extending up to setiger 3-5, jaw with 9-10 teeth, branchiae commencing from setiger 9-11 and extending up to setiger 34-38. Larger individuals with maximum number of branchiate setigers and also with more number of branchial filaments. Pharyngeal papillae arranged as : maxillary ring with 2-3 rows; basal ring with V=4-5 papillae, VIII=5-7 papillae. Variation in numbers and types of setae shown in Table 2.

Table 2. Setal counts for *Dendronereides gangetica* n.sp.

	No. of setae				
	Setiger 10	Setiger 25	Setiger 50	Setiger 75	Setiger 120
Notosetae					
Homogomph spinigers	6(9-10)*	11(10-12)	4(2-5)	5(4-5)	5(3-5)
Neurosetae					
Supra-acicular					
Homogomph spinigers	9(6-10)	10(8-10)	5(4-5)	5(3-5)	2(2-3)
Homogomph falcigers	5(4-5)	4(3-4)	2(1-2)	0(0-1)	1(0-1)
Infra-acicular					
Homogomph spinigers	11(10-12)	10(8-10)	2(2-3)	3(2-3)	2(1-2)
Hemigomph spinigers	—	—	4(3-5)	5(5-7)	4(3-5)
Homogomph falcigers	8(5-8)	7(5-7)	3(2-3)	2(2-3)	1(1-3)

* Numbers in parentheses refer to the variation in numbers of setae in 5 paratypes.

Remarks : This new species is assigned to the genus *Dendronereides* Southern, 1921 because of the presence of soft papillae on both the rings of the pharynx and branchiae formed as subdivisions of notopodial superior ligules. Hitherto, only two species, *D. heteropoda* Southern, 1921 and *D. zululandica* Day, 1951 have been known, of which the former was described from India while the latter from South Africa. *Dendronereides gangetica* n. sp. differs from the other two species in the nature of the branchiae and parapodia. The branchiae are formed as four pinnate divisions in *D. zululandica* and as clusters of branched filaments in *D. heteropoda*. In *D. gangetica* these are, however, formed of several simple filaments forming at first one, and later two whorls. The neuropodium is with a single broad setigerous lobe in *D. zululandica*, with three digitiform lobes in *D. heteropoda*, while in the present new species this is cylindrical with blunt bifid anterior lobe and a short rounded posterior one. Moreover, the heterogomph falcigers, present in the other two species, are absent in *D. gangetica* n.sp.

Habitat : Soft mud in the zone towards LWM; salinity from 0‰ to 12‰.

20. *Dendronereides heteropoda* Southern, 1921

1921. *Dendronereides heteropoda* Southern, *Mem. Indian Mus.*, *12* : 603, text fig. 10a-b, pl.21, fig. 6a-n.
1977. *Dendronereides heteropoda*.–Soota & Rao, *Rec. zool. Surv. India*, *73* : 331.

Material : 4 ex., Kakdwip, 12.7.1980; 6 ex., Bhusighata, North 24 Parganas, 18.10.1982; 15 ex., Champa river, Ramnagar, Midnapur, 25.6.1983; 5 ex., Raychak, 7.12.1983; 10 ex., Haldia, 6.3.1984; 3 ex., 17.3.1985; 2 ex., Teropekhya, 7.3.1984; several ex., Narayanpur (near Geonkhali), 9.3.1984; 3 ex., Bakkhali, 7.3.1985; several ex., Diamond Harbour, 11.3.1985; several ex., Falta, 25.3.1985; 6 ex., Barrackpur, 3.6.1986; several ex., Salkia, Howrah, 10.6.1986, coll. G. Roy.

Diagnosis : Light brown with purple pigments anterodorsally. Prostomium broad, slightly indented in front. Pharynx eversible with soft papillae on both rings. Parapodia biramous from third setiger, with 2-3 notopodial ligules, neuropodium having 2 anterior and a posterior digitiform lobes, and without inferior ligule. Branchiae in the form of branched bunches of filaments arising below dorsal cirrus, commencing from setiger 7 or 8, extending up to setiger 25-35. Notosetae all homogomph spinigers; neurosetae of 4 kinds : homo- and heterogomph spinigers, and homo- and heterogomph falciggers.

Remarks : The material agrees well with the type specimens with the addition that a few heterogomph falcigers appear irregularly in posterior setigers. Other variations observed lie mainly on the number of branchiate setigers which increase with the size of the specimen and, therefore, are considered to bear little taxonomic significance. The species may be recognised by the characters as mentioned in the key.

This species is capable of tolerating a wide range of salinity fluctuation of the estuary, but flourishing well towards the freshwater zone.

Habitat : Burrows in soft silty mud from MTL to LWM; salinity 0‰ to 10‰.

Type Locality : Barantolla, Salt Lake, east of Calcutta.

Distribution : Indian Ocean. *India* : Hooghly estuary, Champa river (W.B.); Burhabalang estuary, Chandipur (Orissa); Tarapur, Bombay (Maharashtra); Vallarpadan (Kerala); Gujarat. *Elsewhere* : Shat-el-Arab; Burma.

Genus ***Dendronereis*** Peters, 1854

Diagnosis : Pharynx eversible, smooth or with soft papillae. Tentacular cirri 4 pairs. Parapodia biramous. Branchiae present as subdivisions of dorsal cirri. Neuropodia in anterior setigers multifid. Setae homo- and hemigomph spinigers.

Type Species : *Dendronereis arborifera* Peters, 1854

Remarks : Of the three species included in the genus, two are known from India. Presently, another species is proposed as a new one and described hereunder to include the earlier material of *D. arborifera* non Peters of Fauvel from India (*vide infra*). It is also suggested that the occurrence of *D. arborifera* Peters in India is doubtful.

Fauchald's (1977) definition of *Dendronereis* Peters includes setae all homogomph spinigers only. However, in the present investigation, homo- and hemigomph spinigers are observed in *D. dayi* n.sp. Hence, both types of setae are included in the generic diagnosis to accommodate the new species.

21. ***Dendronereis aestuarina*** Southern, 1921

1921. *Dendronereis aestuarina* Southern, *Mem. Indian Mus.*, *12* : 598, pl.20, fig.4.

1984. *Dendronereis aestuarina*.—Misra *et al.*, *Rec. Zool. Surv. India*, **81** : 43.

Material : 1 ex., Sandeshkhali, 14.3.1975; 2 ex., Gangasagar, 6.8.1979; 3 exs., Kachuberia, 26.9.1980; 2 ex., Namkhana, 7.10.1982; 12 ex., Jhingakhali, 12.9.1983.

Diagnosis : Anterior 10-12 segments light green with brown pigments, posteriorly light coloured. Prostomium deeply cleft anterodorsally. Pharynx eversible with a pair of jaws; maxillary ring smooth, oral ring with soft papillae. Parapodia biramous from third setiger, with 3 notopodial ligules, 10-12 neuropodial lobes and an inferior ligule. Number of ligules and lobes decreasing in number posteriorly. Branchiae as bipinnate divisions of dorsal cirri, commencing from setiger 15 and extending up to 21-22. Setae all homogomph spinigers with slender, minutely serrated blades.

Remarks : The material agrees well with the type specimens, but varies only with the lesser number of neuropodial lobes, which were noted originally as 15-19.

Habitat : Soft mud in the lower littoral zone; salinity 8‰ to 12‰.

Type Locality : Sundarbans (Munda river).

Distribution : Indo-west Pacific. *India* : Sagar Island, Namkhana, Jhingakhali (W.B.); Godavari estuary (A.P.); Vellar estuary, Madras (T.N.); Komarokan backwater, Vembanad Lake (Kerala); Mandovi estuary (Goa). *Elsewhere* : Thailand.

22. ***Dendronereis dayi*** n.sp.

(Fig. 7A-E, 8A-F)

Dendronereis arborifera.–Fauvel, 1932:85; 1953:172, fig. 86c.–Soota & Rao, 1977:332.–Misra *et al.*, 1983:43. *Non* Peters, 1854.

Material : Holotype - An2251/1, Champa river, Ramnagar, Midnapur, 25.6.1983; paratypes - 1ex., An2252/1, Bhangatushkhali, Sundarbans, 14.3.1975; 2 ex., An2253/1, Taldi, South 24 Parganas, 3.11.1978, coll. N. Sarangi; 1 ex., An2254/1, Kakdwip, 12.7.1980; 3 ex., An 2255/1, Canning, 17.11.1982; 7 ex., An2256/1, Champa river, Ramnagar, Midnapur, 25.6.1983; 2 ex., An2257/1, Bakkhali, 7.3.1985.

Additional Material : 2 ex., W2529/1, backwater creek, Vishakhapatnam, May-June, 1926, coll. H.S. Rao & G. Varugis; 1 ex., W2613/1, other data same as above; 10 ex., An740/1, Baitarani river, Chandbali, 8.1.1976, coll. S. Biswas; 2 ex., An1346/1, Gangasagar, Sagar Island, 21.9.1979, coll. A. Misra; (as *Dendronereis arborifera*).

Description : Holotype complete, 26 mm long, 3.5 mm wide, with 105 setigers; pale brown with redish gills in life. Prostomium deeply cleft anteriorly; antennae short, slender, originating from the base of palps; palps broad, basally fused with prostomium (Fig. 7A). Eyes 3 pairs, on posterior half of prostomium; the anterior pair small, dot-like and subdermal, sometimes fading, one or both. Tentacular cirri 4 pairs, slender, posterodorsal pair longest reaching setiger 9. Pharynx eversible, armed with a pair of small jaws (Fig. 7E), each having 13 teeth, and soft conical papillae arranged as: I = 2-3 irregular rows of small papillae forming a transverse band; II = 4 slender papillae in oblique row; III & IV = continuous row of small papillae, 1 row ventrally, 2 irregular rows on both sides; oral ring with a continuous row of well separated medium-sized papillae, with 2 papillae above on both dorsal and ventral positions.

Parapodia of first 2 setigers uniramous, succeeding ones biramous. Uniramous parapodia (Fig.7B) each with subulate dorsal and ventral cirri, single notopodial ligule, neuropodium similar to those of following setigers. Anterior biramous parapodia (Fig.7C) each with a long dorsal cirrus having large cirrophore and a short ventral cirrus; notopodium with 3 conical ligules and a short anterior setigerous lobe; neuropodium with 2 anterior digitiform lobes, 1-2 small lobes between them, a broad rounded postsetal lobe, and a conical inferior neuropodial ligule. Branchaie commencing from setiger 8, extending up to setiger 21. First branchiae in the form of a simple filament, then a row of 2 lateral simple divisions and later 2 rows of unipinnate divisions on the enlarged cirrophores of dorsal cirri (Fig. 7D). Maximum development of branchiae on setigers 10-18, with 2-3 filaments originating from a point, afterwards suddenly disappearing Parapodia of posterior abranchiate region modified (Fig. 8A-C); notopodial ligules gradually reducing in number to a single setigerous lobe; neuropodial lobes also reducing into a single large triangular setigerous lobe; inferior ligule also reduced and disappearing in posterior setigers; dorsal cirri longer than ventral ones.

Notosetae homogomph spinigers with minutely serrated blades (Fig.8D). Neurosetae numerous arranged almost in circle in anterior setigers, in the form of '3', of 2 kinds: homogomph and hemigomph spinigers, arranged in supra-acicular group of several homogomph spinigers (Fig.8F), and in infra-acicular group of several hemigomph ones (Fig.8E). Short-bladed setae in anterior row, long-bladed ones in posterior row-the former with smooth or very finely serrated blades, and the latter with very fine serrations only. Hemigomph setae reducing in number in posterior setigers. Pygidium short with a pair of long ventral anal cirri, extending over last 5 setigers.

Variations : Paratypes, 2 complete and 16 incomplete, 20-65 mm long, 2.5-4 mm wide, with 85-125 setigers. Variations observed include longest tentacular cirri extending up to setiger 7-9, eyes dark to lightly pigmented, branchiae commencing from setiger 8-10 and extending up to 19-20. Larger specimens with more of branchiate setigers. Variation in numbers and types of setae shown in Table 3.

Table 3. Setal counts for *Dendronereis dayi* n.sp.

	No. of setae			
	Setiger 5	Setiger 25	Setiger 50	Setiger 75
Notosetae				
Homogomph spinigers	24(20-25)*	28(25-28)	34(32-35)	19(15-18)
Neurosetae				
Supra-acicular				
Homogomph spinigers (posterior)	28(26-30)	26(25-26)	14(11-15)	11(10-13)
Homogomph spinigers (anterior)	26(25-27)	13(10-12)	9(5-9)	5(3-5)
Infra-acicular				
Hemigomph spinigers (posterior)	25(25-28)	22(20-24)	24(22-25)	12(10-12)
Hemigomph spinigers (anterior)	22(20-22)	15(12-15)	5(5-6)	6(3-6)

* Numbers in parentheses refer to the variation in numbers of setae in 16 paratypes.

Remarks : The genus *Dendronereis*, well-characterised by its branchiae and parapodia, was established with the type species *D. arborifera* Peters, 1854, from the coast of Mocambique. *Dendronereis arborifera* has subsequently been reported from Madagascar (Fauvel, 1919), India (Fauvel, 1932, 1953) and parts of South Africa (Day, 1934, 1967). The present author has collected several examples of nereidid worms belonging to the genus *Dendronereis* from the Hooghly estuary, which are quite identical with the Fauvel's material of *arborifera* from Vishakhapatnam, India, and with the material determined also as *D. arborifera* by Soota & Rao (1977b) and Misra *et al.* (1983). Detailed study of the above-mentioned material and the review of relevant literature reveal that the material from India are quite different from *D. arborifera* Peters.

In *D. arborifera* Peters from Africa the pharyngeal papillae are lacking, branchiae persist from setiger 12-24, anterior notopodia have three lobes, anterior neuropodia have 5-6 lobes and the setae are all homogomph spinigers. In *D. arborifera* of Fauvel from India and also in the present material

the soft conical pharyngeal papillae are present on both the rings, branchiae persist from setigers 8-10 to 19-22, anterior notopodia are with three triangular lobes and a short anterior setigerous lobe, anterior neuropodia have 3-4 conical lobes and a broadly rounded posterior lobe, and the setae are all homo- and hemigomph spinigers. The important differences are, therefore, observed with regard to the region of persistence of branchiae, occurrence of pharyngeal papillae, number of neuropodial lobes and the type of setae. Moreover, the inferior neuropodial ligule and the additional pair of eyes (anterior pair) as observed in the present material separate them further. Fauvel (1932), while assigning the specimens from Vishakhapatnam to *D. arborifera*, probably considered the inferior neuropodial ligule as neuropodial lobe owing their close proximity and disappearance in posterior setigers and did not give much importance to the additional pair of eyes which are still observed in his material deposited in the National Zoological collections of India at the Zoological Survey of India, some of them being partly faded.

As the differentiating features mentioned above are of specific significance, the specimens from India are considered here to represent a new species for which the name *D. dayi* is proposed. The other two species in the genus, *D. aestuarina* Southern, 1921 and *D. pinnaticiris* Grube, 1878, differ from the present new species in the structure of the branchiae. Though the branchiae appear to be bipinnate in both the species, in the former, anterior three pairs have only a single row of simple branches, while in the latter all the branchiae appear to have two rows of compound branches.

The species is named in honour of Dr. J. H. Day for his contribution in the field of polychaete taxonomy.

Habitat : Soft mud in the zone towards LWM; salinity 5‰ to 15‰.

Distribution : Endemic in the north-east coast of India. *India* : Hooghly estuary (W.B.); Bhitarkonica estuary (Orissa); Vishakhapatnam (A.P.).

Ganganereis, new genus

Diagnosis : Prostomium sub-pyriform, with paired frontal antennae, biarticulate palps and 2 pairs of eyes. Tentacular segment achaetous and apodous; tentacular cirri 4 pairs with distinct cirrophores, the longest pair reaching setiger 15-16. Parapodia of first 2 setigers sub-biramous, succeeding ones biramous; notopodium with a long dorsal cirrus and 2 notopodial ligules; neuropodium with 2 digitiform presetal lobes, a short pointed postsetal lobe, and an inferior ligule. Ventral cirri long and tapered. Notosetae homogomph spinigers only; neurosetae all homo-, hemi- and heterogomph spinigers.

Pharynx with paired jaws and soft papillae on both maxillary and oral rings; papillae on maxillary ring horny, brown, with thick apical cuticle.

Type Species : *Ganganereis sootai*, new species.

Remarks : The generic subdivision of the nereidids is mainly based on the pharyngeal structures and the presence of specific kinds of setae in the parapodial rami (Fauchald, 1977). So far as the nature of the pharyngeal structures is concerned, there is only one genus *Websterinereis* Pettibone, 1971 in the family Nereididae, which is closely allied to *Ganganereis* n.gen.

In both the genera some of the papillae are horny with thick cuticle, giving the false appearance of paragnaths. But the former genus has horny papillae in group VII of oral ring, while the latter has the similar type of papillae on the maxillary ring. Moreover, the neuropodial falcigers, present in the former genus, are absent in the latter which has only spinigerous setae throughout.

While the nature of the setae is considered, *Ganganereis* n.gen. belongs to the group of nereidid genera in which the setae comprised of only spinigers. On closer examination of the genera within this group it appears that *Ganganereis* is very much allied to *Kinberginereis* Pettibone, 1971. Both the genera have sub-pyriform prostomium, very long tentacular cirri, and sub-biramous parapodia in the first two setigers. But the former differs from the latter in the following features : (i) papillae on both ring *vs.* papillae only in group VI of oral ring; (ii) neuropodium with two conical presetal lobes *vs.* neuropodium with bifid presetal lobe; (iii) neurosetae arranged in circle *vs.* arranged in fan-shaped bundle.

The generic name, *Ganganereis*, is proposed after the famous river 'Ganga'- the extuarine part of which favours the natural occurrence of it.

23. *Ganganereis sootai*, new species

(Fig. 9A-H, 10A-F)

Material : Holotype An2258/1, Jhingakhali, Sundarbans, 12.9.1983; paratypes 5 ex., An2259/1, Naraharipur, 10.11.1982; 3 ex., An2260/1 Champatala, 27.6.1983; 2 ex., An 2261/1, Gangasagar, 6.7.1983; 4 ex., An 2263/1, Jhingakhali, Sundarbans, 12.9.1983.

Description : Body cylindrical, very soft, fragile posteriorly. Holotype complete, 130 mm long, 4.5 mm wide, with about 175 setigers. Prostomium partly withdrawn into tentacular segment (Fig. 9A), with deep groove between bases of conical frontal antennae, palps stout, with dilated palpophores consisting of 2-3 segments and small styles; eyes black, 2 pairs on posterior half of prostomium, anterior pair reniform and posterior one rounded. Tentacular segment shorter than the subsequent ones; tentacular cirri 4 pairs with cylindrical cirrophores, styles of posterodorsal pair extending back to setiger 17, but anterodorsal pair shorter reaching setiger 3.

Pharynx eversible with paired jaws, each having 13 teeth and papillae on both maxillary and oral rings (Fig. 9B,C). Maxillary ring with very small conical papillae-horny, brown in colour, with thick apical cuticle, fading on preservation, arranged in a circle of 2-3 irregular rows with lateral gaps. Oral ring with solitary soft papillae arranged as : V = 0; VI = 2 large papillae on each side; VII & VIII = 2 rows, upper with 6 and lower with 7 papillae.

Parapodia of first 2 setigers sub-biramous, succeeding ones biramous. Sub-biramous parapodia (Fig. 9D) each with a notopodial ligule supported by an aciculum; other features similar to those of succeeding parapodia. Anterior biramous parapodia (Fig. 9D, E-G) each with a long cirriform dorsal cirrus, 2 conical notopodial ligules; neuropodium with 2 conical, subequal presetal lobes and a shorter, pointed postsetal lobe; inferior neuropodial ligule similar in shape but slightly smaller than notopodial ligules; ventral cirrus tapered, shorter than dorsal one. Parapodia of middle setigers with all ligules and lobes reduced in size, postsetal neuropodial lobe gradually reducing to small knob-like process. Posterior parapodia (Fig.9H) modified, but dorsal cirri remain unchanged; upper notopodial ligule decreasing in size and considerably smaller than lower one; neuropodial lobes reduced, appearing as single lobe with bifurcated tips.

Notosetae homogomph spinigers (Fig. 10A,B) arranged in vertical row above noto-aciculum, with blades of different sizes, having finely serrated cutting margins; number of setae gradually reducing in posterior setigers, being only 1-2 in posteriormost setigers. Neurosetae numerous, nearly

encircling neuropodial lobes in anterior setigers, and of 3 kinds : homo-, hemi- and heterogomph spinigers, arranged in supra-acicular group of hemigomph spinigers anteriorly and homogomph spinigers dorsoposteriorly, and in infra-acicular group of hemigomph spinigers anteriorly and heterogomph spinigers ventroposteriorly. Neuropodial homogomph spinigers with long blades similar to notosetae; hemigomph spinigers with broad shafts and short blades having fine basal serrations (Fig.10E) in upper bundle, and coarse basal serrations (Fig.10C,D) with longer blades having fine and also coarse basal spines. Long-bladed neuropodial spinigers reducing gradually in number posteriorly, being only 1-2 in infra-acicular position of posteriormost setigers. Pygidium small with dorsal anus and a pair of small ventral anal cirri extending over last 4 setigers.

Variations : Paratypes, 3 complete and 14 incomplete, 50-135 mm long, 2-4.5 mm wide, with about 85-185 setigers. Variations observed include longest tentacular cirri extending up to setiger 14-18, eyes light brown to black, jaw with 13-14 teeth. Papillae on the maxillary ring soft and colourless to apically horny and brown, and on the oral ring soft, 4-6 in upper row, and 7-8 in lower row, on groups VII & VIII. Larger specimens with distinctly hardened papillae on maxillary ring. Variation and types of setae shown in Table 4. Anal cirri extending over last 4-5 setigers.

Table 4. Setal counts for *Ganganereis sootai*, new species

	No. of setae			
	Setiger 10	Setiger 25	Setiger 50	Setiger 100
Notosetae				
Homogomph spinigers	17(12-17)*	15(12-15)	1(8-10)	4(3-5)
Neurosetae				
Supra-acicular				
Homogomph spinigers	10(10-12)	10(8-10)	8(8-10)	8(6-8)
Hemigomph spinigers	12(10-12)	10(10-12)	10(8-10)	5(5-7)
Infra-acicular				
Heterogomph spinigers	52(46-58)	50(42-50)	30(25-30)	12(10-15)
Hemigomph spinigers	15(12-15)	12(10-12)	11(8-11)	6(4-7)

* Numbers in parentheses refer to the variation in number of setae in 14 paratypes.

Remarks : This new species differs from other nereidids as indicated for the genus.

The specific name is proposed in honour of Dr. T.D. Soota for his contribution in the field of polychaete taxonomy in India.

Habitat : Burrows in clayey soil, extending up to 100-150 cm depth, in the zone between MTL and LWM; salinity 8‰ to 16‰.

Genus *Lycastonereis* Rao, 1981

Diagnosis : Pharynx eversible, without any chitinous paragnaths, with a few fleshy papillae on oral ring. Tentacular cirri 3 pairs. Parapodia biramous. Notosetae homogomph spinigers; neurosetae homo- and hemigomph spinigers, and homogomph falcigers.

Type Species : *Lycastonereis indica* Rao, 1981.

Remarks : *Lycastonereis* Rao, 1981, established with the type species *L. indica* Rao, 1981, is a monotypic genus. The original and the only known account of the genus, described on the basis of two incomplete specimens collected from the Baitarani river, Orissa, is not complete and elaborate. Several example of intact specimens collected from the Hooghly estuary as well as the type material are studied to redescribe the genus and species.

24. *Lycastonereis indica* Rao, 1981

(Fig. 11A-F, 12A-E)

1981. *Lycastonereis indica* Rao, *Bull, Zool, Surv. India*, 3(3) : 213, fig.1 A-D.

Material : 1 ex., Kakdwip canal, Kakdwip, 8.8.1978, 2 ex., 10.3.1985; 10 ex., Bhushighata, 12.8.1982, several ex., 17.11.1982; 4 ex., Champa river, Ramnagar, 25.6.1986.

Description : Body, 2 complete and others incomplete, long, slender and fragile, 30-65 mm long, 1-2 mm wide, with about 105-175 setigers; light brown with greenish ting in life. Prostomium slightly wider than long, with dark brown spots forming a definite pattern, extending in 3 rows up to setiger 24-26 (Fig. 12A) a pair of short antennae, a pair of bulbous palps terminating in small knob-like palpostyles, and 2 pairs of eyes arranged in a trapezium on posterior half of prostomium. Tentacular cirri 3 pairs, short, club-shaped; second ventral pair absent. Pharynx eversible with a pair of light brown, chitinous jaws (Fig. 11F), each having several blunt teeth; paragnaths absent, but small fleshy papillae on oral ring only.

Parapodia of first 2 setigers uniramous, succeeding ones biramous. Uniramous parapodia (Fig. 11B) each with a conical dorsal cirrus, a blunt ventral cirrus, a notopodial ligule, and neuropodium similar to those of subsequent biramous parapodia. Anterior biramous parapodia (Fig. 11C) each with a broad, conical dorsal cirrus and a small ventral cirrus, 2 subequal postsetal notopodial ligules–superior one conical and inferior one club-shaped, and a small presetal notopodial lobe; neuropodium with 2 bluntly conical, subequal postsetal lobes and a short presetal one. Middle and posterior parapodia (Fig 11D) without superior notopodial ligules, presetal lobe of notopodium and neuropodial lobes gradually diminishing in size. Each ramus with a single lobe in posteriormost setigers (Fig. 11E). Inferior neuropodial ligule absent.

Notosetae (Fig. 12A) all homogomph spinigers with very minute serrations. Neuroseae of 3 kinds : homo- and hemigomph spinigers (Fig. 12B-D) and homogomph falcigers (Fig. 12E), arranged in supra-acicular group of several homogomph and a few hemigomph spinigers posteriorly and 1-2 falcigers anteriorly, and in infra-acicular group of homo- and hemigomph spinigers posteriorly and falcigers anteriorly in almost equal numbers. Homogomph spinigers with longer blades having long basal cilia, and shorter blades having minute serrations, hemigomph ones with ones with longer blades having long, fine basal cilia superiorly and shorter, finely serrated blades inferiorly. Homogomph falcigers with short, smooth appendages. Setae gradually decreasing in number posteriorly, with longer basal ciliations.

Posterior 6-7 setigers swollen, comparatively large, pygidium narrow, cylindrical with a pair of small anal cirri; frequently lost during collection.

Remarks : The original and only known account of the species, described on the basis of two incomplete specimens collected from the Baitarani river, Orissa, is very brief. On examination of more material, collected from the area under present study, as well as the type specimens, the species has been redescribed here.

Habitat : Soft black muds in the zone near MTL, particularly abundant in sewage outfal areas; salinity 5‰ to 10‰.

Type Locality : Baitarani river, Chandbali, Orissa.

Distribution : Endemic in north-east coast of India. Lower reaches of Hooghly estuary, Champa river (W.B.); Baitarani river (Orissa).

Genus *Neanthes* Kinberg, 1866

Diagnosis : Pharynx eversible with conical paragnaths on both rings. Tentacular cirri 4 pairs. Parapodia biramous. Notosetae homogomph spinigers; neurosetae homo- and heterogomph spinigers and usually also heterogomph falcigers.

Type Species : *Neanthes vaalii* Kinberg, 1866.

Remarks : Eleven species in the genus have so far been recorded from India, of which three are known from the Hooghly estuary. Presently, two more species in the genus have been described as new to science.

Key to Species

1. Paragnaths on basal ring arranged in a continuous belt; falcigerous setae absent .... *N. chingrighattensis* (Fauvel)

   Paragnaths on basal ring arranged in groups; falcigerous setae present 2

2. Notopodia trifid on posterior setigers; paragnaths on group VI = 1+1, on groups VII & VIII = a single row of small cones ..... *N. glandicincta* (Southern)

   Notopodia bifid on posterior setigers; paragnaths on group VI = 5 (6) +5 (6), in round clusters, on group VII & VIII = 3-4 irregular rows of large and small cones ..... *N. meggitti* (Monro)

25. *Neanthes chingrighattensis* (Fauvel, 1932)

(Fig. 12H-K)

1932. *Nereis chingrighattensis* Fauvel, *Mem. India Mus.*, **12** : 90, fig. 14 a-h.

1953. *Nereis chingrighattensis*. -Fauvel, *Fauna of India, Annelida-Polychaeta*, p.179, fig.90 a-h.

Material : 10 ex., Kachuberia, 12.6.1977; 3 ex., Harwood Point, Kakdwip, 11.9.1977; 15 ex., Muriganga river, Kakdwip, 8.9.1979; 2 ex., Gangasagar creek, Gangasagar, 21.1.1983; 2 ex., Diamond Harbour, 11.3.1985; 2 ex., Haldia, 16.3.1985; 4 ex., Gadiara, 22.4.1987, coll. B.P. Haldar.

Diagnosis : Prostomium entire, slightly wider than long. Pharynx eversible with paragnaths arranged as follows: I = a cluster of 4-6 cones; II = a crescentic group of several cones; III = a transverse group of 3-4 irregular rows; IV = an oblique patch of 3-4 rows; V & VI = a transverse row of 30-40 cones forming a continuous line; VII & VIII = 2-3 irregular rows of large and small cones. Pasrapodia biramous from setiger 3; notopodia with triangular superior ligule and 2 inferior ligules; neuropodium with a presetal and 2 postosetal lobes. Anteromedian notopodial ligule and neuropodial lobes reducing in size posteriorly. Notosetae homogomph spinigers throughout; neurosetase homo- and heterogomph spinigers.

Epitokous stage

Material : Several ex., ♂♂, Kakdwip canal, Kakdwip, at surface water, 12.7.1980.

Description : Body complete, 45-50 mm long, 2-2.5 mm wide, with 85-100 setigers. Body divisible into 2 regions : pre-epitokal and epitokal–the former with parapodia (Fig 12H, I) almost similar to those of atokous stage, consisting of 16 setigers and the latter with modified ones. Eyes greatly enlarged. Dorsal and ventral cirri in pre-epitokal region modified on first 7 setigers, swollen medially. Parapodia of epitokal region (Fig. 12J) with thin, flat accessory lamellae on neuropodia and on the bases of dorsal and ventral cirri. Dorsal cirri crenulated on lower margin. Natatory setae (Fig. 12K) with broad, paddle-shaped appendages.

Remarks : The species was described on the basis of only two complete and two incomplete atokous specimens. Subsequent records include only the diagnostic features of the atokous stage. The present material agrees well with the type specimens. However, the epitokous males are described here for the first time. Female epitokes were not detected during the present survey. However, gravid females, collected from bottom sediments, were observed without any sign of modification.

Habitat : Mud, rotten log, and algal matover any hard substratum like bricks, stones, etc., in the zone between MTL and LMW; salinity 5‰ to 16‰.

Type Locality : Chingrighata, Salt Lake (east of Calcutta).

Distribution : Endemic in Indian waters. Middle and Lower reaches of Hooghly estuary (W.B.); Chandipur (Orissa); Malvan (Maharashtra).

26. *Neanthes glandicincta* (Southern, 1921)

1921. *Nereis (Nereis) glandicincta* Southern, *Mem. Indian Mus.*, **5** : 589, pl.23, fig.9A-L, text fig. 5 a-e.

1974. *Neanthes glandicincta*. Hartman, *J. mar. biol. Ass India*, **16**(2) : 618.

Earlier Material : 3 ex., ZEV6262/7. Barantolla, Salt Lake, 9.11.1913, coll. N. Annandale, (types); 2 ex., W1739, Barantolla, Salt Lake, 9.11.1926, coll. N. Annandale & S.W. Kemp.

Diagnosis : Prostomium narrow in front, longer than wide, with 2 short antennae, 2 short palps and 4 eyes in posterior wider part. Tentacular cirri short, 4 pairs, posterodorsal pair longest reaching up to setiger 3. Paragnaths on eversible pharynx arranged as follows : I = 4-10 scattered cones; II = 6-13 large cones forming curve; III = 4 rows of cones in transverse patch; IV = 6-12 large cones; V = 0; VI = 1 cone on both sides in large papillae; VII & VIII = a continuous row of several small cones.

Parapodia of first 2 setigers uniramous, succeeding ones biramous. Biramous parapodia of anterior region each with conical dorsal and ventral cirri, 3 notopodial ligules, 3 digitate neuropodial lobes, and a broad, conical inferior ligule. Median notopodial ligule gradually reducing in size, and neuropodial lobes being 2 in number in posterior setigers. Notosetae homogomph spinigers and homogomph falcigers. Hemigomph spinigers with short coarsely serrated blades, falcigers with long knife-like blades having finely serrated margins and curved tips.

Remarks : Though the Gangetic delta is the type locality, the species has not been collected during the present investigation. The diagnosis is based on the earlier material. The species may readily be recognised by the characters mentioned in the key.

Type Locality : Barantolla, Salt Lake (east of Calcutta).

Distribution : Indo-west pacific. *India* : Hooghly estuary (W.B); Mahanadi estuary (Orissa); Vishakhapatnam (A.P); Adyar estuary (T.N.); Kumbalam Is., Narakal (Kerala). *Elsewhere* : Singapur; Thailand; South China Sea; Australia; New Zealand.

27. *Neanthes meggitti* (Monro, 1931)

(Fig. 13A-D)

1931. *Nereis (Neanthes) meggitti* Monro. *Ann. Mag. nat. Hist.* (Ser 10), **8** : 580, figs. 1-6.
1932. *Nereis cricognatha* : Fauvel, *Mem. Indian Mus.*, **12** : 91. *Non* Ehlers, 1904. *Non* Ehlers, 1904.
1977. *Nereis (Neanthes) meggitti* : Rao, *Sci. & Cult.*, 43(2) : 493, figs. 1-4.

Material : 6 ex., Raychak, 7.12.1983; 5 ex., Haldia, 6.3.1984; Teropekhya, 7.3.1984; 7 ex., Narayanpur, 9.3.1984; several ex., Diamond Harbour, 11.3.1985; several ex., Geonkhali, 21.3.1985; several ex., Falta, 25.3.1985; 5 ex., Uttarpara Library Ghat, Hooghly, 12.6.1986, coll. G. Roy.

Additional Material : 1 ex., W2419/1, Budge Budge, 23.9.1917, coll. N. Annandale; 1 ex., 12.3.1937, 2 ex., 15.3.1937, 3 ex., 24.4.1938, 2 ex., Nov. 1943, Palta Water tanks, Barrackpur, coll. Palta Survey party, (as *Nereis cricognatha* by Fauvel, 1932, 1953).

Diagnosis : Prostomium short, quadrangular, as broad as long. Pharynx eversible with paragnaths arranged as follows: I = 3-4 large cones; II = 11-12 small cones in irregular oblique rows; III = several large and small cones in 3-4 irregular rows; IV = several small cones increscentic cluster; V = 4-5 cones in oblique line; VI = 5-6 cones in round cluster; VII & VIII = several large and small cones in 3-4 irregular rows. Parapodia biramous from setiger 3; notopodia with a long dorsal cirrus and a short ventral cirrus, and 3 conical, pointed subequal ligules; neuropodia with 2 unequal lobes. Median notopodial ligule gradually decreasing in size and disappear after setiger 28-30. Notosetae homogomph spinigers, and neurosetae homo- and heterogomph spinigers and heterogomph falcigers.

Epitokous stage

Material : Several ex., ♂♂♀♀, Geonkhali, 21.3.1985; 4 ex., Uttarpara Library ghat, Hooghly, 12.6.1986, coll. G.C. Roy

Diagnosis : Body complete; male specimens 65-70 mm long, 3-3.5 mm wide, with 85-95 setigers, and female specimen 70-78 mm long, 3.5-4 mm wide, with 90-110 setigers. Body divided into 2 regions : pre-epitokal and epitokal. Pre-epitokal region with parapodia similar to those of atokous stage, consisting of 14 setigers in male and 18-19 setigers in female. Eye enlarged, coalescent on both sides (Fig. 13A). Parapodia of epitokal region modified, with foliaceous dorsal and ventral cirri, neuropodial lobes flat, lamellae-like. Parapodial lamellae more developed in males (Fig. 13B) than in females (Fig. 13C). Natatory setae (Fig. 13D) with broad, paddle-shaped appendages.

Remarks : Re-examination of the material from the Hooghly estuary, determined as *Nereis cricognatha* Ehlers, 1904 by Fauvel (1932 and 1953), reveals that it is really *Neanthes meggitti* (Monro, 1931). More material collected during the present investigation, has been examined and observed to be similar to that of Fauvel. Both the species are closely related. However, *Neanthes cricognatha* (Ehlers) differs from the other species in having a continuous belt of paragnaths on basal ring, gradually decreasing postsetal neuropodial lobe, and in the absence of heterogomph spinigerous setae. owing to the presence of distinct patch of paragnaths in group V and VI, and neuropodial heterogomph spinigers, the present material as well as that of Fauvel, is assigned here to *N. meggitti* (Monro).

Habitat : Soft mud under bricks, stones, etc., in the zone at MTL, up to the depth of 1-3 cm; salinity 0‰ to traces.

Type Locality : Rangoon river, Burma.

Distribution : Indian Ocean. *India* : Upper and middle reaches of Hooghly estuary (W.B). *Elsewhere* : Burma.

Genus ***Perinereis*** Kinberg, 1866

Diagnosis : Eversible pharynx with conical and transverse paragnaths on both rings. Tentacular cirri 4 pairs. Parapodia biramous. Notosetae homogomph spinigers; neurosetae homo- and heterogomph spinigers and heterogomph falcigers.

Type Species : *Perinereis novaehollandiae* Kinberg, 1866.

Remarks : This is a moderately large genus, but represented by only nine species in Indian waters, of which three occur in the Hooghly estuary.

Key to Species

1. Paragnaths absent in group V ..... *P. cavifrons* (Ehlers)

   Three paragnaths present in group V, forming a triangle 2

2. Paragnaths 6-12 in group I, forming a cluster ..... *P. nigropunctata* (Horst)

   Paragnaths 2-3 in group I, forming a vertical line ..... *P. cultrifera* (Grube)

28. ***Perinereis cavifrons*** (Ehlers, 1920)

1920. *Nereis (Perinereis) cavifrons* Ehlers, *K. Ges. Wiss. Gottingen, n. f.* **10**(7) : 47, pl.1, figs. 6-10.
1966. *Perinereis cavifrons*.–Cheriyan, *Bull. Dep. mar. Biol. Oceanogr., Univ. Kerala*, **2** : 43.

Material : 1 ex., Harwood Point, Kakdwip, 11.9.1977.

Diagnosis : Prostomium globular with 2 short frontal antennae, 2 thicker, bulb-like palps. Paragnaths arranged on eversible pharynx as follows: I = 3 cones in vertical line; II = several cones in crescentic patch; III = several cones in oval patch; IV = crescentic patch; V = 0; VI = a transverse bar on each side; VII & VIII = several cones in 2-3 irregular rows.

Notopodia with 2 bluntly conical ligules–superior one larger, and a small anterior setigerous lobe. Neuropodia with a bluntly conical setigerous lobe and a thick, blunt inferior ligule. Notosetae homogomph spinigers only. Neurosetae homo- and heterogomph spinigers and heterogomph falcigers, arranged in supra-acicular group of homogomph spinigers and heterogomph falcigers, and in infra-acicular group of heterogomph spinigers and heterogomph falcigers.

Remarks : This species was described on the basis of only one epitokous female. Subsequently the atokous forms were described by Fauvel (1932) from the Gangetic delta, India. The present material agrees well with that of Fauvel with the exception of the presence of long, sickle-shaped blades of falcigers, in contrast to short ones.

Habitat : Claycy soil at LWM; salinity 5‰.

Type Locality : Ambona (Amboina).

Distribution : Indian Ocean. *India* : Middle reaches of Hooghly estuary, Malta river (W.B.); Travancore, Vembanad Lake, Ashtamundi Kayal, Quilon, Chevara (Kerala); Marmagao Bay (Goa). *Elsewhere* : Java; Indonesia.

29. ***Perinereis cultrifera*** (Grube, 1840)

1840. *Nereis cultrifera* Grube, Actinien Echinodermen und wurmen *Description* Adriatischen und Mittelmeeres, p.74.
1984. *Perinereis cultrifera* Var. hellen. -Misra *et al.*, *Rec. zool. Surv. India*, 81 : 45.

Material : 2 ex., An1215/1, Champatala, Sagar Island, 10.5.1978.

Diagnosis : Body with uniformly distributed brown pigments and white spots on mid-dorsal surface of anterior setigers. Prostomium sub-pyriform with dark longitudinal bands of pigments between anterior pair of eyes. Paragnaths arranged on eversible pharynx as follows: I = 2 cones in vertical line; II = 10-12 cones in curved rows; III = 12-16 cones in oval patch; IV = 20-25 cones in about 3 oblique rows forming wedge; V = 3 cones in triangle; VI = single transverse bar on each side; VII & VIII = 2-3 continuous transverse rows of cones, reducing to single row at both sides.

Notopodia with 2 blunt, finger-like subequal ligules, and a small anterior acicular lobe; bases of superior notopodial ligules gradually expanding. Neuropodia with a bluntly conical setigerous lobe and a blunt inferior ligule. Notosetae homogomph spinigers only. Neurosetae homo- and heterogomph spinigers and heterogomph falcigers.

Epitokous stage
(Fig. 14A-C)

Material : 2 ex. ♂♂, An 1215/1, Champatala, Sagar Island, 10.5.1978.

Description : Male epitokes, 45-60 mm long, 2.5-3 mm wide at pre-epitokal region. Body divided into 2 regions: pre-epitokal region (19 to 20 setigers) with parapodia similar to those of atokous stage, and epitokal region (65 to 70 setigers).

Pharyngeal paragnath counts and patterns same as in the atokous stage. Dorsal cirri in pre-epitokal region modified (Fig. 14A) on first 7 parapodia. In epitokal region each parapodium becoming flattened with circular neuropodial lobes and extra lamellae at bases of dorsal and ventral cirri (Fig. 14B, C).

Remarks : The species is known to have extensive variations, specially with regards to the armature on the pharynx, the length of the tentacular cirri, and the shape of the dorsal notopodial ligule. However, the arrangement of the paragnaths on the eversible pharynx of the present material typically agrees with the original description.

Habitat : Soft mud at LWM, salinity 12‰.

Type Locality : Philippine Island.

Distribution : Indo-Pacific. *India* : Lower reaches of Hooghly estuary (W.B.); Gulf of Mannar (T.N.); Andamans; Arnala, Bombay (Maharashtra). *Elsewhere* : Mergui; Philippines; Great Barrier Reef; New Zealand; Costa Rica.

30. *Perinereis nigropunctata* (Horst, 1889)

1889. *Nereis nigro-punctata* Horst, *Notes Leyden Mus.* **11** : 171, pl.8, figs. -3.
1984. *Perinereis nigropunctata*. -Misra *et al.*, *Rec. zool. Surv. India*, **81** : 45.

Material : 1 ex., Jhingakhali, Sundarbans, 12.9.1983; 1 ex., Canning, S. 24 Parganas, 25.9.1983; 3 ex., An1465/1, Kachuberia, Sagar Island, 5.11.1975.

Diagnosis : Body purple brown 2-3 rows of brown marks of dorsum of anterior segments. Prostomium sub-pyriform. Paragnaths arranged on eversible pharynx as follows: I = 7-10 cones in cluster; II = several cones in triangle; III = several cones in transverse patch; IV = several cones in wedge-shaped cluster; V = 3 large cones forming a triangle; VI = single large transverse bar on each side; VII & VIII = 2-3 irregular rows of large and small cones.

Notopodia with 2 ligules and a small anterior acicular lobe; superior notopodial ligules enlarged bearing dorsal cirri on upper distal margin. Neuropodia with bluntly conical setigerous process and a blunt, club-shaped inferior ligule. Notosetae homogomph spinigers only. Neurosetae homo- and heterogomph spinigers and heterogomph falcigers.

Remarks : The material agrees well with the earlier descriptions of the species with the exception of the following features. Three rows of paragnaths in groups VII & VIII, resembling those of *P. cultrifera* Var. perspicillata Grube, 1878, in contrast to two rows as observed by Fauvel (1932), are observed in the present material.

Habitat : Soft muddy substratum towards LMW; salinity 6‰ to 12‰.

Type Locality : Malay.

Distribution : Indo-Pacific. *India* : Lower reaches of Hooghly estuary (W.B.); Mahanadi estuary, Gopalpur, Chilka Lake (Orissa); Mandapam, Cape Comorin (T.N.); Andamans; Mandovi-zuary estuary, Kalangut (Goa); Redi, Vengurla, Malvan, Devgad, Vijaydurg, Ratnagiri, Alibag, Bombay, Arnala, Tarapur, Dahanu, Gholghad (Maharashtra); New Kandla Port, Port Okha (Gujarat). *Elsewhere* : Red Sea; Mocambique; Madagascar; Malay; Solomon Is.; Great Barrier Reef.

Family NEPHTYIDAE Grube, 1850

Genus *Nephtys* Cuvier in Audouin & Milne Edwards, 1833.

Diagnosis : Pharynx eversible, usually with 22 rows of papillae. Interramal cirri recurved. Setae include barred and very long, smooth or finely serrated capillaries; acicula in most forms with a distal cap.

Type Species : *Nephtys hombergii* Savigny, 1818.

Remarks : This is a moderately large genus, but represented by only three species in Indian waters, of which two occur in the Hooghly estuary.

Key to species

Interramal cirri commencing on setiger 5, absent after setiger 23-25 ..... *N. oligobranchia*

Interramal cirri commencing on setiger 2, extending up to posterior end ..... *N. polybranchia*

31. ***Nephtys oligobranchia*** Southern, 1921

1921. *Nephtys oligobranchia* Southern, *Mem. Indian Mus.*, **5** : 610, pl. 24, fig.12.

1980. *Nephtys oligobranchia*, Chen & Wu, *Acta zool. sin.*, **26**(3) : 250.

Material : 2 ex., Champa river, Ramnagar, Midnapur, 25.6.1983; 4 ex., Uttarpara Library ghat, Hooghly, 10.6.1986.

Diagnosis : Pharynx eversible, divisible, into short muscular distal region and inflated proximal region; distal region with a long, slender dorsomedian subdistal papilla and 16 bifid distal papillae surrounding mouth and also with 14-16 longitudinal rows of papillae. Interramal cirri commencing on setiger 5, absent after setiger 23-24. Setae simple and of 3 types: barred, spinulose and capillary, arranged in pre- and post-acicular rows. Barred setae absent after setiger 15-16.

Remarks : The present material agrees well with the types. However, the lyrate setae, as observed in the Australian material of *N. oligobranchia* by Fauchald (1968), are not detected in the material from India.

Habitat : Soft mud or silty mud in the zone near and below LWM; salinity 0‰ to 5‰.

Type Locality : Chilka Lake, Orissa.

Distribution : Indo-west Pacific. *India* : Upper reaches of Hooghly estuary, Port Canning, Champa river (W.B.); Baitarani river, Chilka Lake (Orissa); Vishakhapatnam, Godavari estuary (A.P.); Cochin backwater (Kerala). *Elsewhere* : Mergui; Gulf of Siam; Vietnam; China.

32. *Nephtys polybranchia* Southern, 1921

1921. *Nephthys polybranchia* Southern, *Mem. Indian Mus.*, **5** : 607, pl.24, fig.11A-G, text fig. 11a-b.
1980. *Nephtys polybranchia*, Chen & Wu, *Acta zool. sin.*, **26**(3): 250.

Material : 4 ex., Teropekhya, 19.3.1985; 2 ex., Geonkhali, 23.3.1985; 5 ex., Falta, 25.3.1985; 4 ex., Uttarpara Library ghat, Hooghly, 10.6.1986.

Diagnosis : Pharynx eversible, divisible into short muscular distal region and inflated proximal region; distal region with 20 bifid papillae surrounding mouth and also with 22 longitudinal rows of papillae. Interramal cirri commencing on setiger 2, extending nearly to the posterior end. Setae simple and of 3 types: barred, spinulose and smooth capillary setae, arranged in pre- and post-acicular rows. Barred setae absent after setiger 24-25.

Remarks : The present material agrees well with the types and some other material subsequently recorded from Indian waters. The variability in the shape and size of the interamal cirri, also noted by earlier workers, may be the result of fixation.

Habitat : Soft silty sediments, muddy sand, in the zone near and below LWM; salinity 0‰ to traces.

Type Locality : Chilka Lake, Orissa.

Distribution : Indo-west Pacific. *India* : Upper and middle reaches of Hooghly estuary (W.B.); Chilka Lake (Orissa); Vellar estuary, Adyar estuary Madras (T.N.); Cochin backwater (Kerala); Umbargoan (Gujarat). *Elsewhere* : Sri Lanka; Gulf of Siam; Vietnam; China; Ryukyu Island (Japan).

Family GLYCERIDAE Grube, 1850

Genus *Glycera* Savigny, 1818

Diagnosis : Prostomium long with at least 3, usually 5-7 annuli. Aileron of jaws with lateral wings. Pharyngeal organs of many kinds. Notosetae simple, either capillary or acicular, or both; neurosetae simple, either capillary or acicular, or both; neurosetae composite spinigers.

Type Species : *Glycera unicornis* Savigny, 1818

Remarks : So far nine species in the genus have been known from India including four from the Hooghly estuary. In addition, one species has been described hereunder as new to science.

Key to species

1. Branchiate absent 2
   Branchiae present 3
2. Postsetal lobe single ..... *G. lancadivae* Schmarda
   Postsetal lobe double ..... *G. tesselata* Grube
3. A single posterior lobe in parapodia ..... *G. longipinnis* Grube
   Two posterior lobes in parapodia 4
4. Branchial filaments start from the dorsal edge of setiger 35-40 ..... *G. convoluta* Keferstein
   Branchial filaments start from the anterior surface of setiger 22-24 ..... *G. rouxi* Aud. & M. Edw.

33. *Glycera convoluta* Keferstein, 1862

(Fig. 15A-H)

1862. *Glycera convoluta* Keferstein, *Z. wiss. Zool.*, **12** : 106.
1953. *Glycera alba*.- Fauvel, 1953, Fauna of India, Annelida-Polychaeta, p.292, fig.149 i-m. *Non* Muller.
1974. *Glycera convoluta*. Hartman, *J. mar. biol. Ass. India*, **16**(1) : 196.

Material : 6 ex., Jambu Is., 21.10.1979; 3 ex., Gangasagar, 22.3.1981.

Additional Material : 1 ex., An1467/1, Gangasagar, 21.9.1979, coll. A. Misra; 1 ex., ZEV4298/7, Shetland Is., Scotland, donor W.C. McIntosh; (as *G. alba* Rathke). 2 ex., Ernakulum, Cochin, Sept., 1914, coll. F.H. Gravely; 1 ex., W1868/1, Marmagao Bay, Goa, Sept., 1916, coll. S.W. Kemp; (as *G. alba* Var. *cochinenis* Southern).

Diagnosis : Body complete, 30-35 mm long, 1 mm wide, with about 105-112 setigers; dark red in life. Prostomium with 10-12 rings, 2 small eyes at the base and 4 small tentacles distally. Pharyngeal papillae of 2 kinds : mostly cylindrical with cape-like sheath and distal mammilated tip (Fig. 15G), and others rounded. Projected tips of cylindrical papillae bounded by flat wings; both types of papillae each with longitudinal duct having terminal pore. Jaw supports (Fig. 15F) divergent, each with 2 unequal limbs having very small notch between them.

Parapodia of first 2 setigers uniramous, subsequent ones biramous. Parapodia of first setiger minute with single setigerous lobe. Biramous parapodia (Fig. 15A-E) each with 2 acicula piercing the bases of 2 long, cirriform, subequal presetal ligules, a short rounded postsetal lobe, a rounded dorsal cirrus, and a conical ventral cirrus. Postsetal lobes pointed superiorly from setiger 25-30 (Fig. 15C,D), being prominent posteriorly. Branchiae simple, appear as short stumpy lobes above the dorsal edge of setiger 35-40, extending beyond the tip of presetal lobes at least in some setigers, continuing nearly to the posterior end. Notosetae capillaries throughout, with very narrow wings; neurosetae (Fig. 15H) composite heterogomph spinigers with longer blades having coarsely crenulated margin.

Remarks : The present material is assigned here to *G. convoluta* Keferstein for having the characteristic pharyngeal papillae, divergent jaw supports and the longer branchiae.

On review of literature, it appears that the very common and widely occurring glycerid of Indian waters has been determined as *G. alba* Rathke, 1843. Fauvel (1932) merged *G. alba* Var. cochinersis Southern, 1921 with *G. alba* Rathke and made some records. Since then, it has been reported from newer localities of India.

The material of *G. alba* (non Müller) from the Hooghly estuary (Misra *et al.*, 1984) and that of *G. alba* Rathke from some other localities (Fauvel, 1932) has been found, on re-examination, to be *G. convoluta* Keferstein. The author suggests that several earlier records of *G. alba* Rathke from India, if re-examined, may perhaps prove to be *G. convoluta* Keferstein.

Habitat : Silty sand in the zone between MTL and LWM; salinity 10‰ to 19‰.

Type Locality : Mediterranean Sea.

Distribution : Cosmopolitan. *India* : Lower reaches of Hooghly estuary (W.B.) Ganjam coast, Puri, Konarak (Orissa); Cochin Backwater (Kerala); Ghogha (Gujarat); coasts of Maharashtra; Marmagao Bay (Goa). *Elsewhere* : Mocambique; South Africa; Madagascar; Persian Gulf; Japan;

western Canada to southern California; eastern Atlantic from the English Channel to tropical western Africa; Mediterranean Sea; Tristan da Cunha; South West Africa.

34. *Glycera lancadivae* Schmarda, 1861

1861. *Glycera lancadivae* Schmarda, *Neue wirbellose* Thiere ..... und Anneliden, p.95.
1983. *Glycera lancadivae*.–Misra *et al.*, *Rec. Indian Mus.*, **81** : 47.

Material : 1 ex., Gangasagar, 21.1.1980.

Diagnosis : Body incomplete, 8 mm long, 1 mm wide, with about 56 setigers. Pharyngeal papillae of 2 kinds: slender and triangular, and rounded, both with median ducts, but without any rings. Jaw supports forked, each with a short, thin limb united with a long limb by a pale chitinous area.

Biramous parapodia with 2 elongated, subequal presetal ligules, and a low, rounded postsetal lobe being slightly emarginate dorsally. Branchiae absent.

Remarks : The material agrees well with the earlier descriptions with the exception of the absence of rings in pharyngeal papillae. Day (1962) recorded 16-20 rings on the slender conical pharyngeal papillae. The present material is extremely small in size in comparison to earlier material from Sundarbans, which is over 3 cm in length.

Habitat : Silty sediments near LWM; salinity 16‰.

Type Locality : Sri Lanka.

Distribution : Indo-west Pacific. *India* : Lower reaches of Hooghly estuary (W.B.); Chandipur, Konark, Puri, Gopalpur (Orissa); Godavari estuary (A.P.); Madras coast (T.N.); Lakshadweep. *Elsewhere* : Madagascar; Persian Gulf; Maldives; Sri Lanka; Burma; north-east Australia; Solomon Is.; New Caledonia.

35. *Glycera longipinnis* Grube, 1878

1878. *Glycera longipinnis* Grube, *Mem. Acad. Sci. S. Peterb.*, **25** : 182, pl.8, fig.9.
1953. *Glycera longipinnis*.–Fauvel, Fauna of India, Annelida - Polychaeta, p.291, fig.148a-d.

Material : 1 ex., Digha coast, 2.3.1983; 1 ex., Digha coast, 19.3.1985, coll A. Dey; 9 ex., Digha coast; 5.4.1983; 4 ex., Lykani Khal, Digha, 21.2.1988; coll. R.K. Chakraborty.

Diagnosis : Pharyngeal papillae of 2 kinds : mostly long cylindrical papillae without rings, and a few stout and rounded. Jaw supports with two long slender limbs, united at the base. Biramous parapodia each with 2 subequal, cirriform presetal ligules, and a single rounded postsetal lobe. Branchial filaments simple, longer than presetal ligules, start from the dorsal surface of setiger 20-22.

Remarks : The material agrees well with the earlier descriptions. This is the first record of the species from West Bengal coast.

Habitat : Silty sand towards the LWM.

Type Locality : Philippine Islands.

36. *Glycera rouxii* Audouin & Milne Edwards, 1833

1833. *Glycera rouxii* Audouin & Milne Edwards, Annls. Sci. nat., 29 : 264.
1983. *Glycera rouxii*..-Misra *et al.*, *Rec. Indian Mus.*, 81 : 47.

Material : 1 ex., Gangasagar, 12.10.1979; 3 ex., Canning, 18.11.1982.

Diagnosis : Pharyngeal papillae in the form of smooth, conical, globular processes. Jaw supports each with a well-developed limb, and the other limb being small, triangular basal projection separated from the larger one by a small conical pale chitinous area. Biramous parapodia of anterior setigers each with 2 slender, subequal presetal ligules, and a short, rounded postsetal lobe. Postsetal lobes becoming double in middle and posterior setigers. Branchiae simple, slender and retractile, start from the anterior surface of setiger 22-24.

Remarks : The present material with the branchial filaments longer than the presetal ligules, at least in some setigers, arising on the anterior surface of it, has been ascertained in the present dissertation as *G. rouxii* Audouin & Milne Edwards. But the branchiae of this species being retractile are difficult to detect in preserved specimens.

Habitat : Soft silty sediments near or below LWM: salinity 12‰ to 14‰.

Type Locality : Marseilles, France.

Distribution : Indo-Pacific and North Atlantic. *India* : Lower reaches of Hooghly estuary, Canning (W.B.); Chandipur (Orissa); Vishakhapatnam (A.P.); Vellar estuary, Gulf of Mannar, Pamban backwater (T.N.); Andamans; Kerala coast; Lakshadweep Sea. *Elsewhere* : Mocambique; South Africa; Madagascar; Persian Gulf; Japan; Solomon Is.; Farallon Is.; North Atlantic; Mediterranean Sea.

37. *Glycera tesselata* Grube, 1863

1863. *Glycera tesselata* Grube, *Arch. Naturgesch.*, 29 : 41, pl. 4, fig. 4.
1953. *Glycera tesselata*. –Fauvel, Fauna of India, Annelida-Polychaeta, p. 291, fig. 152a-c.

Material : 1 ex., W2924/1, Doarakara, Sundarbans, 15.3.1918 coll. B. Prashad.

Diagnosis : Pharyngeal Papillae uniform, very long and grooved, without rings. Jaw supports forked, dagger-like, each with a short and a long limb, having a very deep notch between them. Biramous parapodia each with 2 triangular, subequal presetal ligules, and 2 shorter, rounded, subequal postsetal lobes. Branchiae absent.

Remarks : The species has not been recorded during the present investigation, and the diagnosis is based on the earlier material. It may be recognised by the characters as mentioned in the key.

Type Locality : Mediterranean Sea.

Distribution : Cosmopolitan. *India* : Sundarbans (W.B.); Chandipur, Gopalpur (Orissa); Off Orissa (Bay of Bengal); Godavari estuary (A.P.); Andamans; Nani Daman (Daman). *Elsewhere* : Red Sea; Madagascar; Maldives; Japan; British columbia south to Panama; western Canada to southern California; North Carolina; West Indies; Caribbean Sea; Scotland to Morocco; Mediterranean Sea.

Family GONIADIDAE Kinberg, 1866

Key to Genera

Pharynx eversible without V-shaped paragnaths or chevrons; pharyngeal organs of several kinds. ..... *Glycinde* Müller

Pharynx eversible with V-shaped paragnaths or chevrons; pharyngeal organs usually of one kind. ..... *Goniada* Aud. & & M. Edw.

Genus *Glycinde* Müller, 1958

Diagnosis : Posterior segments biramous. Chevrons absent; pharyngeal organs large and of several kinds. Notosetae knobbed or falcate hooded hooks; neurosetae composite spinigers.

Type Species : *Glycinde multidens* Müller, 1858.

Remarks : About 20 species are included in the genus *Glycinde*, of which only one is known to occur in India. However, this is the first record of the genus from the Hooghly estuary.

38. *Glycinde oligodon* Southern, 1921

1921. *Glycinde oligodon* Southern, *Mem. Indian Mus.*, 5 : 629, pl. 28, fig. 18.
1953. *Glycinde oligodon.* –Fauvel, *Fauna of India, Annelida - Polychaeta,* p. 288, fig. 147a-d.

Material 2 ex., Namkhana, 24.1.1979; 1 ex., Taldi (north of Canning) 12.1.1980, coll. N. Sarangi.

Diagnosis : Worms dark yellowish-green in life, but dark brown in spirit. Anterior region with 19-20 uniramous parapodia each with a setigerous lobe having a long presetal lobe, a short rounded postsetal lobe, a large broad dorsal cirrus, and a short thick ventral cirrus. Subsequent parapodia biramous each with a notopodial lobe partially fused with dorsal cirrus leaving a small rounded papilla; neuropodial presetal lobes enlarged and lamellar in middle setigers, reducing posteriorly. Notosetae simple, 2 per setiger, not protruding, each with curved tip and a long, curved apical spine. Neurosetae composite hererogomph spinigers with smooth or finely serrated blades.

Remarks : The material agrees well with the type specimens. This is the first record of the species from the Hooghly estuary.

Habitat : Soft mud towards the LWM; salinity 8‰.

Type Locality : Chilka Lake, Orissa.

Distribution : Endemic in east coast of India. Lower reaches of Hooghly eatuary, Vishakhapatnam, Kakinada Bay (A.P.); Off Santa palli (Bay of Bengal); Vellar estuary Madras (T.N.).

Genus *Goniada* Audouin & Milne Edwards, 1833

Diagnosis : Posterior segments biramous. Chevrons present; pharyngeal organs small, mainly of 1 kind. Notosetae acicular; neurosetae composite spinigers.

Type Species . *Goniada emerita* Audouin & Milne Edwards, 1833.

Remarks : This is a moderately large genus, but only two species have been from Indian waters, of which one occurs in the Hooghly estuary.

39. ***Goniada emerita*** Audouin & Milne Edwards, 1833

1833. *Goniada emerita* Audouin & Milne Edwards, *Annls. Sci. nat.*, **29** : 268.
1953. *Goniada emerita*. –Fauvel, *Fauna of India, Annelida-Polychaeta*, p.282, fig.144h-q.

Material : 1 ex., Haldi, Sundarbans, 11.9.1983, coll. A.K. Mandal; 1 ex., Jharkhali, Sundarbans, 20.5.1985; 2 ex., Gangasagar, An1345/1, 30.7.1978, coll. a. Choudhury.

Diagnosis : Worms yellowish-brown in life, dark brown in preserved state. Pharynx eversible, with small rounded papillae and chevrons having 5-8 chitinous pieces on each side. Parapodia uniramous for anterior 37 to 39 setigers, next 10 to 12 setigers transitional, succeeding ones biramous. Uniramous parapodia each with a setigerous lobe having 2 digitiform presetal lobes and a triangular shorter postsetal one; dorsal cirrus flattened and ventral cirrus conical. Transitional setigers with notoacicula and 1 or 2 stout, projecting acicular notosetae; otherwise similar to uniramous ones. Biramous parapodia each with a small triangular notopodium and neuropodium having 2 slender presetal ligules and a conical postsetal ligule. Neurosetae all heterogomph spinigers.

Remarks : The present material agrees well with the earlier descriptions with the addition that the biramous parapodial region begins more anteriorly and chevrons have lesser number of chitinous pieces.

Habitat : Clayey soil or fine sandy substratum at MTL; salinity 12‰ to 16‰.

Type Locality : Mediterranean Sea.

Distribution : Indo-west Pacific and North Atlantic. *India* : Lower reaches of Hooghly estuary, Sundarbans (W.B.); Vishakhapatnam (A.P.); Vandruthi (Kerala); Jamnagar (Gujarat). *Elsewhere* : Red Sea ; South Arabian coast; Mocambique; South Africa; Madagascar; Australia; Chatham Is.; Scotland to Morocco; Mediterranean Sea.

Family ONUPHIDAE Kingberg, 1865

Key to Genera

Tentacular cirri present; branchial filaments arranged in whorl ..... *Diopatra* Aud. & M. Edw.

Tentacular cirri absent; branchial filaments simple..... *Hyalinoecia* Malmgren.

Genus ***Diopatra*** Audouin & Milne Edwards, 1833

Diagnosis : Frontal antennae short and conical; tentacular cirri present. Anterior setigers and setae not modified. Branchial filaments arranged in whorl; dorsal cirri digitate.

Type Species : *Diopatra amboinensis* Audouin & Milne Edwards, 1833

Remarks : Only three species in the genus have so far been recorded from Indian waters. The earlier record of *D. neapolitana* delle Chiaje, 1841 from the Gangetic delta by Fauvel (1932 and 1953) has been re-examined and transferred here to *D. cuprea* (Bosc) [*vide infra*]. In the Hooghly estuary only *D. cuprea* (Bosc) is available.

40. *Diopatra cuprea* (Bosc, 1802)

1802. *Nereis cuprea* Bosc, *Histoire naturelle .....nature*, Paris, 1 : 143.

1953. *Diopatra neapolitana*. –Fauvel, *Fauna of India, Annelida-Polychaeta*, p.252, figs.126a-h. (in part). Non dellechiaje, 1841.

1988. *Diopatra cuprea cuprea*. –Misra *et al.*, *State Fauna of Orissa, Special Publication*, Sr.1 : 76.

Material : 4 ex., Gangasagar, 9.7.1975; 4 ex., Champatala, 17.11.1975; 1 ex., Gangasagar, 12.4.1978; 1 ex., Kachuberia, 13.4.1978; 5 ex., Canning, 12.1.1983; 3 ex., Bakkhali, 7.3.1985.

Additional Material : 3 ex., W1949/1, Gangetic delta, coll. R.I.M.S. "Investigator"; 11 ex., An1674/1, Burhabalang river mouth, Chandipur, 19.1.1976, coll. S. Biswas & A. Misra; 5 ex., An1472/1, Bhangatushkhali, Sundarbans, 13.3.1975, coll. A. Misra & T.K. Samanta.

Diagnosis : Prostomium with a pair of short, subulate frontal antennae, a pair of oval cushion-like palps, and 5 occipital antennae—each with a short ceratophore having 9-10 rings.

Anterior parapodia well developed, with long, triangular dorsal and ventral cirri, notopodia represented by the bases of branchiae and dorsal cirri supported by 2-3 fine acicula; neuropodia well developed, supported by 2-3 acicula, each with a long, conical postsetal lobe and a short, rounded presetal lobe. First 4 or 5 setigers with presetal lobes having larger superior and smaller inferior processes; presetal lobes of succeeding parapodia being rounded and symmetrical. Branchiae commencing from setiger 4-5, extending up to setiger 50-61, branchial filaments arranged in 10-12 whorls. Setae include limbate setae, pseudocomposite hooks, pectinate setae and subacicular hooks. Pseudocomposite hooks distinctly bidentate, restricted to anterior 4 setigers; pectinate setae with 10-25 fine teeth commencing from setiger 8-10.

Remarks : On examination of the material from the Gangetic delta and Chandipur, India, determined as *D. neapolitana* delle Chiaje by Fauvel (1932), it appears that this belongs to *D. cuprea* (Bosc). The present author suggests that the numerous references to *D. neapolitana* delle Chiaje from Indian waters may not be conspecific. All such material should be restudied.

Habitat : Tough tube, about 100-150 cm long, embedded in stiff mud, sometimes admixed with fine sand in the zone between MTL or below, often forming dense bed in sheltered areas. Three to five centimeters of the tube projects and curls over the surface of substratum and are impregnated with shell fragments, leaves, etc. Salinity 8‰ to 16‰.

Type Locality : Charleston, South Carolina, U.S.A.

Distribution : Warm and tropical Atlantic and Indian Oceans. *India* : Lower reaches of Hooghly estuary, Matla river (W.B.); Chandipur (Orissa); Ratnagiri (Maharashtra). *Elsewhere* : Mocambique; South Africa; Sri Lanka; U.S.A. (New England to Florida) and the Gulf of Mexico; Brazil; tropical western Africa (Ghana to Angola).

Genus *Hyalinoecia* Malmgren, 1867

Diagnosis : Frontal antennae short and conical; tentacular cirri absent. Anterior setigers and setae not modified. Branchiae mostly simple and strap-like; dorsal cirri digitate.

Type Species : *Nereis tubicola* Müller, 1779.

Remarks : The genus is represented by only two species in Indian waters, of which only one, recorded earlier from Sandhead, is known to occur in the Hooghly estuary.

41. *Hyalinoecia tubicola* (Müller, 1776)

1776. *Nereis tubicola* Müller, *Zoologica Danicae ..... popularium*, p.18.

1953. *Hyalinoecia tubicola*.–Fauvel, *Fauna of India, Annelida-Polychaeta*, p.261, fig.126 i-q.

Material : 2 ex., W1814/1, Sandhead, Hooghly river mouth, coll. Pilot Barnett & Milner.

Diagnosis : Body long, encased in transparent quill-like free tube. Prostomium with a pair of globular palps, 2 short frontal antennae and 5 longer occipital antennae having short, 3-5 ringed ceratophores and long ceratostyles. Branchiae simple beginning from setiger 18-26, continuing up to posterior end. Dorsal cirri longer than branchiae, gradually decreasing in size posteriorly; ventral cirri subulate on first 3 to 4 setigers, subsequently modified to form glandular cushions. Prebranchial parapodia with a presetal lip and a cirriform postsetal lobe; presetal lip longer on first 3 to 4 setigers, postsetal lobe persisting up to setiger 15. First or first 2 setigers with stout capillaries and pseudocomposite or simple hooks; hooks bluntly bidentate and hooded. Subsequent setigers with winged capillaries and pectinate setae. Long-shafted, bidentate subacicular hooks appearing posteriorly.

Remarks : The species is known to be restricted to the continental shelf and extreme upper levels of the continental slope. Earlier records of the species from the Gangetic delta as well as from other Indian localities are only from the subtidal habitats. As the present investigations is restricted to the intertidal zones, the species has not been obtained.

Type Locality : Christiania Fjord, Norway.

Distribution : Cosmopolitan. *India* : Mouth of Hooghly estuary (W.B.); Vishakhapatnam coast (A.P.); Andamans; Bay of Bengal; Arabian Sea; Lakshadweep Sea. *Elsewhere* : Red Sea; South Africa; gulf of Oman; Torres Strait; Australia; New Zealand; Japan; Greenland; Gulf of Mexico; Faeroes; Bay of Biscay; Noway; Sweden.

Family EUNICIDAE Savigny, 1818

Key to Genera

1. Occipital antennae 3 ..... *Lysidice* Savigny
   Occipital antennae 5 2
2. Tentacular cirri present ..... *Eunice* Cuvier
   Tentacular cirri absent ..... *Marphysa* Quatrefages

Genus *Eunice* Cuvier, 1817

Diagnosis : Occipital antennae 5; tentacular cirri and branchiae present. Setae include limbate setae, pectinate setae, composite falcigers and subacicular hooks.

Type Species : *Nereis aphroditois* Pallas, 1788

Remarks : This is a very large genus, but represented by only 12 species from Indian waters, of which only one has so far been reported from the Hooghly estuary.

42. *Eunice aphroditois* (Pallas, 1788)

1788. *Nereis aphroditois*. Pallas, *Nova. Acta. Acad. Sci. Imp. St. Petersburg* ., *2* : 229.

1953. *Eunice aphroditois*.— Fauvel, *Fauna of India, Annelida-Polychaeta*, p. 233, fig. 117 a-g.

'12- 8 –187/ZSI/Cal/98

Earlier Material : 1 ex., W1613/1, Andamans, coll. R.I.M.S. Investigator.

Diagnosis : Body very long, brownish purple with a white bar across setiger 4. Prostomium bilobed, formed by partial fusion f palps; antennae smooth, longer than prostomium. Tentacular cirri 1 pair, smooth, shorter than peristome. Dorsal cirri stouter than branchial filaments; branchiae commencing from setiger 10 as simple filaments, with a maximum of 15-16 filaments in anterior and middle setigers, gradually decreasing in the number of filaments posteriorly. Setae include limbate capillaries and pectinate setae superiorly, composite falcigers and subacicular hooks inferiorly. Composite falcigers with short sickle-shaped blades having 2 teeth and rounded hoods. Subacicular hooks black, bidentate with small guards; acicula black with pointed ends.

Remarks : *Eunice aphroditois* is one of the most widespread species in the genus *Eunice*. The variability of this species was studied by Fauvel (1917). The species may readily be recognised by the shape of the branchiae, and the length and shape of the antennae. Branchiae have very strong branchial stems and the short branchial filaments are well organised in a pectinate pattern, while the antennae are smooth and twice as long as prostomium.

Habitat : Deep burrows in muddy substratun impregnated with fine sand, near LWM.

Type Locality : Indian Ocean (not definitely known).

Distribution : Cosmopolitan. *India* : Lower reaches of Hooghly estuary (W.B.); Andamans. *Elsewhere* : South Africa; Maldives; Sri Lanka; Singapore; Solomon Is.; Japan; South California; North Atlantic from France and Morocco to West Indies; Mediterranean Sea; South West Africa.

Genus *Lysidice* Savigny, 1818

Diagnosis : Occipital antennae 3; tentacular cirri and branchiae absent. Setae include limbate setae, pectinate setae, composite spinigers and falcigers, and subacicular hooks.

Type Species : *Lysidice ninetta* Audouin & Milne Edwards, 1833.

Remarks : Two species in the genus have so far been recorded from India, of which one occurs in the Hooghly estuary.

43. *Lysidice natalensis* Kinberg, 1865

1865. *Lycidice natalensis* Kinberg, ofvers, *K. Vetensk. Akad. Forh.*, **21** : 566.
1981. *Lysidice natalensis*. –Soota *et al.*, *Rec. Zool. Surv. India*, **79** : 97.
1984. *Lysidice collaris*. –Misra *et al.*, *Rec. Zool. Surv. India*, **81** : 48. Non Grube, 1870.

Material : 2 ex., Naraharipur, Sagar Island, 12.6.1980.

Additional Material : 1 ex., An1276/1, Mandirtala, Sagar Island, 10.5.1978, coll. A. Misra (as *L. collaris* by Misra *et al.*, 1983); 5 ex., An1103/1, Chorwad, Gujarat, 23.1.1978, coll. B.P. Haldar.

Diagnosis : Light brown in life, pale in preserved condition. Prostomium bilobed, with 3 occipital antennae and 2 reniform eyes. Mandibles heavy; second maxillary plate with 3 teeth. Parapodia each with a bluntly conical dorsal cirrus, rounded ventral cirrus and a broad setigerous lobe. Setae include capillaries, pectinate setae, composite falcigers and subacicular hooks. Acicula black with blunt tips. Subacicular hooks from setiger 22-25 onwards.

Remarks : A re-examination of the material, determined as *L. collaris* from the Gangetic delta by Misra *et al.* (1984), reveals that it belongs to *L. natalensis* due to the presence of three teeth on the second dental plate.

Habitat : Soft mud in zone between MTL and LWM; salinity 21‰.

Type Locality : Durban, South Africa.

Distribution : Indian Ocean. *India* : Lower reaches of Hooghly estuary (W.B.); Chorwad (Gujarat). *Elsewhere* : South Africa.

Genus ***Marphysa*** Quatrefages, 1865

Diagnosis : Occipital antennae 5; tentacular cirri absent; branchiae present. Setae include limbate setae, pectinate setae, composite spinigers and falcigers, and subacicular hooks.

Type Locality : *Nereis sanguinea* Montagu, 1815.

Remarks : This is a moderately large genus, but represented in Indian waters by only seven species including two from the Hooghly estuary. Presently, one more species in the genus, till not named, is described hereunder to include the earlier record of *Marphysa macintoshi* non Crossland by Misra *et al.* (1984) from the Gangetic delta.

Key to Species

1. Composite spinigers absent ..... *M. mossambica* (Peter)

   Composite spinigers present 2

2. Prostomium bilobed; acicular setae bidentate, inferior setae composite spinigers only .....

   M. sanguinea (Montagu)

   Prostomium rounded; acicular setae bidentate, inferior setae capillaries and composite spinigers.. *Marphysa* sp.

44. ***Marphysa mossambica*** (Peters, 1854)

1854. *Eunice mossambica* Peters, *Akad. wiss. Berlin*, 1854:612.

1984. *Marphysa mossambica.*–Misra *et al.*, *Rec. zool. Surv. India*, 81 : 49.

Material : 3 ex., Jhingakhali, Sundarbans, 12.9.1983; 1 ex., Kachuberia, Sagar Island, 26.9.80.

Diagnosis : Worms deep red in life, fades on preservation. Prostomium wider than long, with a deep anterior notch and 5 smooth occipital antennae. Parapodia of prebranchial setigers each with a small transverse fold-like presetal lobe, and a broadly, and ventral cirri short, bluntly conical. Parapodia of branchial setigers each with a well-developed presetal lobe having distal notch, and a triangular postsetal lobe. Branchiae commencing from setiger 15-30 in smaller specimens, 45-50 in larger forms, extending up to posterior end, with a maximum of 10 filaments. Setae include capillaries and pectinate setae only. Acicula brown with pale tips.

Remarks : According to Fauvel (1932), the diagnostic features of *M. mossambica* are that the gills begin from setiger 30-33 and the complete absence of composite setae. But the present material differs from that of Fauvel in having branchiae beginning from setiger 15-30 in smaller specimens and setiger 45-50 in larger ones.

The present material is assigned to *M. mossambica* mainly for the complete absence of composite setae, which is considered to be of greater specific value.

Habitat : Deep burrows in soft mud in the the zone towards LWM; salinity 5‰ to 12‰.

Type Locality : Mocambique Island.

Distribution : Indo-west Pacific. *India* : Lower reaches of Hooghly estuary, Sundarbans (W.B.); Pondichery; Krusadai Is., Manauli Is., Kilakarai (T.N.); Nicobar; Bombay (Maharashtra). *Elsewhere* : Red Sea; Mocambique; Sri Lanka; Bay of Bengal; Singapore; Philippines; Australia; Fiji.

45. *Marphysa sanguinea* (Montagu, 1807)

1807. *Nereis sanguinea* Montagu, *Trans. Linn. Soc. Lond.*, **11** : 20, Table 3, fig.1.

1984. *Marphysa sanguinea*. –Misra *et al.*, *Rec. Indian Mus.*, 81 : 49.

Material : 1 ex., An1471/1, Gangasagar, Sagar Island, 4.9.1979.

Diagnosis : Prostomium bilobed with 5 smooth and slender occipital antennae. Presetal lobes broad and rounded on anterior setigers conical on posterior setigers, postsetal lobes bluntly produced, ridge-like on anterior setigers, reducing in size posteriorly. Branchiae commencing from setiger 16, extending up to posterior end, with a maximum of 4 filaments. Setae include capillaries, pectinate setae, composite spinigers and subacicular hooks. Acicula black with blunt pale tips.

Remarks : *Marphysa sanguinea* (Montagu) reaches considerable size and is the most variable species in the genus (Fauchald, 1970). The development of branchial stems and filaments, and the occurrence of subacicular hooks were observed to be variable by earlier workers. The present author could not verify the variability of characters as the material from the Hooghly estuary is represented by a single specimen.

Habitat : Soft mud at LWM; salinity 12‰.

Type Locality : Coast of Devon, England.

Distribution : Cosmopolitan. *India* : Lower reaches of Hooghly estuary (W.B.); Vishakhapatnam (A.P.); Krusadi Is., Pamban backwater, Tuticorin, Gulf of Mannar (T.N.); Pondichery; Andamans; Travancore, east Narakar, backwater between Ernakulum and Edappalli, Neendakara Bar, Kayankulam Kayal, Chevara, Quilon (Kerala); Marmagao Bay (Goa); Malvan (Maharashtra), Umbargaon (Daman); Okha (Gujarat). *Elsewhere* : Red Sea; Sri Lanka; Western Australia; New South Wales; Queensland; New Zealand; Japan; southern California; North Carolina to the Gulf of Mexico; Scotland; English Channel; Mediterranean Sea; Senegal.

46. *Marphysa* sp.

1984. *Marphysa macintoshi*. –Misra *et al.*, *Rec. zool. Surv. India*, **81** : 48.

Material : 1 ex., An1470/1, Mandirtala, Sagar Island, 30.7.1974. (as *Marphysa macintoshi* by Misra *et al.*, 1983).

Description : Body long, cylindrical, 70 mm long, 3 mm wide, with about 165 setigers. Prostomium broad, more or less rounded, formed by almost completely fused palps; antennae 5, smooth, as long as prostomium, median one longest reaching first setiger, outer lateral pair shortest. Eyes not visible. First peristomial segment twice as long as second.

Presetal lobes low, reduced, transverse and fold-like, and postsetal lobes broad, rounded; postsetal lobes developed as conical processes on middle and posterior setigers. Dorsal cirri with swollen base on anterior setigers, digitiform afterwards, and ventral cirri broad, club-shaped. Branchiae commencing from setiger 20, first in the form of simple filaments, later developed with a maximum of 6 filaments, decreasing in number afterwards, but extending up to the posterior end.

Setae include capillaries, composite spinigers and pectinate setae. Superior bundle with capillaries having flattened blades, and pectinate setae 1-2 per setiger anteriorly, 4-5 posteriorly, having 25-30 coarse teeth. Inferior bundle with 3-4 composite spinigers having knife-shaped blades, and several capillaries having narrow blades. Composite spinigers absent in posterior setigers. Subacicular hooks bidentate, rarely unidentate with small guards, appearing after 50; irregularly present in posterior setigers. Neuroacicula brown with pale tips, 2-3 in anterior setigers, 1 in middle and posterior setigers; notoacicula very fine, 1 or 2 per setiger, piercing the bases of dorsal cirri.

Remarks : Re-examination of the material of *M. macintoshi* (non Crossland) from the Gangetic delta (Misra et al., 1984) reveals that it differs from Crossland's description in having bidentate subacicular hooks and both capillaries and composite spinigers in inferior bundle of setae. As compared with *M. sanguinea*, *M. macintoshi* has more rounded head, longer and more uniformly slender body, and what is most important is that it has unidentate subacicular hooks, not bidentate (Day, 1962). The present material with bidentate subacicular hooks, rounded and both capillaries and composite spinigers in inferior bundle stands in between *M. macintoshi* and *M. sanguinea*. As the observation is based on a single specimen, the specific determination of the material is kept pending subjected to further study on more material.

Habitat : Soft silty mud at LWM; salinity 12‰.

Family LUMBRINERIDAE Malmgren, 1867

Genus ***Lumbrineris*** Blainville, 1828

Diagnosis : Nuchal papillae usually absent, sometimes 1-3. Dorsal cirri usually absent, rarely present. Branchiae absent. Jaw apparatus present.

Type Species : *Lumbrineris latreilli* Audouin & Milne Edwards, 1834.

Remarks : This is a very large genus, but represented by only nine species in Indian waters. Of these, only three species have so far been known from the Hooghly estuary. Presently, one more species in the genus is described here as new to science.

Key to Species

1. Dorsal cirri present 2
   Dorsal cirri absent 3

2. Dorsal cirri rudimentary; hooded hooks from setiger 20-40 ..... *L. heteropoda* Marenzeller
   Dorsal cirri long, strap-like; hooded hooks from setiger 40-45 ..... *L. notocirrata* Fauvel

3. Postsetal lobes narrow, conical and longer than presetal lobes in posterior setigers ..... *L. polydesma* Southern

   Postsetal lobes low, reduced and subequal to presetal lobes in posterior setigers ..... *L. bilabiata* n.sp.

47. *Lumbrineris bilabiata*, new species

(Fig.16A-L)

Material : Holotype-An2277/1, Kakdwip, 25.8.1980; paratypes-1 ex., An2278/1, Kachuberia, 12.6.1977; 6 ex., An2279/1, 26.6.1983; 10 ex., An2280/1, Champa river, Midnapur, 26.6.1983; 1 ex., An2281/1, Gangasagar, 4.6.1983; 2 ex., An2282/1, Bakkhali, 6.3.1985.

Description : Body long, narrow and slender; holotype complete, 75 mm long, 1.5 mm wide, with about 155 setigers; dark brown, slightly iridescent in life, with dark pigment spots in intersegmental grooves. Prostomium (Fig. 16A,B) bluntly conical, peristomial segment longer and second one only half as long as the first. Parapodia (Fig. 16D-F) each with a short crescent-shaped presetal lobe and a broad, acicular postsetal lobe. Middle and posterior parapodia (Fig. 10 G,H) with both pre- and postsetal lobes being low, reduced and more or less subequal–slightly produced in posteriormost setigers attaining a bi-labiate condition (Fig. 16H).

Setae arranged in fan-shaped bundle and of 2 kinds : limbate setae and simple hooks. Winged capillaries or limbate setae (Fig. 16I) in anterior setigers, continuing up to setiger 38. Simple hooded hooks (Fig. 16 J-L) appearing on setiger 22, continuing up to the posterior end. Hooks with several denticles above the main large fang, and long hoods in anterior setigers, but with shorter hoods posteriorly; size of teeth enlarged posteriorly. Acicula yellow, 4-6 per setiger anteriorly, gradually reducing to 2 in posterior setigers.

Maxillae (Fig. 16c) consisting of 4 symmetrical pairs of black toothed plates, with long lanceolate supports, no median unpaired plates. Dental formula : MX I = 1 +1. Mandibles fused along half of their length. Pygidium with 4 short, blunt anal cirri.

Variation : Paratypes all complete, 55-80 mm long, 1-1.5 mm wide, with about 135-170 setigers. Other variations include extension of limbate setae up to setiger 35-40, appearance of hooded hooks from setiger 20-22. Variation in numbers and types of setae shown in Table 9.

Table 9. Setal counts for *L. bilabiata* n.sp.

	No. of setae				
	Setiger 10	Setiger 25	Setiger 50	Setiger 100	Setiger 150
Limbate setae	5(2-6)*	2(1-2)	—	—	—
Simple hooded hooks	0	2(2-3)	3(2-4)	3(1-3)	2(1-2)

* Numbers in parentheses refer to the variation in numbers of setae occurring in 20 paratypes.

Remarks : *Lumbrineris bilabiata* n. sp. belongs to the group of *Lumbrineris* species with simple multidentate posterior hooks and unidentate maxilla III. Other species of this group, closely resembling the present new species, are *l. tenuis* (Verrill, 1873) and *L. minima* Hartman, 1984. All these three species have minute parapodial lobes in all setigers. *L. tenuis* has short, inconspicuous parapodial lobes in all setigers and has hooded hooks from setiger 16. *L. minima* has broad postsetal lobes, presetal lobes gradually elongated and longer than the postsetal lobes in posterior setigers,

and has hooded hooks in some anterior setigers. *Lumbrineris bilabiata* n.sp. may readily be recognised in having longer first peristomial segment, minute parapodial lobes reducing gradually and attaining a bi-labiate condition in posteriormost setigers and hooded hooks from setiger 20-22. *L. pallida* Hartman, 1944, with minute parapodia and reduced posterior postsetal lobes resembles with the present new species to some extent. But it differs in the structure of the maxillae and in having anterior composite hooks. On examination of *L. impatiens* Claparede, 1868, recorded earlier from India, it appears that it has some superficial resemblance with the present new species, but differs from it in having cone-shaped prostomium, longer and cirriform postsetal lobes, hooks in anterior setigers and in the structural details of the maxillae and the mandibles.

The species name *bilabiata* referes to the bi-labiate condition of the parapodial lobes in posteriormost setigers.

Habitat : Soft clayey soil, sometimes mixed with very fine sand in MTL; salinity 14‰ to 19‰.

48. *Lumbrineris hateropoda* (Marenzeller, 1879)

1879. *Lumbriconereis heteropoda* Marenzeller, *Denkschr. Akad. Wiss., Wien*, **41(2)** : 138, pl.6, fig.1.

1984. *Lumbrineris heteropoda heteropoda*. –Misra *et al.*, *Rec. zool. Surv. India*, **81** : 50.

Earlier Material : 10 ex., An1413/1, Bhangatushkhali, Sundarbans, 14.3.1975, coll. A. Misra & T.K. Samanta.

Diagnosis : Prostomium conical. Anterior parapodia with presetal lobes low and rounded, and postsetal lobes long and conical. Posterior parapodia with postsetal lobes being much longer, sometimes erect. Postsetal lobes reduced to short processes in midbody region. Dorsal cirri rudimentary. Capillaries in anterior setigers, long-bladed simple hooded hooks appearing on setiger 20-40, extending up to the posterior end. Posterior setae short-bladed and sometimes with winged capillaries. Acicula pale.

Remarks : *Lumbrineris heteropoda* belongs to the group of *Lumbrineris* species having prolonged posterior parapodial postsetal lobes and hooded hooks originating from setiger 20-40. *Lumbrineris erecta* (Moore, 1904) belonging to this group was synonymised with *L. heteropoda* by Fauvel (1932), and were differentiated with difficulty by Hartman (1942). Though they are closely related, may be distinguished as follows : *L. heteropoda* has long parapodia postsetal lobes in anterior and posterior setigers, but the lobes are reduced to short processes in midbody region, whereas *L. erecta* has long postsetal lobes in all setigers with increasing prolongation from the anterior to the posterior end.

Type Locality : South Japan.

Distribution : Indo-Pacific. *India* : Sundarbans (W.B.); Godavari estuary (A.P.); Neendakara Bar (Kerala); Mandovi-Zuary estuary, Marmagao Bay, coast of Goa (Goa); Ratnagiri, Chaupati, Bombay (Maharashtra); Chorwad (Gujarat). *Elsewhere* : Red Sea; Mocambique; South Africa; Madagascar; Persian Gulf; Indo-China; South Vietnam; Japan; California.

49. *Lumbrineris notocirrata* (Fauvel, 1932)

1932. *Lumbriconereis notocirrata* Fauvel, *Mem. Indian Mus.*, **12** : 156, pl.7, figs. 1-8, text fig. 23 a-d.

1984. *Lumbrineris notocirrata*.- Misra *et al.*, *Rec. zool. Surv. India*, **81** : 51.

Material : 10 ex., Kachuberia, 12.6.1977; several ex., Gangasagar, 28.2.1978; 3 ex., Canning, 17.11.1982; 1 ex., Champa river, Midnapur, 26.6.1983.

Additional Material : 1 ex., W2781/1, Orissa coast, coll. R.I.M.S. "Investigator"; 1 ex., W2808/1, Vishakhapatnam, coll. H.S. Rao & G. Varugis, May-June, 1926; 3 ex., W2684/1, 1 ex., W2864/1, other data same as above; (types).

Diagnosis : Worms red in life, fading to pale brown with transverse red streak in preserved condition. Prostomium bluntly conical without eyes, antennae or any appendages. Parapodia subbiramous; notopodia represented by small dorsal cirri supported by acicula, compressed and button-shaped on anterior setigers, but longer and strap-like from setiger 15-17 onwards. Presetal lobes short and crescent-shaped in anterior setigers, being rounded in middle and posterior setigers. Postsetal lobes flattened and auricular in anterior setigers, being longer and erect posteriorly. Setae of 2 kinds : limbate and simple hooks. Hooks appear on setiger 40-45. Neuroacicula stout and yellow.

Remarks : The presence of dorsal cirri is a very rare feature in the genus *Lumbrineris*, whereas this is a constant and characteristic feature in the genus *Kuwaita* Mohammad, 1973 in the same family Lumbrineridae. This feature is very distinctly observed in the species *L. notocirrata*, by which it can readily be isolated from the other congeneric species. *Lumbrineris notocirrata* bears a close resemblance with *Kuwaita magna* Mohammad, 1973 in having not only the dorsal cirri, but also in some other details, particularly, in the origin and distribution of the limbate setae and hooded hooks, and in the shape of the maxillae and mandibles. However, the former species differs from the latter in the absence of nuchal papillae.

Habitat : Mud in the zone between MTL and LWM; salinity 14‰ to 20‰.

Type Locality : East coast of India.

Distribution : Endemic in east coast of India. Lower reaches of Hooghly estuary, Bhangatushkhali (W.B.); Chandipur, Orissa coast (Orissa); Vishakhapatnam backwater (A.P.).

50. *Lumbrineris polydesma* (Southern, 1921)

1921. *Lumbriconereis polydesma* Southern, *Mem. Indian Mus.*, **5** ; 622, pl.26, fig.15 A-L.
1984. *Lumbrineris polydesma*.–Misra *et al.*, *Rec. zool. Surv. India*, **81** : 51.

Material : 3 ex., Kakdwip, 28.6.1980; several ex., Naraharipur, 25.9.1980; 10 ex., Kakdwip canal, Kakdwip, 10.3.1981; 5 ex., Canning, 17.11.1982; 5 ex., Jhingakhali, 12.9.1983; 2 ex., Muriganga creek, Sagar Island, 5.6.1984, coll. S. Chakraborty.

Additional Material : 2 ex., W1316/1, Chilka Lake, Chilka survey, (types); 1 ex., An1476/1, Mandirtala, Sagar Island, 12.7.1976, coll. A. Misra; 2 ex., An1477/1, Gangasagar, 21.9.1979, coll. A. Misra.

Diagnosis : Prostomium bluntly conical, without eyes or any other appendages. Parapodia uniramous. Presetal lobes short and rounded throughout; postsetal lobes flat and wide in anterior and middle setigers, narrow and conical in posterior setigers. Setae of 2 kinds: limbate and simple hooks. hooks appear on setiger 30-35. Acicula colourless basally and dark brown apically.

Remarks : *Lumbrineris polydesma* belongs to the group of *Lumbrineris* species with multidentate simple posterior hooks and bi- or multidentate maxilla III. There are about seven species within this group having prolonged parapodial postsetal lobes in posterior setigers and hooded hooks from setiger 20-40 (Fauchald, 1970). The present species differs from others in this group in having slightly prolonged posterior postsetal lobes, while others have strongly prolonged and often erect posterior postsetal lobes.

Lumbrineris polydesma and *L. heteropoda* are apparently very closely related species. The latter has rudimentary dorsal cirri and long postsetal parapodial lobes in anterior and posterior end—those in the posterior end are clearly longer than those in the anterior end, but the lobes are reduced to short processes in middle region of the body, while the former species differs from the latter in having long postsetal parapodial lobes throughout the body and also in lacking dorsal cirri.

Habitat : Mud, sometimes admixed with fine sand in the zone between MTL and LWM; salinity 5‰ to 12‰.

Type Locality : Chiriya Island, Chilka Lake, India.

Distribution : Endemic in India. Lower reaches of Hooghly estuary (W.B.); Chandipur, Talichua, Chilka Lake (Orissa); Vellar estuary, Adyar estuary, Pulicat Lake (T. N.); Nani Daman, Devka (Deman).

Family ORBINIIDAE Hartman, 1942

Subfamily ORBINIINAE Hartman, 1957

Diagnosis : Body large and long; anterior asetigerous segment 1. Pharynx epithelial, voluminous and eversible. Parapodia highly developed with diversified papillae.

Key to Genera

Thoracic neuropodia with crenulate capillaries only, no hooks ..... ***Leitoscoloplos*** Day

Thoracic neuropodia with both crenulate capillaries and hooks ..... ***Scoloplos*** Blainville

Genus *Leitoscoloplos* Day, 1977

Diagnosis : Prostomium pointed; asetigerous segment 1. Foot-papillae usually 1 or 2, sometimes 4; stomach-papillae absent; branchiae from setiger 8 or later.

Type Species : *Haploscoloplos bifurcatus* Hartman, 1957.

Remarks : The genus *Leitoscoloplos* Day was erected for those species of *Haploscoloplos* Monro, 1933 which lack thoracic hooks, while the others with thoracic hooks were transferred to *Scoloplos* Blainville, 1828. So far the genus is known to be represented in Indian waters by only one species, *L. kergulensis* (non McIntosh), recorded from Vishakhapatnam, Andhra Pradesh. Presently, one more species, till not named, is described hereunder. However, the examination of the Fauvel's (1932) material of *L. kergulensis* from India reveals that is differs from McIntosh's species in having 11-18 thoracic setigers and with branchiae appearing between setiger 20-22, whereas *L. kergulensis* (McIntosh) has 9-12 thoracic setigers and branchiae appearing between setiger 13-14. The present author endorses Day's (1977) statement that *L. kergulensis* with many more thoracic setigers and branchiae appearing further back may be referred to a different species. Studies on more material are needed to ascertain the status of the Fauvel's *L. kergulensis* from India.

This is the first record of the genus from the Hooghly estuary.

51. *Leitoscoloplos* sp.

(Fig. 18F-J)

Material : 1 ex., Gangasagar, Sagar Island, 22.3.1981.

Other material : 4 ex., W2234/1, Vishakhapatnam (A.P.), May-June, 1926, coll. H.S. Rao and G. Varugis; 5 ex., W2386/1, other data same as above; (as *Scoloplos kergulensis* by Fauvel, 1923).

Description : Body complete, in 2 fragments, 54 mm long, 2 mm wide, with about 210 setigers. White in life, flesh-coloured in preserved condition. Prostomium long, conical and pointed. Thorax rounded, abdomen compressed dorsoventrally.

Thorax with 19 setigers; notopodia visible from setiger 1, each with a round postsetal lamella, prominent posteriorly; neuropodia (Fig. 18) as blunt acicular projections, each with an inferior round postsetal lamella. Foot-papillae or stomach-papillae absent. Abdominal notopodia large, digitiform. Interramal cirri absent. Abdominal neuropodia (Fig. 18G) oval, notched externally with papilliform inner lobe; inferior border crenulated (Fig. 18H) in posterior setigers. Ventral cirri absent, but inferior margin projected slightly, flange-like. Anal cirri long and paired.

Branchiae in the form of simple, slender filaments from setiger 21, becoming broad and lamellar, and larger than notopodial lamellae in posterior setigers.

Thoracic notosetae and neurosetae as short crenulate capillaries, (Fig. 18I), hooks entirely absent. Abdominal neurosetae 5-6, very long, smooth capillaries (Fig. 18J). Aciculum single in each noto- and neuropodia, rarely 2 in abdominal notopodia.

Remarks : The material seems to be interesting, but its species determination could not be done at the moment since it is represented by only a single specimen form the area under study. On the basis of detailed examination it has been observed that the present materials is closely allied to *L. normalis* Day, from Australia and *L. kergulensis* (non McIntosh) recorded from Vishakhapatnam, India by Fauvel (1932). All the three species have more or less similar number of thoracic setigers and the branchiae appearing on similar body region. But *L. normalis* differs from the present material in having distinct foot-papillae, biramous abdominal neuropodia with the inner lobe much longer than the outer, and forked setae in abdominal notopodia. While *L. kergulensis* (non McIntosh) of Fauvel differs from the present material in the shape of the parapodial lobes– abdominal neuropodia are not notched and with non-crenulated inferior border.

Habitat : fine silty sand towards LWM; salinity 18‰.

Genus *Scoloplos* Blainville, 1828

Diagnosis : Prostomium conical and pointed. Branchiae present from setiger 5 or later. Foot-papillae never exceeding 4, stomach-papillae usually absent. Thoracic neurosetae include blunt hooks and crenulate capillaries (may be absent). Abdominal notosetae include crenulate capillaries, furcate setae and spines.

Type Species : *Lumbricus armiger* Müller, 1776

Remarks : Only three species in the genus have so far been recorded from India. Presently, one more species is described hereunder as new to science, which registers the first record of the genus from the Hooghly estuary.

52. *Scoloplos (Scoloplos) sagarensis*, new species

(Fig. 17A-E & 18 A-E)

Material : Holotype-An2283/1, Gangasagar, Sagar Island, 12.7.1983; paratypes - 3 ex., An2284/1, other data same as above.

Description : Holotype complete, 36 mm long, 1 mm wide, with about 195 setigers; white in life, lacking any colour pattern, flesh-coloured in preserved state. Thorax dorsoventrally flattened, abdomen more or less cylindrical. Prostomium (Fig. 17A) conical, narrowly pointed; peristomial segment 1. Eye spots absent. Thoracic setigers (Fig. 17C), 18; notopodia blunt, without any lamellae in anterior setigers, postsetal lamellae as slender, digitiform lobes after setiger 10. Thoracic neuropodia broad, rounded and each with a small, blunt, median foot-papilla. Stomach-papillae and interramal cirri absent. Abdominal parapodia projected laterally; postsetal notopodial lamellae enlarged, narrow, leaf-shaped. Abdominal neuropodial lobes (Fig. 17D, E) broad, erect and bilobed; inner lobes larger. Ventral cirri absent. Branchiae in the form of slender, digitiform lobes, subequal to notopodial lamellae from setiger 17, extending up to the posterior end. Abdominal setigers with stout and stumpy branchiae.

Notosetae crenulate capillaries (Fig. 18C, D) throughout. Forked setae absent. Thoracic neurosetae as 2-3 rows of crenulate capillaries and an anterior row of 10-12 hooks arranged in superior and inferior groups; hooks (Fig. 18A, B) slightly bent, with poorly marked serrations and small hood in anterior setigers; hooks in posterior setigers a few, with longer serrated region nd no hoods. Abdominal neurosetae a few. 2-3 fine capillaries and 1-2 flail-setae (Fig. 18E) with crenulate margin having abruptly tapered tips. Acicula 2-3 per setiger, also with tapered tips.

Variations : Paratypes 1 complete and 2 incomplete, 25-30 mm long, with about 125-154 setigers. Other variations include 18-20 thoracic setigers and branchiae starting from setiger 17-19.

Remarks : *Scoloplos (Scoloplos) sagarensis* n. sp. is placed in the subgenus *Scoloplos* in having branchiae after setiger 8, only one row of a few slender thoracic neuropodial hooks, and no emerging notoacicula in posterior setigers. On the basis of closer examination it has been observed that *S. sagarensis* n. sp. is closely allied to *S. capensis* (Day, 1961) from South Africa and *S. typica* (Eisig, 1914) from the Mediterranean Sea. The first two species have only one footpapilla per setiger, and coarsely serrated blunt thoracic hooks. But *S. capensis* differs from the former in having bilobed thoracic neuropodia, undivided broad lateral lamellae of the abdominal neuropodia, and with branchiae starting from setiger 15. The last species, *S. typica*, differs from the present new species in having foot-papilla superior in position–not median, and smooth neuropodial hooks on the thorax.

The present new species may readily be recognised by 18-20 thoracic setigers, branchiae from posterior thorax (17-19 setiger), median foot-papilla, undivided thoracic neuropodia, and by the absence of lateral flanges (lateral lamellae) below the abdominal neuropodia.

The specific name *sagarensis* refers to the type locality (Sagar Island) of the species.

Habitat : Fine sand mixed with silt at LWM; salinity 15‰.

Family SPIONIDAE Grube, 1850

Key to Genera

1. Setiger 5 with strongly modified setae 2
   Setiger 5 without modified setae 3
2. Setae arranged in a horseshoe-shaped pattern on setiger 5 ..... *Pseudopolydora* Czerniavsky
   Setae arranged in a straight line or in small patch on setiger 5 ..... *Polydora* Bosc
3. Peristomium with lateral wings; branchiae all cirriform ..... *Minuspio* Foster
   Peristomium without lateral wings; branchiae fused at least anteriorly with notopodial postsetal lobes ..... *Spio* Fabricius

Genus *Minuspio* Foster, 1971

Diagnosis : Prostomium anteriorly blunt; peristomium with lateral wings. Branchiae cirriform, present from setiger 2 to about 40. Anterior setigers with capillaries, and posterior ones with uncini, in both rami.

Type Species : *Prionospio cirrifera* Wirén, 1833.

Remarks : Foster (1971) erected the genus *Minuspio* for members of the *Prionospio* complex having peristomial lateral wings and also comparatively large number of cirriform branchiae. Although Blake and Kudenov (1978) considered it as a subgenus, Hutchings and Murray (1984) retained it as a genus. So far only three species in the genus have been known from India, of which one is reported to occur in the Hooghly estuary.

53. *Minuspio cirrifera* (Wirén 1833)

1833. *Prionospio cirrifera* Wirén, *Vega-Exped. vetensk. Iakttag.*, **2** : 237, fig. 134a-b, 146.

1984. *Minuspis cirifera*. –Hutchings & Hurray, *Rec. Aust. Mus.*, **36** (suppl. 3) : 59.

Earlier Material : 10 ex., An1479/1, Taldi, S. 24 Parganas, 28.4.1979, coll. N. Sarangi.

Diagnosis : Prostomium round anteriorly and narrow posteriorly, extending back to setiger 2-3 as a narrow keel. Eyes 2 pairs, sometimes absent, posterior pair larger. Branchiae from setiger 2, 10-12 pairs, all cirriform. First parapodial postsetal lamella small, somewhat rounded, latter ones being larger and leaf-like. Notopodial lamella triangular–gradually decreasing in size in midbranchial region, extending across the dorsum as low dorsal ridges in postbranchial region. Genital pouches from setiger 5 in mature specimens. Capillaries in anterior setigers; multidentate hooded hooks from setiger 13 or 14 in neuropodia and 30-32 in notopodia. Pygidium with long middorsal cirrus and a pair of short lateral anal cirri.

Remarks : On review of literature it appears that the species is highly variable with respect to the commencement of hooks. Day (1967) observed that the hooks commenced from setiger 15-18 in the neuropodia, and after 30 in the notopodia. According to Foster (1971), the species has hooks commencing from setiger 12-18 in the neuropodia and 15-44 in the notopodia. Hutchings and Rainer (1979) recorded the same from setiger 14-15 ventrally and about setiger 30 dorsally. The material from Taldi, Lower Bengal, recorded earlier by the present author, has hooks commencing from setiger 13-14 ventrally and setiger 30-32 dorsally. However, the material determined as

Prionospio cirrifera Wirén by Fauvel (1932) from Vishakhapatnam, India not being in a good condition, could not be studied properly for observing the distribution of hooks and other details. Moreover, Fauvel (1932) noted that the specimens from Vishakhapatnam did not possess any peristomial wings which is an important generic character, and hence confusion about the identity of those still remained.

Present diagnosis is based on earlier material, as the present author was not able to collect any material of the species from the area under present study.

Habitat : Soft silty sediments at the bottom of the brackishwater ponds; with variable salinity.

Type Locality : Bering Sea.

Distribution : Cosmopolitan. *India* : Taldi, South 24 Parganas (W. B.); Godavari estuary, Vishakhapatnam (A.P.); Vellar estuary, Adyar estuary (T.N.); Vembanad Lake (Kerala); Mandovi-Zuary estuary (Goa). *Elsewhere* : South Africa; Sri Lanka; South Australia; Victoria; New South Wales; Queensland; Solomon Is.; North Atlantic from Greenland, North and South America and Sweden to the North Sea, English Channel and Portugal; Arctic.

Genus ***Polydora*** Bosc, 1802

Diagnosis : Prostomium anteriorly blunt or bifid. Branchiae present from setiger 6. Setiger 5 with strongly modified stout setae. Other setae include notopodial capillaries, sometimes also with simple posterior spines. Neuropodial uncini usually present from setiger 7-10.

Type Species : *Polydora cornuta* Bosc, 1802.

Remarks : This is a very large genus, but only five species have so far been recorded from India. Presently, two more species have been added, including one determined up to the genus, which registers the new record of the genus from the Hooghly estuary.

Key to Species

Enlarged hooks of setiger 5 slightly curved; posterior notosetae not modified .....*P. normalis* Day

Enlarged hooks of setiger 5 straight; posterior notosetae modified, densely spinulose..... *Polydora* sp.

54. ***Polydora normalis*** Day, 1957

1957. *Polydora normalis* Day, *Ann. Natal Mus.*, **14** : 97, fig. 6 f-j.

Material : 5 ex., Namkhana, 7.10.1982; 12 ex., Canning, 17.11.1982.

Diagnosis : Worms colourless in life as well as in preserved state. Prostomium deeply notched anteriorly, caruncle extending up to setiger 4. Eyes absent. Branchiae commencing from setiger 7-9 as slender filaments, continuing nearly to the posterior end. Parapodia of first setiger each with reduced notopodium in the form of a papilla and a well-developed neuropodial lamella. Parapodia of succeeding setigers each with notopodium projecting as broad acicular lobe, neuropodium having superior and inferior presetal lamella and a median rounded postsetal lobe.

Setiger 1 with capillary setae in both noto- and neuropodia, notosetae 1-2 per setiger throughout. Modified setae of setiger 5 of 2 types; slightly curved stout hooks and interspersed companion setae.

Remaining setae also of 2 types : capillaries and bidentate hooded hooks. Modified posterior notosetae absent. Notopodia with capillary setae from setiger 1 to the pygidium; neuropodia with only capillary setae on setigers 1-6, and bidentate hooded hooks (Fig. 57H) along with a few winged capillaries from setiger 7 to the pygidium. Capillaries unilimbate in anterior setigers (Fig. 57F), bilimbate in middle and posterior ones (Fig. 57G).

Remarks : The species may readily be recognised by the slightly curved modified hooks without any spur on setiger 5. The material agrees well with the original description of the species (Day, 1957) with the exception of the following points. Day (1957) reported the commencement of branchiae from setiger 8 and the companion setae on setiger 5 were abraded to mere stumps, and were rarely with broad hastate blades. But in the present material the branchiae appear on setiger 7-9 and most of the companion setae are with longer blades. In Day's material the blades might have been worn out.

This is the first record of the species from India.

Habitat : Soft tube embedded in mud at MTL; salinity 5‰ to 8‰.

Type Locality : Inhaca Island, Delagoa Bay, Mocambique.

Distribution : Indian Ocean. *India* : Lower reaches of Hooghly estuary; Matla river (W.B.). *Elsewhere* : Mocambique; South Africa.

55. *Polydora* sp.

(Fig. 19A-G)

Material : 2 ex., Naraharipur, 23.7.1982.

Description : Worms colourless both in life and in preserved state. Prostomium (Fig. 19A) rounded with a small bluntly pointed tip. Caruncle extending up to setiger 5. Eyes absent. Branchiae commencing from setiger 9 as slender filaments with blunt ends, continuing nearly to the posterior end, well separated from notopodial lobes. Parapodia (Fig. 19B) of prebranchial setigers with erect and blunt notopodial postsetal lamellae and short, rounded neuropodial postsetal lamellae; presetal lamellae obscured in both rami. Parapodia (Fig. 19C) of branchial setigers with reduced noto- and neuropodia.

Modified setae on setiger 5 of 2 types : 8-10 bluntly projecting stout, straight hooks (Fig. 19D), and interspersed companion setae (Fig. 19E) with very fine, tapered ends. Remaining setae also of 2 types : capillaries and bidentate hooded hooks. Posterior notosetae modified–very long and densely spinulose (Fig. 19G) in middle and posterior setigers. Setigers 1-6 with capillary setae only, neuropodial hooded hooks (Fig. 29F) from setiger 7 to the pygidium. Notosetae in 2 rows, short, straight and smooth in anterior setigers; spinulose posteriorly. Hooded hooks 4-5 initially, reducing in number in posterior setigers; with small superior teeth and larger, blunt inferior teeth; incompletely covered with hoods, apex free.

Remarks : The material is placed in the genus *Polydora* Bosc in having modified setae arranged in a small patch on setiger 5. It is further placed in the group of *Polydora* species having modified notosetae on posterior setigers. On closer examination it appears that the material is closely allied to *P. flava* Claparède, 1870, in this group with respect to the commencement of branchiae, hooded

hooks and modified notosetae. But it differs from the latter in the following features : (i) modified capillary setae spinulose *vs.* slender, needle-like setae; (ii) prostomium bluntly produced *vs.* notched between two sharp horns; (iii) hooks with incomplete hoods *vs.* complete hoods. Thus, the material seems to be interesting, but its type designation is kept pending for the moment as it is represented by only two incomplete specimens. However, it may readily be recognised by the densely spinulose capillary notosetae in middle and posterior setigers.

Habitat : U-shaped burrow in solid mud at MTL; salinity 13‰.

Genus ***Pseudopolydora*** Czerniavsky, 1881

Diagnosis : Prostomium anteriorly blunt or bifid. Branchiae present from setiger 7. Setiger 5 modified with large, thick setae arranged in a horseshoe-shaped pattern. Notosetae capillaries; neurosetae include capillaries and posterior uncini.

Type Species : *Polydora antennata* Claparède, 1870.

Remarks : So far the genus is represented by only two species in Indian waters of which one, described earlier from Salt Lake (near Calcutta), is known to occur in the Hooghly estuary.

56. ***Pseudopolydora kempi*** (Southern, 1921)

1921. *Polydora (carazzia) kempi* Southern, *Mem. Indian Mus.*, **5** : 636, pl. 28, fig. 20 A-J.
1984. *Pseudopolydora kempi.* –Hutchings & Murray, *Rec. Aust. Mus.*, **36** (suppl.) : 61.

Earlier Material : 4 ex., ZEV6638/1, Chingrighata, Salt Lake, 27.10.1914, coll. Museum collector, (types).

Diagnosis : Prostomium faintly notched anteriorly with a posterior occipital papilla. Eyes 2 pairs. First setiger without notosetae. Branchiae 10-11 pairs from setiger 7. Setiger 5 with normal notopodial capillaries, double rows of specialised setae and normal neuropodial setae. Specialised setae include an anterior row of short bilimbate capillaries with broad wings tapering rapidly and a posterior row of stout, simple hooks with curved tips. Bidentate hooded hooks from neuropodium of setiger 8. No specialised notosetae in posterior setigers. Pygidium small and saucer-like.

Remarks : As the species has not been recorded during the present investigation, the diagnosis is based on earlier material collected from the Hooghly estuary. The species may readily be recognised by the first setiger without notosetae, fifth setiger less modified with superior notosetae long and narrow capillaries in addition to two rows of modified setae and normal neurosetae.

Type Locality : Chingrighata, Salt Lake (east of Calcutta).

Distribution : Indo-west Pacific. *India* : Upper reaches of Hooghly estuary (W.B.); Godavari estuary (A.P.); Adyar estuary (T.N.); Vembanad Lake (Kerala). *Elsewhere* : Mocambique; South Africa; South Australia; Victoria; New South Wales; Queensland.

Genus *Spio* Fabricius, 1785

Diagnosis : Prostomium anteriorly rounded. Branchiae present from setiger 1, fused with the notopodial postsetal lobes, at least anteriorly. Notosetae all capillaries; neurosetae include capillaries and hooded hooks.

Type Species : *Nereis filicornis* O.F. Müller, 1776.

Remarks : So far only one species has been known from Indian waters, that too was described from the Gangetic delta with only single record from outside.

57. *Spio bengalensis* Willey, 1908

1908. *Spio bengalensis* Willey, *Rec. Indian Mus.*, 2(4) : 389, figs. 1-6.
1964. *Spio bengalensis*. –Balasubrahmanyan, *J. Annamalai Univ.*, **25** : 105.

Diagnosis : Prostomium slightly emarginate anteriorly, being narrow posteriorly, extending back to setiger 1 as a narrow keel. Eyes 2 pairs. Branchiae 12-15 pairs, cirriform, last 2 or 3 pairs smaller than others. Postsetal lamellae broad and triangular in branchial region, decreasing in prominence and becoming very inconspicuous in postbranchial region. Notosetae capillaries throughout. Neurosetae capillaries anteriorly; bidentate hooded hooks from setiger 28 onwards; one sabre seta at inferior edge of each neuropodium from setiger 12 onwards. Pygidium with a ventral cone and a pair of low dorsal elevations.

Remarks : This species was described by Willey (1908) on the basis of the material from the brackish-water pond at Port Canning, Lower Bengal. The present author has failed to trace the type material of this species. Hence, the diagnosis is based on the original description.

Distribution : Endemic in east coast of India. Canning, in brackish pond (W.B.) : Vellar estuary (T.N.).

Family FLABELLIGERIDAE Saint-Joseph, 1894.

Genus *Pherusa* Oken, 1807

Diagnosis : Body anteriorly inflated, narrowed to a well marked tail posteriorly; cephalic cage present. Branchial filaments either 4 or many pairs, on a short branchial membrane. Neurosetae mostly uni - or bidentate hooks.

Type species : *Amphitrite plumosa* O.F. Müller, 1776.

Remarks : Only three species in the genus have so far been reported from Indian waters, of which one is known to occur in the Hooghly estuary.

58. *Pherusa bengalensis* (Fauvel, 1932)

1932. *Stylarioides bengalensis* Fauvel, *Mem. Indian Mus.*, **12** : 180, fig. 30 a-f.
1974. *Pherusa bengalensis*. –Hartman, *J. mar. biol. ass.*, **16**(1) : 199.

Material : 1 ex., W2020/1, Sandheads, Hooghly river mouth, July, 1927, coll. Capt. Parks of P. V. Lady Fraser, (type).

Diagnosis : Body cylindrical anteriorly, tapering to a filiform coiled tail, about 60 mm long, 6-7 mm wide, with numerous indistinct segments. Surface with globular papillae. Cephalic cage formed by long capillaries of first 3 setigers. Cephalic hood horseshoe-shaped with numerous slender, filiform branchial filaments. Notosetae all capillaries, very long and stout, beautifully iridescent on third setiger. Neurosetae capillaries in anterior 6-8 setigers, neuropodial hooks starting further back on setiger 7-9. Hooks with slightly curved, pointed tips, at first small and 1-2, later enlarged and about 4-5 per setiger.

Remarks : The original record of the species is from the Sandhead at the Hooghly river mouth and Madras coast. The next record by Hartman (1974) is from the Arabian Sea at a depth of 46-55 m. During the present investigation, the sub-tidal habitats were not surveyed, and naturally the species has not been found.

Type Locality : Sandheads, mouth of Hooghly river.

Distribution : Endemic in Indian waters. Mouth of Hooghly river (W.B.); Madras coast (T.N.); Arabian sea.

Family CAPITELLIDAE Grube, 1862

Key to Genera

1. Thorax with 9 segments; anterior asetigerous segment absent ..... *Capitella* Blainville
   Thorax with 12 segments; anterior asetigerous segment 1 2
2. First 4 thoracic setigers with capillary setae only..... *Parheteromastus* Monro
   More than 4 thoracic setigers with capillary setae 3
3. First 5-7 thoracic setigers with capillary setae only ..... *Barantolla* Southern
   All thoracic setigers usually with capillary setae only ..... *Mastobranchus* Eisig

Genus ***Barantolla*** Southern, 1921

Diagnosis : Thorax with 12 segments, anterior asetigerous segment 1; first setiger either complete or incomplete. Capillary setae extending up to segment 7, segment 8 with mixed capillary setae and hooks in notopodia, and hooks only in neuropodia; succeeding thoracic segments with elongate hooks. Abdomen with short hooks. Branchiae may be present in posterior segments.

Type Species : *Barantolla sculpta* Southern, 1921.

Remarks : Only three species have so far been included in the genus, of which one species is known from Indian waters including the Hooghly estuary.

59. ***Barantolla sculpta*** Southern, 1921

1921. *Barantolla sculpta* Southern, *Mem. Indian Mus.*, **5** : 643, pl.19, fig.24.
1987. *Barantolla sculpta.* –Sunder Raj & Sanjeeva Raj, *J. Bombay nat. Hist. Soc.*, **84**(1) : 96.

Earlier Material : 6 ex., ZEV6261/1, brackish pool, Barantolla, Salt Lake, 9.11.1931, coll. N. Annandale, (types).

Diagnosis : Body widest near segments 4-5, tapering backwards; first 4 segments tesselated. Prostomium conical, without eye spots. Pharynx eversible, covered with minute papillae. Thorax with 12 segments, first segment achaetous. Setae from second segment, with narrow-winged capillaries in both rami of segments 2-7; segments 8-12 with long-handled hooded hooks only. Abdominal setae all short-hooded hooks. Branchiae in the form of short finger-shaped lobes, appearing on segment 55-70, continuing up to posterior end. Branchiate setigers each with a membranous collar, produced into 4 shallow parapodial lobes. Pygidium with a single anal cirrus.

Remarks : *Barantolla sculpta* may readily be differentiated from the other two species known in the genus, namely, *B. americana* Hartman, 1963 and *B. lepte* Hutchings, 1974 by the presence of branchiate setigers having membranous collar produced into four lobes. Moreover, the first-named species has neuropodial capillary setae on the anterior six thoracic setigers (1-6), while the second and the last-named species bear the same feature on the anterior eight thoracic setigers (1-8) and five thoracic setigers (2-6) respectively. *Barantolla* near *americana* Hartman, 1971, described from abysal depths of 2,000 - 3,753 m off southern California, has capillary setae in both noto- and neuropodia of first six thoracic setigers, like that in *B. sculpta*, but differs from the latter in having a mixed bundle of setae in the notopodia of seventh thoracic setiger.

Type Locality : Barantolla, Salt Lake (east of Calcutta).

Distribution : Indo-west Pacific. *India* : Barantolla, salt Lake (W.B.); Pulicat Lake (T.N.). *Elsewhere* : Thailand.

Genus *Capitella* Blainville, 1828

Diagnosis : Thorax with 9 segments; anterior asetigerous segment absent; first setiger complete. Either first 4 segments with capillary setae only, then 3 segments with mixed hooks and capillary setae in both rami, then genital spines in segments 8-9; or first 7 segments with capillary setae only, then segments 8-9 with genital spines. Branchiae absent.

Type Species : *Lumbricus capitatus* Fabricius, 1780.

Remarks : On reviewing the genus *Capitella*, Warren (1976) merged *Capitellides* Mensil, 1897 with it and recognised only eight species in it. So far only one species has been reported from Indian waters, which is also known to occur in the Hooghly estuary.

60. *Capitella capitata* (Fabricius, 1780)

1780. *Lumbricus capitatus* Fabricius, Fauna Groenlandica observationes. Hafniae, p.279.
1908. *Matla bengalensis.* – Stephenson, *Rec. Indian Mus.*, **2** : 39.
1979. *Cpitella capitata.* – Hutchings & Rainer, *J. nat. Hist.*, **13** : 777.

Diagnosis : Body very small, generally varies from 30 to 40 mm in length. Prostomium conical with a pair of ventral eyes. Thorax of 9 segments, with capillaries in both rami from segments 1-6; segment 7 variable, with capillaries only or hooks only, or both. In females, segments 8-9 with hooks in both rami, but in males, genital hooks replace notosetae. Abdominal segments with long-shafted hooks in both rami.

Remarks : Stephenson (1908) described the species *Matla begalensis* from Port Canning, Gangetic delta and considered that as an oligochaete worm. Later in 1910, he himself referred the species to the class Polychaeta. However, Hartman (1947b) considered this species as *Capitella capitata* Fabricius. During the present investigation the species has not been collected from the Hooghly estuary.

Review of literature reveals that the diagnostic features of *C. capitata* are not well defined, and the setal formula in the thorax in highly variable. Stephenson (1908) showed that the notosetae in setigers 1-6 and neurosetae in setigers 1-5 were only capillaries, and notosetae in setigers 7-8 and the neurosetae in setigers 6 and 7 were either capillaries or hooks, or both, while succeeding setigers

with hooks only. Day (1967) observed the first six setigers with capillary setae only, the 7th variable, and the 8th and 9th with only hooks. Hutchings and Rainer (1979) found capillaries in both rami of setigers 1-7 and hooded hooks in setigers 8-9.

Warren (1976) reviewed the genus *Capitella* and gave the diagnosis of the species *C. capitata* as follows : "... usually with capillaries in both rami of setigers 1-6, capillaries and hooded hooks in setiger 7, and only hooded hooks in setigers 8-9" She also remarked that the setal formula varied with age and locality; capillary setae present only in setigers 1-3 and hooks only in setigers 8-9, but intermediate setigers may have capillaries, hooks or mixed setae.

Type Locality : Greenland.

Distribution : Cosmopolitan. *India* : Matla river (W.B.); Vishakhapatnam Harbour (A.P.). *Elsewhere* : South Africa; North Pacific from Bering Sea to the North-west Japan; Western Australia; south Australia; Tasmania; New South Wales; Southern California; North Atlantic from Greenland and Scotland to North Carolina and Senegal; Mediterranean Sea; Black Sea; Arctic; subantartic.

Genus *Mastobranchus* Eisig, 1887, emended

Diagnosis : Thorax with 12 segments; first segment achaetous. first setiger with or without neurosetae. Setigers 1-9 with capillary setae only. Last 2 thoracic segments with capillary setae only or hooded hooks only. One or more abdominal notopodia with mixed fascicles of capillary setae and hooded hooks; abdominal neuropodia with hooks only.

Type Species : *Mastobranchus trinchesii* Eisig, 1887.

Remarks : Five species in the genus were known, of which two, namely, *M. dollfusi* Fauvel, 1936 and *M. indicus* Southern, 1921, are considered as *incertae sedis* (Gallardo, 1968 and Ewing, 1948), as they lack an important diagnostic character of the genus—mixed bundle of capillary setae and hooded hooks at least in some anterior abdominal notopodia. So far, only one species *M. indicus* Southern, 1921, described from Barantolla, Salt Lake, is known to be endemic in Indian waters.

61. *Mastobranchus* sp. [cf. *indicus* Southern, 1921]

Material : 4 ex., Kachuberia, 12.7.1977; 2 ex., Kakdwip canal, Kakdwip, 28.6.1980; 6 ex., Bhushighata, 12.8.1982; 10 ex., Bhushighata, 18.10.1982; 2 ex., Diamond Harbour, 12.3.1983; 5 ex., Haldia, 16.3.1983; 2 ex., Patikhali, Haldia, 18.3.1983; 2 ex., Gangasagar, 12.7.1983; 5 ex., Bakkhali, 7.3.1985.

Diagnosis : Body long, cylindrical; swollen anteriorly, tesselated for anterior 6-7 segments. Dark red in life. Prostomium short, rounded, without eyes or distinct lateral sense organs. Genital pores 4 pairs behind segments 8-11. Pharynx smooth, everted in some specimens.

Thorax with 12 segments, first segment achaetous. First setiger complete; all thoracic setigers with capillary setae only, occasionally the last thoracic neuropodia with mixed fascicle of capillary setae and hooded hooks. First 2 or 3 abdominal setigers transitional, with capillary notoseate and neuropodial hooded hooks; succeeding setigers with hooded hooks only; mixed fascicles of capillary setae and hooded hooks appear in any one of the first 3 abdominal notopodia.

Parapodia inconspicuous, with poorly developed ridges or tori in both rami anteriorly, parapodial lobes developed in branchiate region. Tori of setiger 1-3 short, succeeding tori 2 to 3 times longer. Branchiae appearing on setiger 50-55, extending up to end, in the form of small finger-like processes under dorsal parapodial lobes. Pygidium with a short ventral anal cirrus.

Capillaries in setigers 1-3 short, bilimbate, with narrow wings; in succeeding setigers long, simple-winged; in setigers with mixed bundle of setae, short, bilimbate resembling those of anterior thoracic setigers. Hooks with slender shafts, long hoods extending about one-fourth of length of the shafts, each with a small main tooth and several small denticles above. Hoods of hooks reducing in size posteriorly.

Remarks : The present material is placed in the genus *Mastobranchus*, owing to the presence of mixed bundle of capillary setae and hooded hooks at least in one anterior abdominal notopodia. Three species in the genus, namely, *M. trinchesii* Eisig, 1887, *M. variablilis* Ewing, 1984 and *M. loii* Gallardo, 1968 differ from the present material as follows : the first two species have two or more abdominal notopodia with mixed fascicles of capillary setae and hooded hooks, while the last-named species has posterior two thoracic setigers with hooded hooks only in both noto- and neuropodia. On re-examination of the type material of *M. indicus* Southern, described on the basis of a single incomplete specimen, it appears that the specimen has no abdominal notopodia with mixed setae. However, the presence of mixed setae in the last right thoracic neuropodial bundle, though not observed by the present author, is reported in the original description. In the nature of the last thoracic neuropodial bundle and also in external morphology, the present material is closely allied to *M. indicus* Southern.

Habitat : Clayey soil in the zone between HWM and MTL; salinity 5‰ to 16‰.

Genus ***Parheteromastus*** Monro, 1937

Diagnosis : Thorax with 12 segments; anterior asetigerous segment 1. Capillary setae only in first 4 thoracic setigers; hooks only in succeeding setigers. Branchiae absent.

Type Species : *Parheteromastus tenuis* Monro, 1937

Remarks : The genus is represented by only one species which has earlier been recorded from India, and also reported here for the first time from the Hooghly estuary.

62. ***Parheteromastus tenuis*** Monro, 1937

1937. *Parheteromastus tenuis* Monro, *Ann. Mag. nat. Hist.* (Sr.10), **19** : 536, fig.2 a-e.

1973. *Parheteromastus tenuis*.– Damodaran, *Bull. Dep. mar. Sci. Univ. Cochin*, **6** : 36.

Material : 10 ex., Gangasagar creek, Gangasagar, 15.6.1978; several ex., Muriganga creek, Sagar Island, 10.3.1979, 10 ex., 10.6.1984, coll. S. Chakraborty; 5 ex., Namkhana, 6.10.1982; 6 ex., Bakkhali creek, Bakkhali, 7.3.1985.

Diagnosis : Worms thread like; dark red in life, pale brown in spirit. Prostomium bluntly conical, without eyes. Thorax with 12 segments, first segment achaetous; setigers 1-4 with short capillaries in both rami; setigers 5-11 with long-handled hooded hooks in both rami. Abdominal hooded hooks with shorter shafts than in thorax. Branchiae absent. Pygidium with a short, median anal cirrus.

Remarks : The material agrees well with the original description with the exception of the absence of prominent subterminal enlargement in abdominal hooks. *Mediomastus caudatus* Hartman, 1974, described from the Bay of Bengal and Arabian Sea and *Heteromastus deductus* Pillai, 1961, described from Sri Lanka, are very closely related to this species. However, both the species differ form the present one in having ten thoracic setigers. Moreover, *M. caudatus* is characterised by greatly prolonged posteriormost setigers with conspicuously projecting uncinial spines, which is lacking in the other two species.

This is the first record of the species from the Hooghly estuary.

Habitat : Clayey soil in the zone between MTL and LWM; salinity 5‰ to 24‰.

Type Locality : Maungmagan, Burma.

Distribution : Indo-west Pacific. *India* : Lower reaches of Hooghly estuary (W.B.); Vellar estuary (T.N.); Vembanad Lake (Kerala); Ratnagiri (Maharashtra). *Elsewhere* : Mocambique; Burma.

Family MALDANIDAE Malmgren, 1867

Subfamily MALDANIDAE Malmgren, 1867 (Arwidsson, 1907)

Diagnosis : Both anterior and posterior ends with plaques. Nuchal grooves curved, divergent anteriorly. Pygidium as a slanting plate with a dorsal anus.

Genus *Asychis* Kinberg, 1867

Diagnosis : Cephalic rim with deep lateral incisions forming 2 lateral lobes and a curved posterior portion; Cephalic keel short and low. Anterior segments short and without collars. Notosetae include winged and spinose capillaries; neurosetae long-shafted hooks, absent in first setiger. Branchiae absent.

Type Species : *Asychis atlanticus* Kingberg, 1867.

Remarks : Only three species in the genus have so far been known from India, of which one species, *A. gangeticus* Fauvel, 1932, is known from the Hooghly estuary, only through its original description.

63. ***Asychis gangeticus*** Fauvel, 1932

1932. *Asychis gangeticus* Fauvel, *Mem. Indian Mus.*, **12** : 206, pl.8, figs.1-9.

Earlier Material : 1 ex., W2709/1, Sandheads, Hooghly river mouth, coll. Pilots Barnett and Milner, (type).

Diagnosis : Worms without achaetous preanal segments. Prostomium flattened, broadly rounded in front. Nuchal grooves transversely curved. Cephalic plate rounded, slanting with a membranous rim divided into 3 pairs by deep lateral notches. Cephalic keel broad, long depressed. Notosetae of 3 kinds: long and slightly bent winged setae, slender setae with barbed tips and very slender smooth capillary setae. Neurosetae long-shafted hooks, absent in setiger 1; subsequent setigers with a row of hooks each with a large tooth and several fine denticles arranged in transverse arcs above the main fang, tuft of tendons below the main fang. Pygidium with a broad, triangular, foliaceous dorsal

lobe having a rounded border and a dorsal keel ending in a rounded valve above anus; a foliaceous ventral lobe divided by a deep indentation into 2 lateral lobes.

Remarks : The taxonomic account of the species is available only in the original description. It may readily be recognised by the detailed structure of the pygidium, as mentioned in the diagnosis, and in the absence of achaetous preanal segments.

Type Locality : Sandheads, Hooghly estuary.

Distribution : Endemic in Hooghly estuary, India. Sandheads, mouth of Hooghly estuary (W.B.).

Family OWENIIDAE Rioja, 1917

Genus ***Owenia*** delle Chiaje, 1841

Diagnosis : Prostomium produced anteriorly into a low tentacular crown with flattened lobate projections forming a frilly food-gathering membrane. Anterior 3 setigers short with capillary setae only, rest elongated with notopodial capillaries and neuropodial rows of minute long shafted hooks.

Type Species : *Owenia fusiformis* delle Chiaje, 1841.

Remarks : This is a small genus represented in Indian waters by only one species. This is the first record of the genus from the Hooghly estuary.

64. ***Owenia fusiformis*** delle Chaije, 1841

1841. *Owenia fusiformis* delle Chiaje, Descrizione ..... negli anni 1842-30, p.31.

1988. *Owenia fusiformis*. –Misra *et al., State Fauna of Orissa, Special publication*, Sr.1, p.79.

Material : 20 ex., Naraharipur, 23.7.1982; 10 ex., Namkhana creek, Namkhana, 7.10.1982; 6 ex., Champa river, Midnapur, 26.6.1983; Bakkhali, 6.3.1985.

Diagnosis : Body slender, encased in tough tube impregnated with sand grains. Prostomium fused to achaetous buccal segment, with a low tentacular crown having flattened lobate projections mounted on a trilobed base. Thoracic region of 3 short setigers with capillary notosetae only. Abdomen slender, first 5 setigers much longer and the rest gradually decreasing in length. Abdominal notopodia with capillaries having sparsely spinulose blades; neurosetae with minute, long-shafted hooks having 2 recurved apical teeth. Pygidium short, obtusely conical.

Remarks : This is the first record of the species from the Hooghly estuary. The material agrees well with the earlier descriptions. This is a well-known cosmopolitan species abundantly occurring in the sea shore habitats. Its occurrence in the Australian estuary is known only in salinities 30.4-35‰ (Hutchings & Murray, 1984). It is interesting to note that in the Hooghly estuary the species tolerates much lower salinities (as low as 5‰). No dense beds were seen in this estuary during the present investigation, as observed in the coastal zones of India (author's observation). Solitary individuals were collected during the present survey.

Habitat : Mud mixed with fine sand towards LWM; salinity 5‰ to 12‰.

Type Locality : Naples, Italy.

Distribution : Cosmopolitan. *India* : Lower reaches of Hooghly estuary, Champa river (W.B.); Chandipur (Orissa), Tuticorin (T.N.); Andamans. *Elsewhere* : Red Sea; Mocambique; South Africa;

Sri Lanka; Western Australia; South Australia; Victoria; New South Wales; Queensland; northern Pacific from the Bering Sea to Japan; Chile; North Atlantic from Greenland and Sweden to North Carolina and the Gulf of Mexico; English Channel; Mediterranean Sea; Angola; South West Africa.

Family STERNASPIDAE Carus, 1863

Genus ***Sternaspis*** Otto, 1821

Diagnosis : Body sausage-shaped, with limited segments. Anterior segments forming an introvert with stout setae. Posterior end with a pair of ventral horny shields with radiating bundles of capillary setae. Filiform branchiae arise from two posterior plaques.

Type Species : *Echinorhynchus scutatus* Renier, 1807.

Remarks : Only one species in the genus has so far been reported from Indian waters. The present record of the species from the Hooghly-Matla estuarine complex registers the new record of the genus from the area.

65. ***Sternaspis scutata*** (Renier, 1807)

1807. *Echiorhynchus scutatus* Renier, *Tavole per ..... degli animali*, Padua, p.34.

1953. *Sternaspis scutata*. –Fauvel, *Fauna of India, Annelida Polychaeta*, p.401.

Material : 14 ex., Banamali Khal, Jharkhali, Sunderbans, 23.9.1984; coll. B.P. Haldar & A. Misra.

Diagnosis : Body swollen at both ends. Anterior 6-7 segments form an introvert; prostomium small, papillose and often retracted into introvert. First three segments with lateral rows of falcate spines. Posterior end with a pair of rhomboidal shields having 14-16 bundles of capillary setae. Branchial filaments numerous, often rolled into spirals, arise posteroterminally.

Remarks : The material agrees well with the earlier description of the species. This is the first record of the species from Hooghly-Matla estuarine complex.

Habitat : Silty mud or sand in the subtidal habitat; salinity 14‰.

Type Locality : Mediterranean Sea.

Distribution : Cosmopolitan. *India* : Lower reaches of Hooghly estuary (W.B.); Chilka Lake, Ganjam coast (Orissa); Madras (T.N.); Andamans. *Elsewhere* : From the Arctic to the Antarctic.

Family SABELLARIIDAE Johnston, 1865

Genus ***Sabellaria*** Savigny, 1818

Diagnosis : Paleae in 3 rows; opercular peduncles short and fused; hooks absent, accessory setae sometimes present. Parathoracic setigers 3. Middle opercular paleae pointed distally, operculum open and generally rather bristly in appearance.

Type Species : *Sabella alveolata* Linnaeus, 1767.

Remarks : Seven species in the genus have so far been known from India, of which two are recorded earlier from the Hooghly estuary.

Key to Species

Outer paleae with denticulate margin; central terminal spine slightly produced and finely ciliated ..... *S. pectinata intermedia* Fauvel

Outer paleae with smooth margin; central terminal spine elongated and much densely spinulose.. ..... *S. alcocki* Gravier

66. ***Sabellaria pectinata intermedia*** Fauvel, 1932

1932. *Sabellaria pectinata* var. *intermedia* Fauvel, *Mem. Indian Mus.*, **12** : 210, fig. 35.

1984. *Sabellaria pectinata* intermedia. –Misra *et al.*, *Rec. zool. Surv. India*, **81** : 52.

Material : 25 ex., Naraharipur 25.3.1980; 20 ex., Namkhana, 6.10.1982; 15 ex., Harwood Point, Kakdwip 11.9.1977.

Additional Material : 8 ex., W2877/1, Matla river, Gangetic delta, Dec., 1916, coll. S.W. Kemp, (types).

Diagnosis : Tube made of minute sand particles, fragile. Opercular crown formed of 3 rows o golden paleae. Outer paleae long, broad, flattened, slightly curved and denticulate, 15-18 on each side, gradually increasing in size to long, sharp 5-7 spines at distal ends; central spine longer, finely ciliated on both sides. Middle paleae spoon-shaped, short and broad, 10-12 on each side. Inner paleae spoon-shaped, elongated, 12-15 on each side, with long and sharp tips directed inwards. Buccal tentacles numerous. Branchiae on anterior 4-5 abdominal segments. Notosetae oar-shaped, neurosetae bipectinate capillaries in parathoracic region; abdominal notosetae serpuliform uncini, neurosetae capillaries.

Remarks : The material agrees well with the type specimens with the addition that the central terminal spines of the outer paleae are very finely ciliated.

Habitat : Fragile sandy tube attached to any hard object in the zone between MTL and LWM; salinity 5‰ to 12‰.

Type Locality : Matla river, Gangetic delta, India.

Distribution : Endemic in Hooghly-Matla estuary, India. Lower reaches of Hooghly estuary, Matla river (W.B.).

67. ***Sabellaria alcocki*** Gravier, 1906

1906. *Sabellaria alcocki* Gravier, *Bull. Mus. Hist. nat., Paris*, **12** : 543.

1972. *Sabellaria spinulosa* var. *alcocki*. –Kumaraswamy Achari, *Proc. Indian natn. Sci. Acad.*, **38B** : 445.

Diagnosis : Small gregarious species. Opercular crown almost at right angle to body, with a deep dorsal notch between opercular lobes. Opercular crown formed of 3 rows of golden paleae. Outer paleae broad, with smooth margin, terminating in 5-7 slender teeth of which median one elongated and barbed. Middle paleae spoon-shaped, erect, alternately long and short. Inner paleae spoon-shaped, all of same size.

Remarks : The record of this species from the Gangetic delta (India) was made by Fauvel (1932). Subsequently, the species has been reported from other localities of South India. According

to Hartman (1944), this species is very close to *S. bella* Grube, 1870. Kumaraswamy Archari (1972) is of the opinion that *S. chandraae* De Silva, 1961 from Sri Lanka is very similar to this species. However, the species may be recognised by the outer paleae with smooth margin and densely spinulose central spine.

Type Locality : Indian Ocean, 8°23'N, 76°28'E, 186 meters.

Distribution : Indo-Pacific and Eastern Atlantic. *India* : Matla river (W.B.); Vedali, Manauli Is., Rameswaram (T.N.); Andamans; Kozhikode, Quilon, Kovalam, Vizhingam, Colachel (Kerala). *Elsewhere* : South Africa; Persian Gulf; Mergui; Indo-China; California; eastern Atlantic from English channel to Senegal.

Family TEREBELLIDAE Malmgren, 1867

Subfamily AMPHITRITINAE Hessle, 1917

Diagnosis : Tentacular lobe short and collar-like; proboscis usually absent. Thoracic uncini in double or alternating rows at least in some posterior setigers.

Key to Genera

Branchiae 3 pairs; thoracic setigers 17; long handled uncini absent.....***Loimia*** Malmgren

Branchiae 2 pairs; thoracic setigers 15-25; long uncini long-handled, present in anterior setigers..
.....***Pista*** Malmgren

Genus ***Loimia*** Malmgren, 1866

Diagnosis : Branchiae branched, 3 pairs, on segments 2-4. Lateral lappets present. Thoracic setigers 17; notosetae smooth-tipped, commencing on segment 4. Unicini with all teeth in a single row (pectinate), commencing on segment 5, in double rows and back to back on posterior setigers.

Type Species : *Terebella medusa* Savigny, 1818.

Remarks : The genus is represented in Indian waters by only one species, *L. medusa* (Savigny, 1818), which has also been recorded from the Hooghly estuary.

68. ***Loimia medusa*** (Savigny, 1818)

1818. *Terebella medusa* Savigny, *Histoire naturelle Description animaux sans Vertebres* etc., p.95.

1984. *Loimia medusa*.–Hutchings & Murray, *Rec. Aust. Mus.*, **36** (suppl.3) : 97.

Material : 2 ex., Gangasagar, Sagar Island, 22.3.81, 1 ex., 12.7.1983.

Additional Material : 3 ex., An1481/1, Gangasagar, 10.7.1975, coll. A. Misra & P. Roy.

Diagnosis : Prostomium reduced; tentacular lobe short, collar-like with long tentacles on ateroventral surface. Buccal segment with a large, rounded foliaceous lower lip. Segments 2 and 3 fused with a large, foliaceous horizontal lateral lobe and a large united ventral pad. Branchiae 3 pairs on segments 2,3 and 4; with numerous filaments arranged dichotomously. Notosetae, all narrow-winged capillaries, begin on segment 4 and continuing for next 17 segments. Neurosetae uncinigerous, pectiniform with a single vertical series of about 5-6 teeth; from segment 5, continuing up to the pygidium.

Remarks : The material agrees well with the earlier description of the species.

Habitat : Adults in rigid, U-shaped tubes coated with sand, with multiple openings, forming beds in fine sandy substratum at MTL. Young ones settle in sheltered areas, particularly in canals and creeks, forming more or less U-shaped tubes made of debris and attached to under surface of hard substratum, such as bricks, stones, etc., salinity 15‰ to 21‰.

Type Locality : Gulf of Suez, Red Sea.

Distribution : Cosmopolitan in temperate and tropical waters. *India* : Lower reaches of Hooghly estuary (W.B.); Chandipur (Orissa); Adyar estuary, Gulf of Mannar (T.N.); Andamans; Vembanad Lake (Kerala); Ratnagiri, Bombay (Maharashtra); Beyt Is., (Gujarat). *Elsewhere* : Red Sea; Mocambique; New South Wales; Queensland; Indo-China; Japan; South California; North Carolina; West Indies; English Channel.

Genus *Pista* Malmgren, 1866

Diagnosis : Branchiae branched and stalked, 2 pairs; lateral lappets large, on segments 2 and 4, at least. Notosetae smooth-tipped, from segment 4; uncini long-handled, present in anterior setigers. Thoracic setigers 15-24.

Type Species : *Amphitrite cristata* O.F. Müller, 1776.

Remarks : This is a moderately large genus, but represented by only three species from Indian waters, of which only one has so far been known from the Hooghly estuary.

69. *Pista typha* (Grube, 1878)

1878. *Terebella (Pista) typha* Grube, *Mem. Acad. Sci. S. Peterb.*, **25** : 232, pl.12, fig.4.

1984. *Pista typha*. –Hutchings & Murray, *Rec. Aust. Mus.*, **36** (suppl.3) : 100.

Earlier Material : 1 ex., W2029/1, Sta.274, Lakshadweep Sea, 1150-1170 fms, 3.1.1901, coll R.I.M.S. "Investigator"

Diagnosis : Small tubicolous species. Branchiae 2 pairs on segments 2 and 3; branchial filaments arranged in whorls. Semicircular lateral lobes also on segments 2 and 3. Thoracic setigers 17. Unicini of the first segment with long, slender chitinised basal shafts, reducing in size afterwards. All uncini with strongly crested heads.

Remarks : The records of the species from India are all from the subtidal levels, though the depth of occurrence at Sandheads, mouth of the Hooghly river, is not known. Evidently the species has not been recorded during the present intertidal survey.

Type Locality : Philippine Island.

Distribution : Indo-west Pacific. *India* : Sandheads, mouth of the Hooghly river (W.B.); Bay of Bengal; Lakshadweep Sea. *Elsewhere* : Japan; Philippines; Indonesia, Queensland; New South Wales; Victoria; South Australia; Solomon Is.

Family AMPHARETIDAE Malmgren, 1867

Subfamily MELINNINAE Chamberlin, 1919

Diagnosis : Segments 3-5 or 6 with fine acicular neurosetae, other neurosetae uncinigerous; Post-branchial hooks may be present.

Genus ***Isolda*** Müller, 1858

Diagnosis : Branchiae 4 pair, 2 smooth and 2 pennate; Nuchal hooks present; capillary notosetae present in segments 5 and 6; thoracic unciniger 12 or 13.

Remarks : This is the first record of the genus from West Bengal. Only one species is so far known from Indian waters.

70. ***Isolda pulchella*** Müller, 1858

1858. *Isolda pulchella* Müller, *Arch. Naturg. Berlin*, **24**(1) : 219.

1983. *Isolda pulchella*. –Rao & Rama Sarma, J. Bombay *nat. Hist. Soc.* **79**(2) : 447.

Material : 2 ex., Chhotahardi, Sundarbans, 10.11.88, coll. A. Misra.

Diagnosis : Prostomium snout-like; buccal tentacles smooth, arise from a horizontal shelf in the roof of the mouth. Branchiae in 2 groups of 4, each united basally; inner 2 pairs with 2 rows of long lateral lamellae. Fine acicular neurosetae on segments 3 and 5 but not on 4; stout notopodial hooks on segment 4. Small notopodial capillaries on segment 5 and 6. Thirteen uncinigerous thoracic segments starting from segment 7.

Remarks : The material agrees well with the earlier description of the species. This is the first record of the species from the West Bengal coast.

Habitat : Soft muddy tubes in compact clayey soil at MTL.

Type Locality : St. Caterine Is., Brazil.

Distribution : *India* : Sunderbans (W.B.); Godavari estuary (A.P.). *Elsewhere* : Cape; Burma; S.W. Australia; North Carolina; Brazil.

Family SABELLIDAE Malmgren, 1867

Subfamily SABELLINAE Malmgren, 1867 (Rioja, 1923)

Diagnosis : Uncini avicular; companion setae may be present. Branchial crown innervated by a single pair of nerves.

Genus ***Potamilla*** Malmgren, 1866

Diagnosis : Radioles in semicircles; external stylodes and webbing absent; eyes present. Collar with 2 or 4 lobes. Spatulate thoracic notosetae present. Thoracic uncini short-handled.

Type Species : *Sabella neglecta* Sars, 1850.

Remarks : Only three species in the genus have so far been known from India, of which one occurs in the Hooghly estuary.

71. ***Potamilla leptochaeta*** Southern, 1921

1921. *Potamilla leptochaeta* Southern, *Mem. Indian Mus.*, **5** : 615, pl.31, fig. 28A-N.

1987. *Potamilla leptochaeta*.–Sundar Raj & Sanjeeva, Raj, *J. Bombay nat. Hist. Soc.*, **84**(1) : 98.

Material : 3 ex., Bakkhali creek, Bakkhali, 4.10.1982; 5 ex., Namkhana, 6.10.1982; 4 ex., Canning, 18.11.1982; 5 ex., Jhingakhali, 14.9.1983.

Additional Material : 4 ex., ZEV5207/1, Canning, Dec., 1908, coll. N. Annandale, (types); 2 ex., W2976/1, Chingrighata, east of Calcutta, 12.1.1915, coll. N. Annandale & S.W. Kemp.

Diagnosis : Body with 7-8 thoracic and 27-30 abdominal setigers. Tentacular crown with 7-9 pairs of radioles, each with 10-14 branchial filaments. Thoracic notosetae of 2 types: narrow-winged capillary setae having long filiform tips, and bayonet-shaped spatulate setae. Thoracic neurosetae include an anterior row of companion setae, and a posterior row of avicular uncini. Uncini without prominent anterobasal swellings and posterior processes. Abdominal notosetae include avicular uncini and neurosetae all capillaries. Pygidium short, without eye-spots.

Remarks : The material agrees well with the type specimens with the exception of the following features: (i) thoracic setigers seven to eight in number *vs.* six setigers; (ii) Unicini without prominent anterobasal swellings and posterior processes *vs.* with prominent anterobasal swellings and posterior processes. The species may readily be recognised by the very slender tips of the capillary setae.

Habitat : Soft leathery tubes embedded in soft mud at MTL; salinity 6‰ to 10‰.

Type Locality : Canning, West Bengal.

Distribution : Indian Ocean with a single record from West Pacific. *India* : Hooghly estuary, Matla river (W.B.); Vishakhapatnam (A.P.); Adyar estuary, Pulicat Lake (T.N.); Arnala, Malvan, Bombay (Maharashtra); Miramar (Goa). *Elsewhere* : Sri Lanka; Malay.

Family SERPULIDAE Johnston, 1865

Subfamily SERPULINAE Johnston, 1865 (MacLeay, 1840)

Diagnosis : Thorax symmetrical with 7 thoracic setigers, collar segment may lack setae; operculum well developed, without pinnules on the stalk. Thoracic uncini with a single row of teeth.

Genus ***Ficopomatus*** Southern, 1921

Diagnosis : Tube white, gradually increasing in diameter towards anterior end, semicircular in cross section; keels 1-3, sometimes present. Operculum bulbous, fleshy, terminated by horny plate; peduncle smooth. Thoracic segment 7 of which 6 uncinigerous. Collar setae coarsely serrated and limbate; remaining thoracic setae limbate. Thoracic uncini saw-like, partly rasp-like, with 6-12 teeth visible in profile. Abdominal setae geniculate with denticulate edge. Abdominal uncini saw- or rasp-like, with 1-4 rows of teeth, 6-14 teeth visible in profile, including anterior gouged tooth.

Type Species : *Ficopomatus macrodon* Southern, 1921.

72. ***Ficopomatus macrodon*** Southern, 1921

1921. *Ficopomatus macrodon* Southern, *Mem. Indian Mus.*, **5** : 655, pl.30, fig.27A-M.

1978. *Ficopomatus macrodon*. –ten Hove & Weerdenburg, *Biol. Bull.* **154** : 103, fig. 1 a-e. 3b, 4 e-g, o-p, t-u, cc-dd, ww, 5e.

Material : 10 ex., Namkhana, 6.10.1982; 15 ex., Jhingakhali, 14.9.1983; 12 ex., Canning, 18.11.1982.

Additional Material : 5 ex., ZEV6774/7, Cochin backwater, Kerala, Sept., 1914, coll. F.H. Gravely, (types); 2 ex., W2978/1, Teleh-Sap, Sta. 32, coll. N. Annandale.

Diagnosis : Body with 7 thoracic and 45-58 abdominal setigers. Tube white, semicircular in cross section, with a single dorsal ridge. Operculum fleshy bulb, with conical horny cap–flats or convex apically. Branchial filaments borne on paired lobes, 13-16 in number, each with 18-20 pairs of pinnules. Collar setae of 2 types: large setae with transverse row of few basal teeth and series of very coarse teeth distally, and capillaries having finely ciliated cutting edge. Other thoracic notosetae capillaries with densely packed fine, long cilia on one side. Thoracic uncini arranged in 2 rows, each with a single row of 9-10 teeth. Abdominal notosetae uncinigerous, rasp-like, and neurosetae geniculate.

Remarks : The details of the special collar setae in *F. macrodon* Southern 1921, which was earlier considered as important taxonomic feature at the generic level, being highly variable and thereby reduces the diagnostic value of it (ten Hove & Weerdenburg, 1978). However, the species may readily be recognised by its non-spinous operculum with a single dorsal ridge. This species is a well known brackish-water form but is reported to be restricted mainly to Indian Ocean habitats.

Habitat : Calcareous tubes attached to hard substrates, viz., wood, concrete piles, bricks in zones towards LWM; salinity 6‰ to 14‰.

Type Locality : Cochin backwater, India.

Distribution Indian Ocean with a single record from west Pacific. *India* : Lower reaches of Hooghly estuary, Sundarbans (W.B.); Chilka Lake (Orissa); Ennur backwater, Madras coast (T.N.); Cochin backwater, Chepparam (Kerala). *Elsewhere* : Sri Lanka; Thailand.

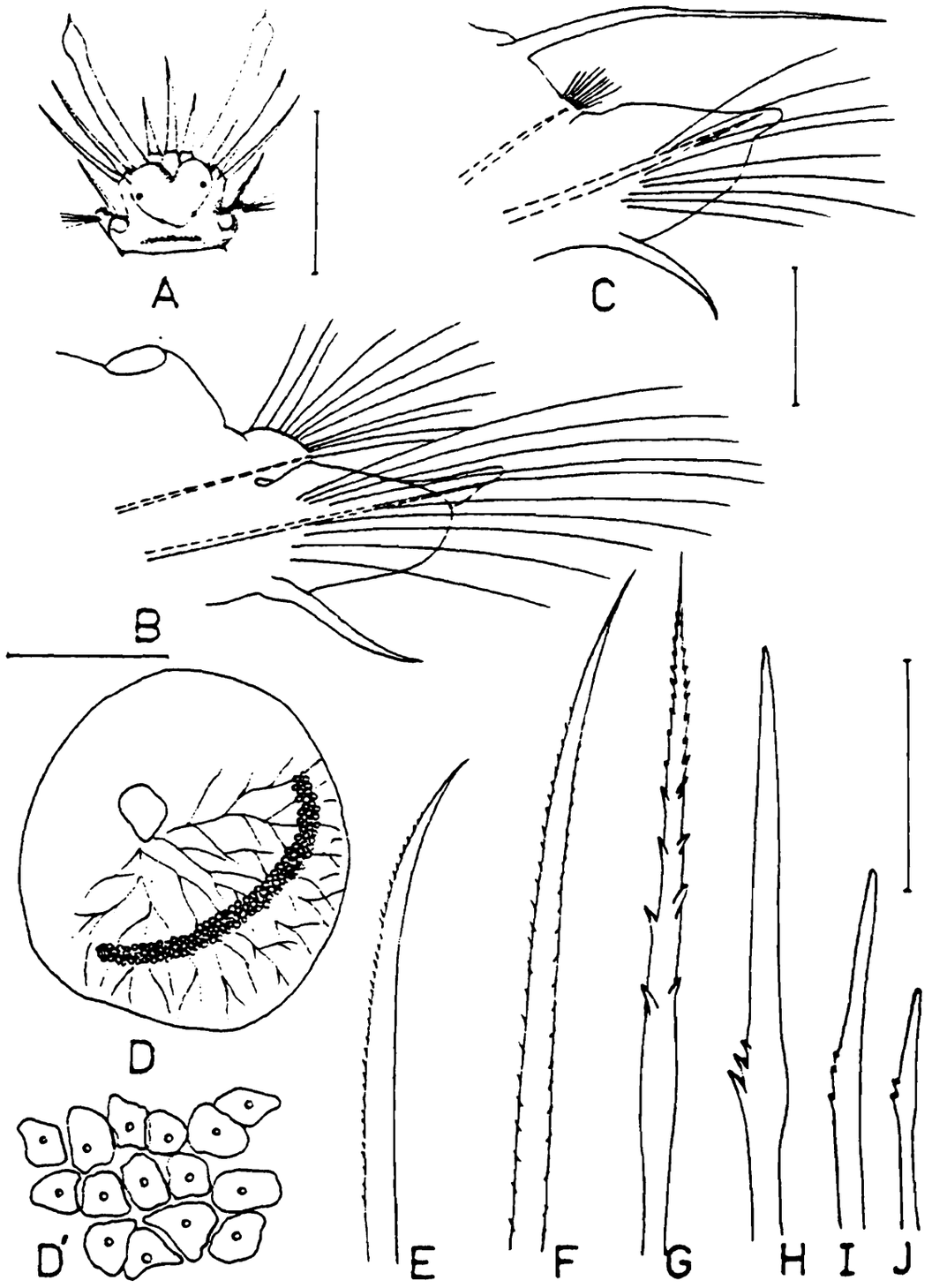

Figure 1. *Gattyana fauveli* (holotype) : A, anterior end, dorsal view; B, right elytrigerous parapodium from setiger 5, posterior view; C, right cirrigerous parapodium, anterior view; D', elytron, D', a portion of the pigmented area of the same elytron, enlarged; E, F, notosetae; G, dorsal neuroseta; H-G, ventral neurosetae. (Scales = 2 mm for A; 0.5 mm for B, C; 0.3 mm for D; 0.1 mm for D', E,J.)

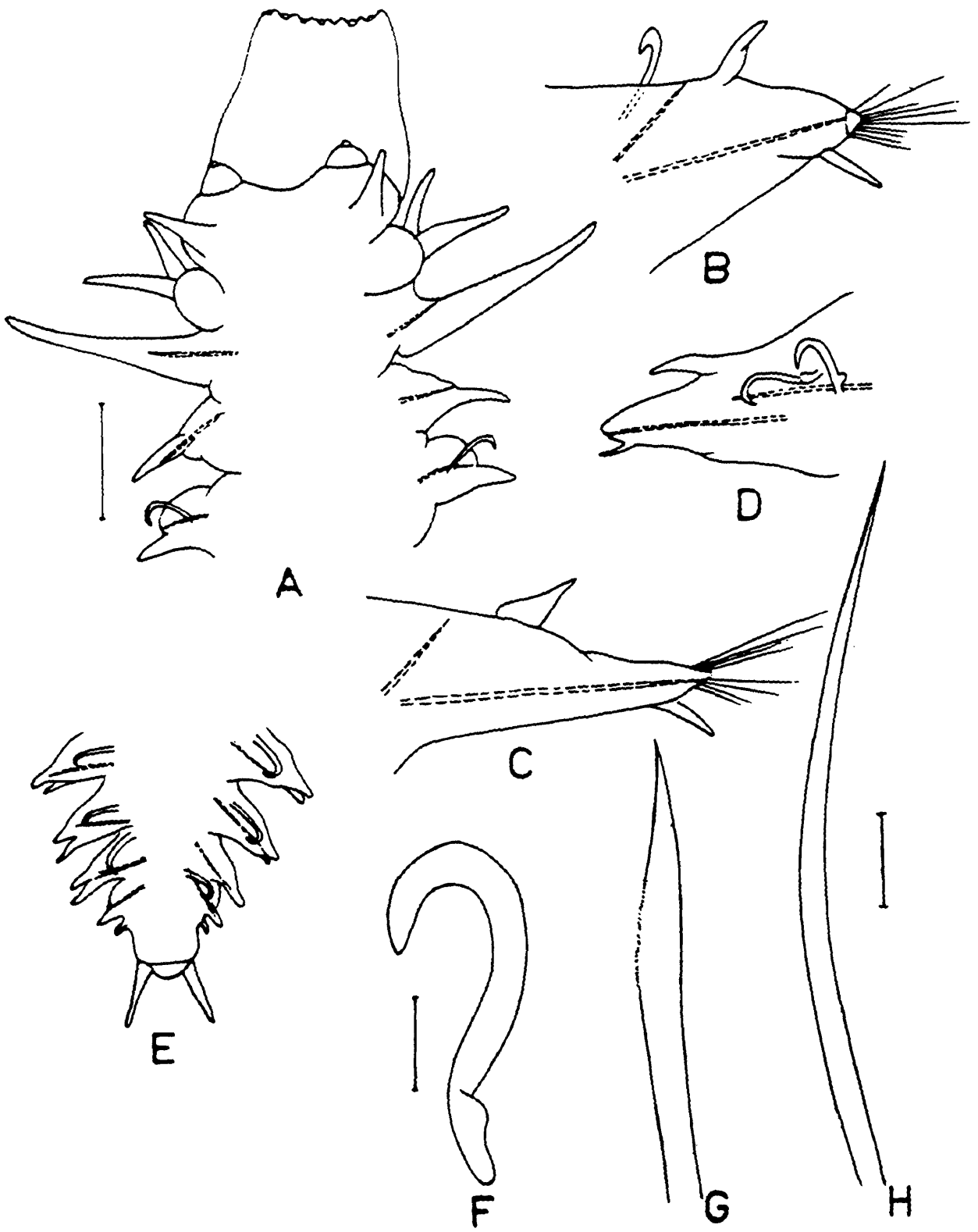

Figure 2. *Sigatargis commensalis* (holotype, A-D, F-H; paratype, E) : A, anterior end, dorsal view; B,C, left parapodia from setigers 5 and 50, anterior view; D, left parapodium from setiger 80, posterior view; E, posterior end, dorsal view; F, emergent hook; G,H, short and long setae. (Scales = 0.3 mm for A-E; 0.05 mm for F; 0.02 mm for G,H.)

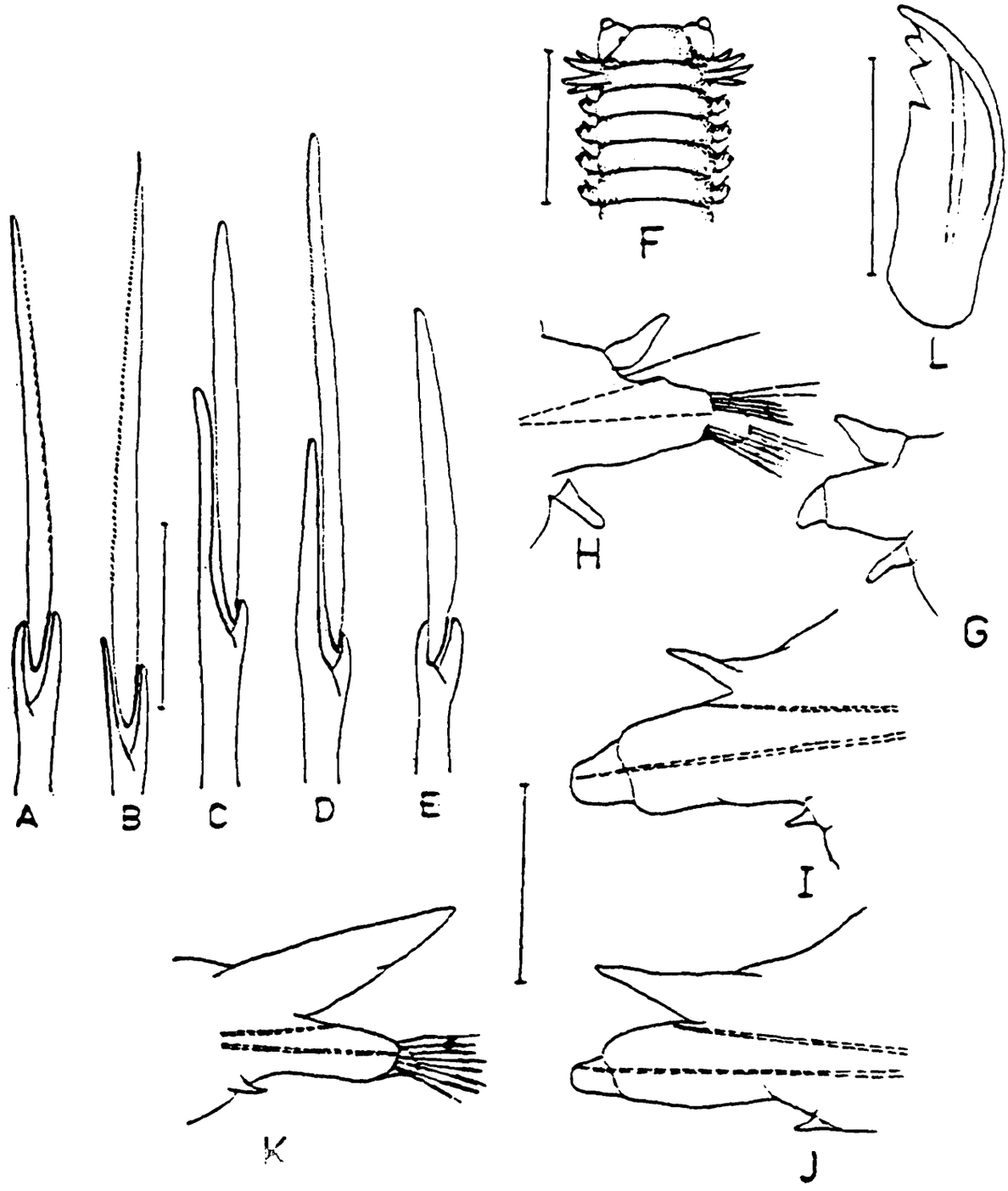

Figure 3. *Namalycastis fauveli* : A, Anterior notoseta; B, heterogomph spiniger; C,D, heterogomph falcigers; E, posterior notoseta; F, anterior end, dorsal view; G, I, J, left parapodia from setigers 1,25 and 100, posterior view; H,K, left parapodia from setigers 5 and 250, anterior view, L, Jaw. (Scales = 1 mm for F, 0.4 mm for L; 0.3 mm for G-K; 0.03 mm for A-E.)

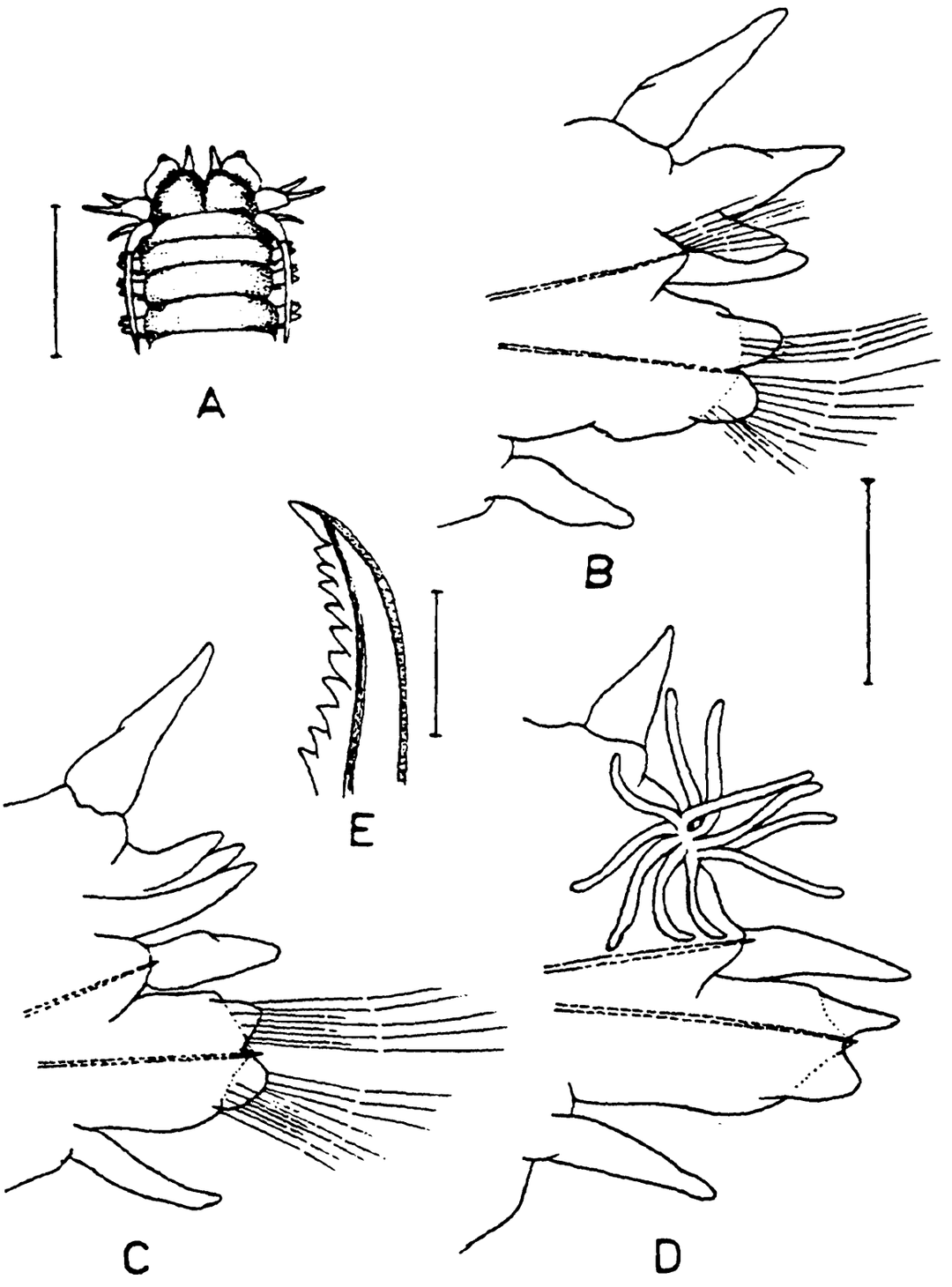

Figure 4. *Dendronereides gangetica* (holotype) : A, anterior end, dorsal view; B-D, left parapodia from setigers 5, 11 and 20 E, jaw. (Scales = 1mm for A; 0.5 mm for E; 0.3 mm for B-D.)

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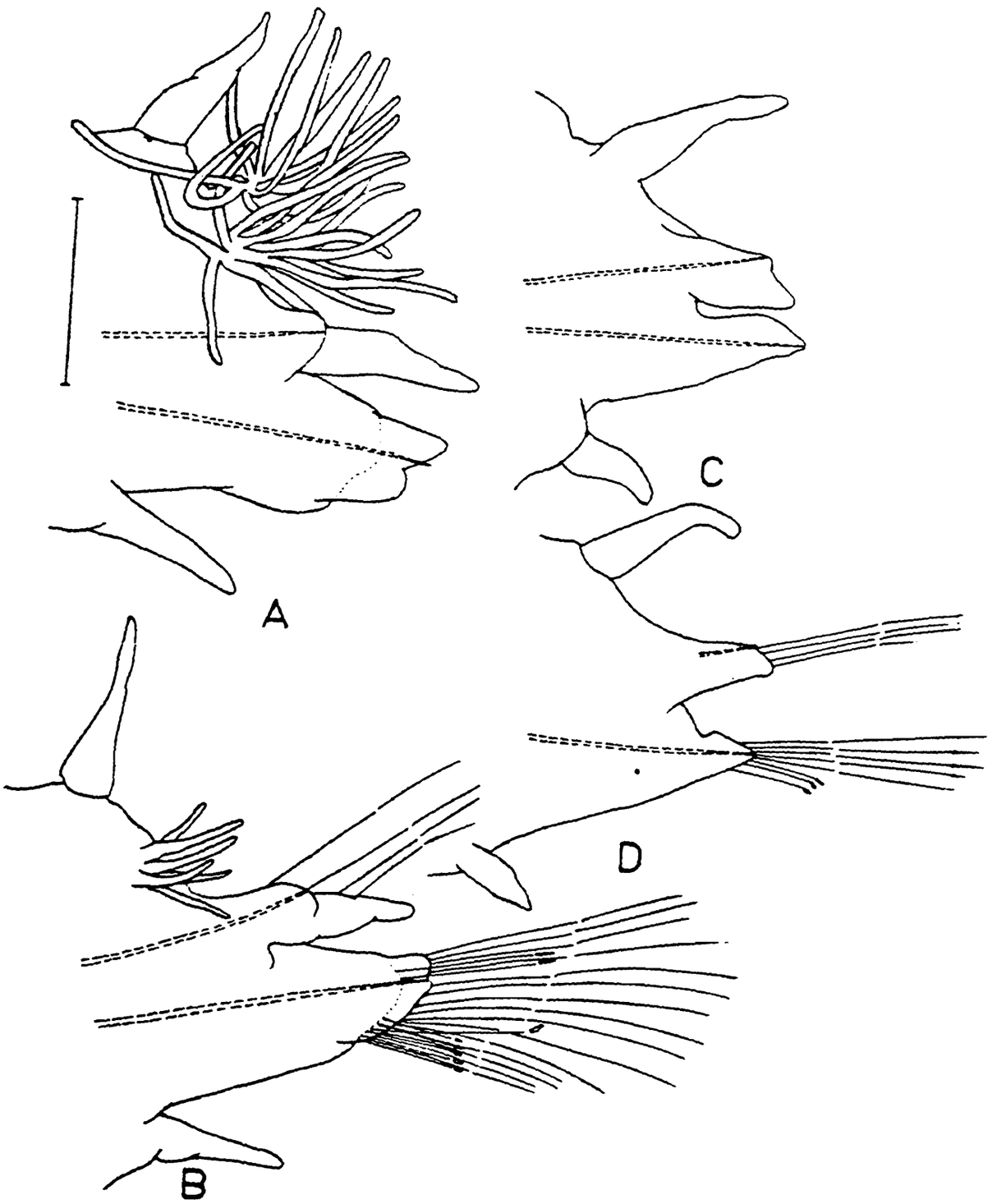

Figure 5. *Dendronereides gangetica* (holotype) : A-D, left parapodia from setigers 25, 35, 50 and 120, anterior view. (Scales = 0.3 mm for A-D.)

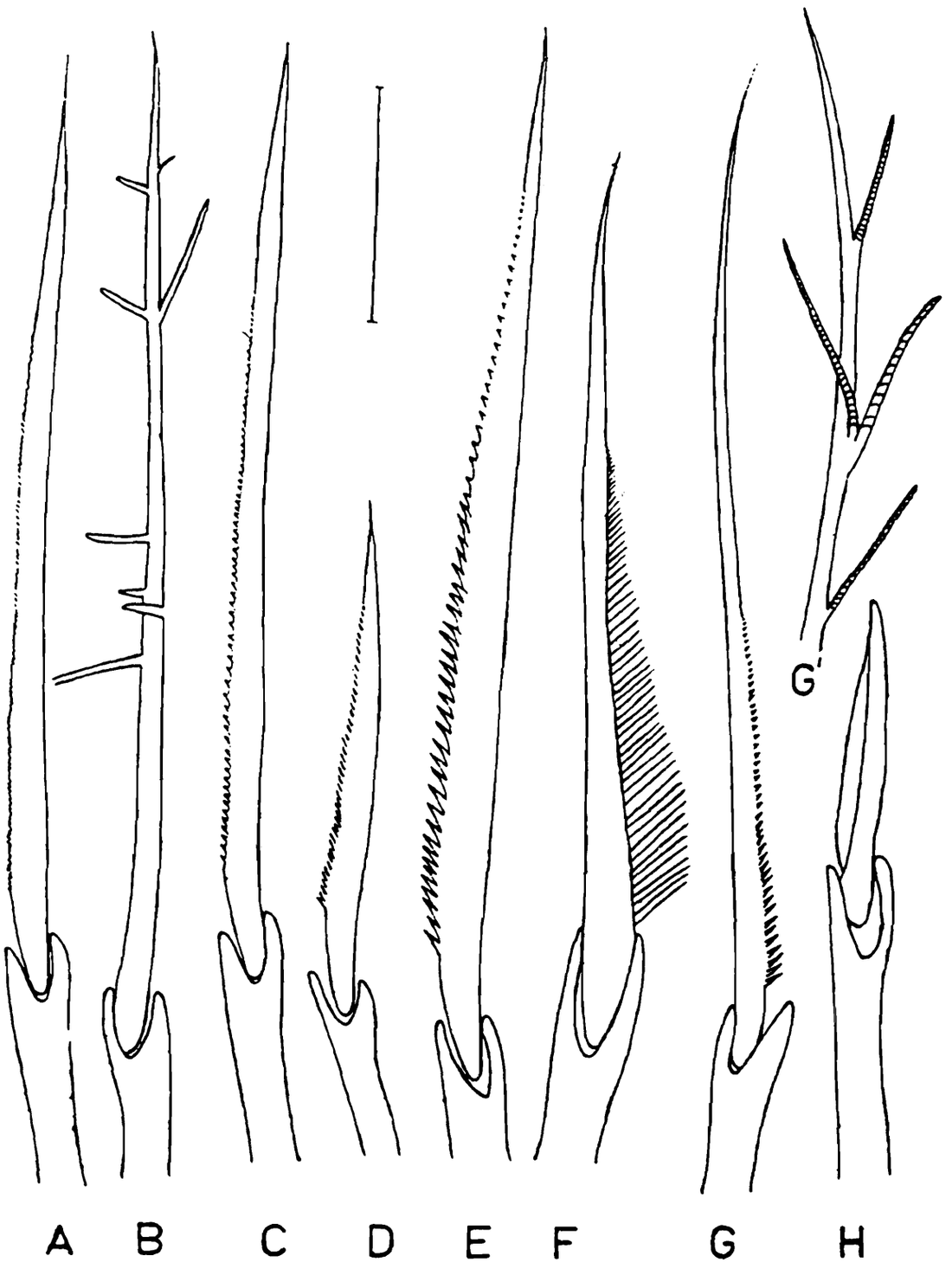

Figure 6. *Dendronereides gangetica* (holotype) : A,B, notosetae form setigers 25 and 50, possibly with algal outgrowths; C–H, neurosetae, C,D, long and short-bladed setae, E, coarsely serrated setae from setiger 35, F,G, supra- and infra-acicular setae from setiger 50, G' tip of infra-acicular neurosetae with occasional algal (?) outgrowths; H, homogomph falciger. (Scales = 0.03 mm for A-H.)

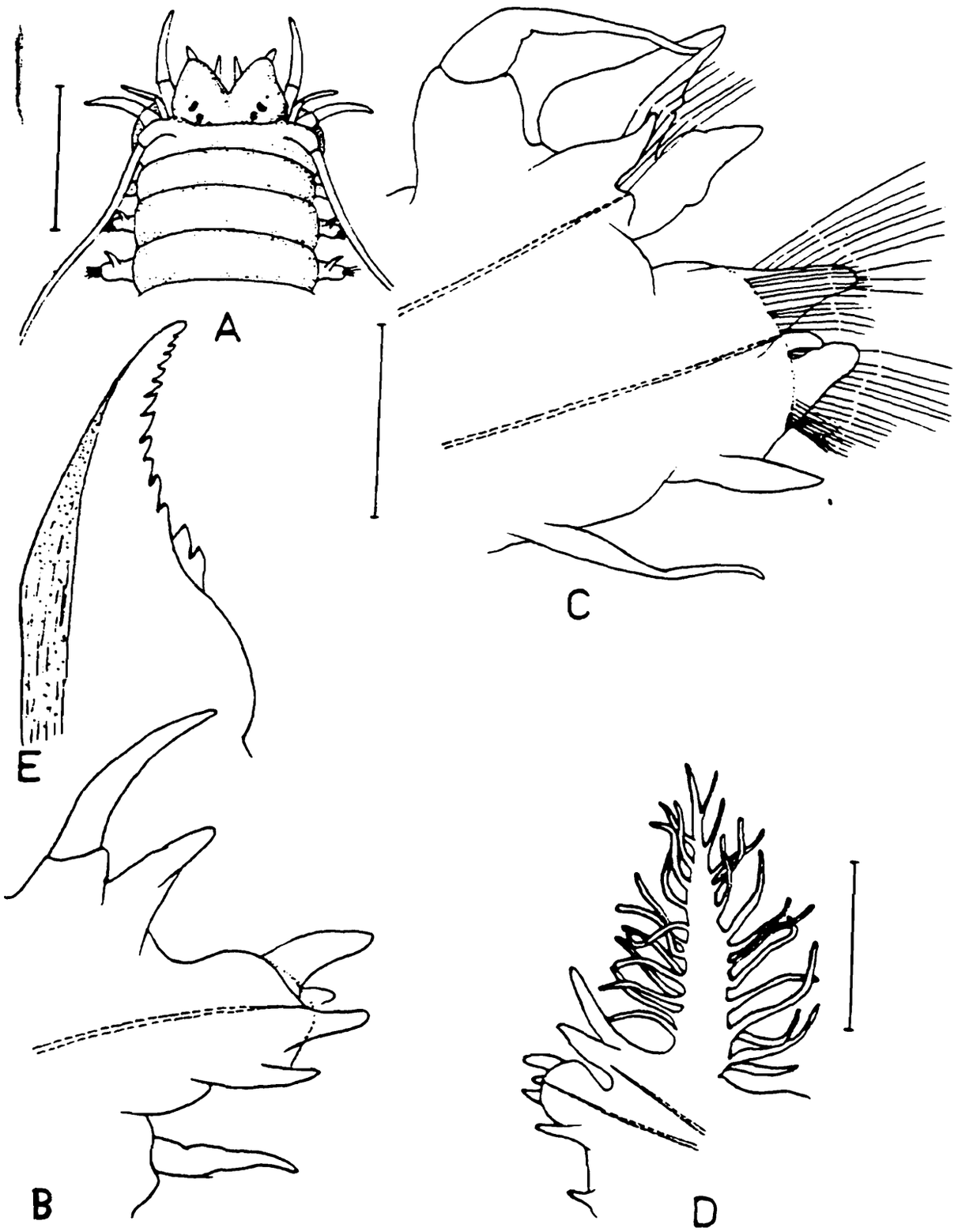

Figure 7. *Dendronereis dayi* (holotype) : A, anterior end, dorsal view; B,C, left parapodia from setigers and 2 and 5, anterior view; D, left parapodium from setiger 12, posterior view; E, jaw. (Scales = 1 mm for A; 0.5 mm for D; 0.3 mm for B,C,E.)

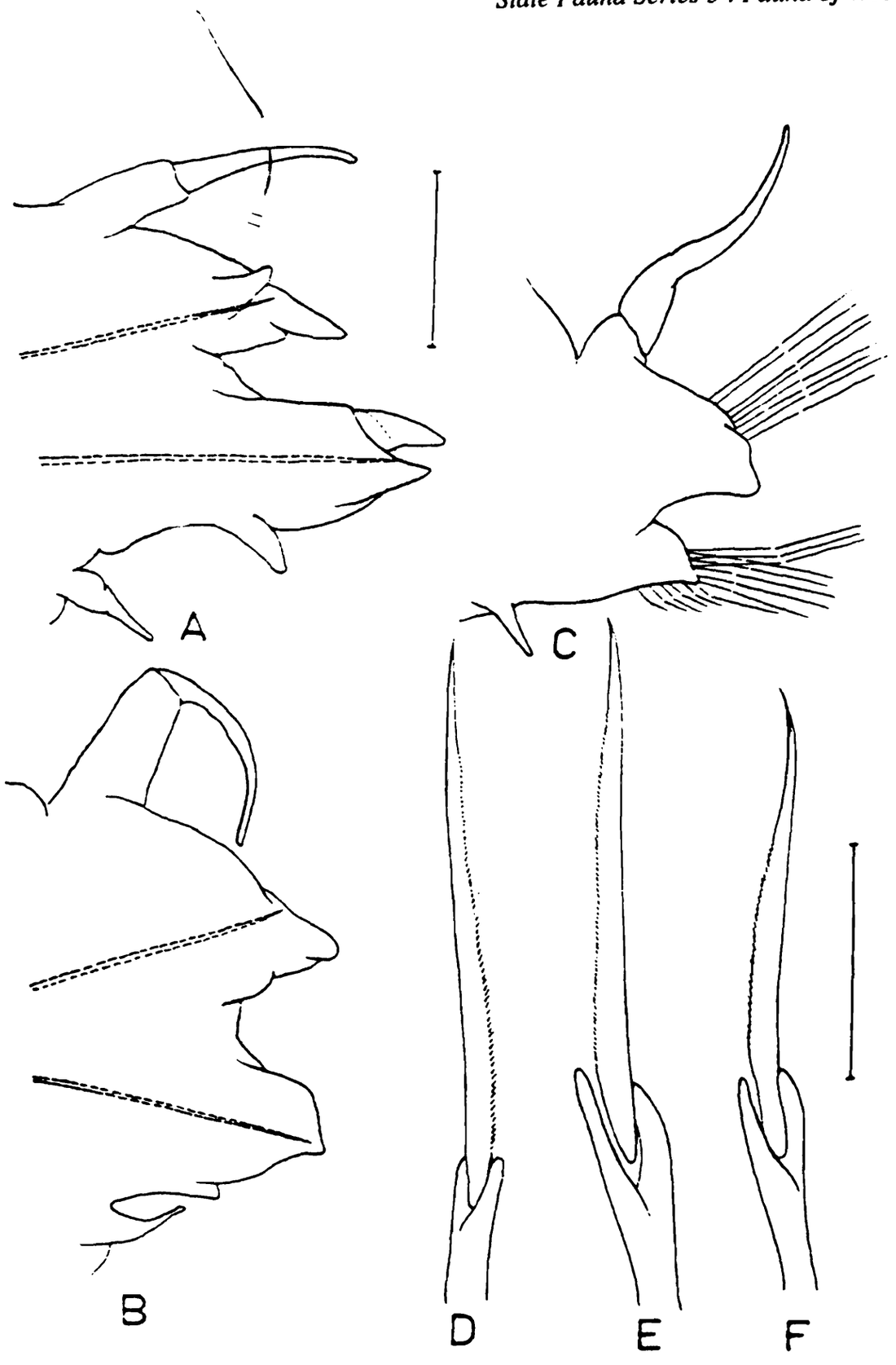

Figure 8. *Dendronereis dayi* (holotype) : A-C left parapodia from setigers 30, 65 and 85, anterior view; D, homogomph notoseta; E,F, hemigomph neurosetae. (Scales = 0.5 mm for A-C; 0.03 mm for D-F.)

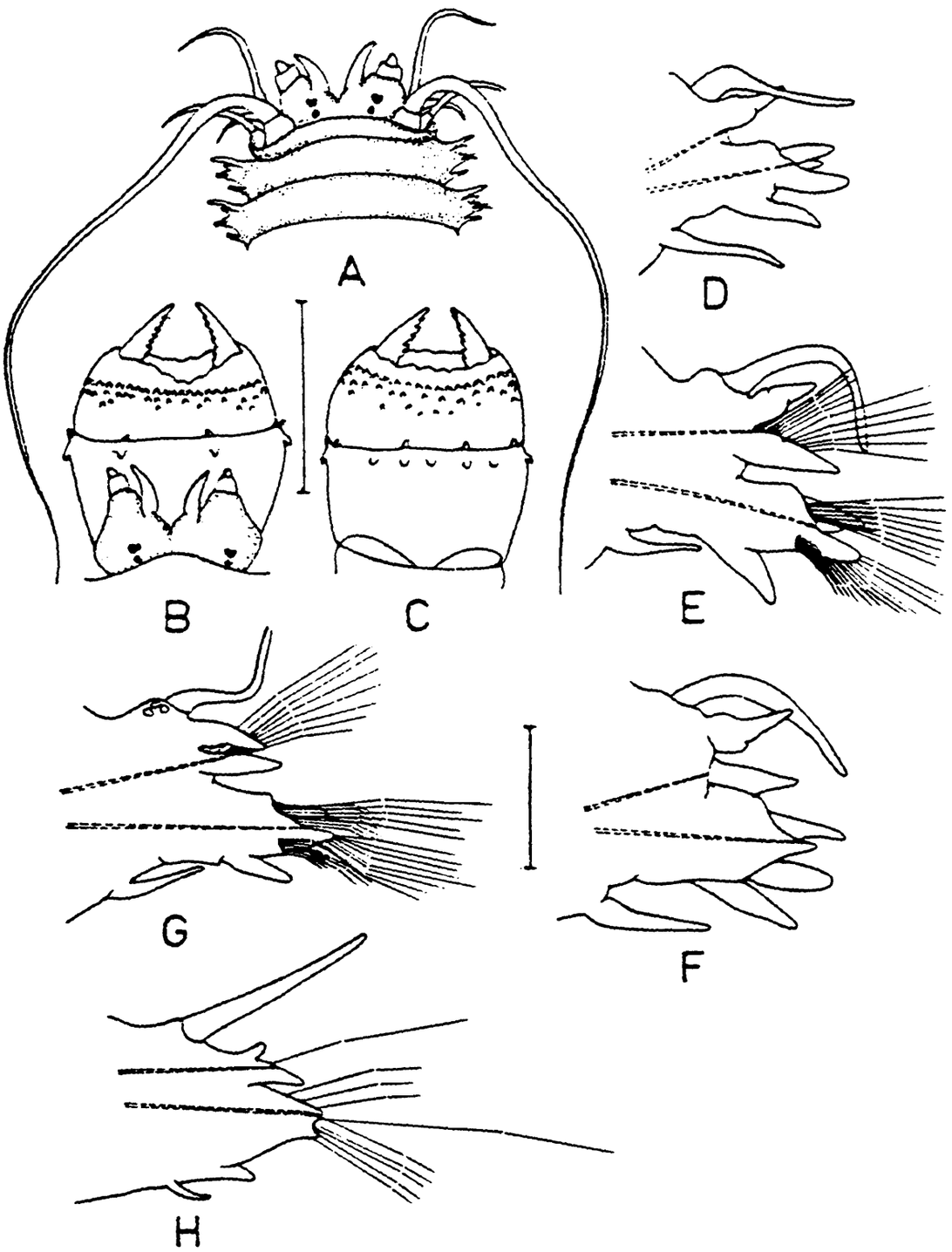

Figure 9. *Ganganereis sootai* (A, D-H, holotype; B,C, paratype) : A, anterior end, dorsal view; B, C, everted pharynx, dorsal and ventral view; D, E, G, H, left parapodia from setigers 2, 5, 25 and 120, anterior view; F, right parapodium from setiger 5, posterior view. (Scales = 2 mm for A-C; 0.5 mm for D-H.)

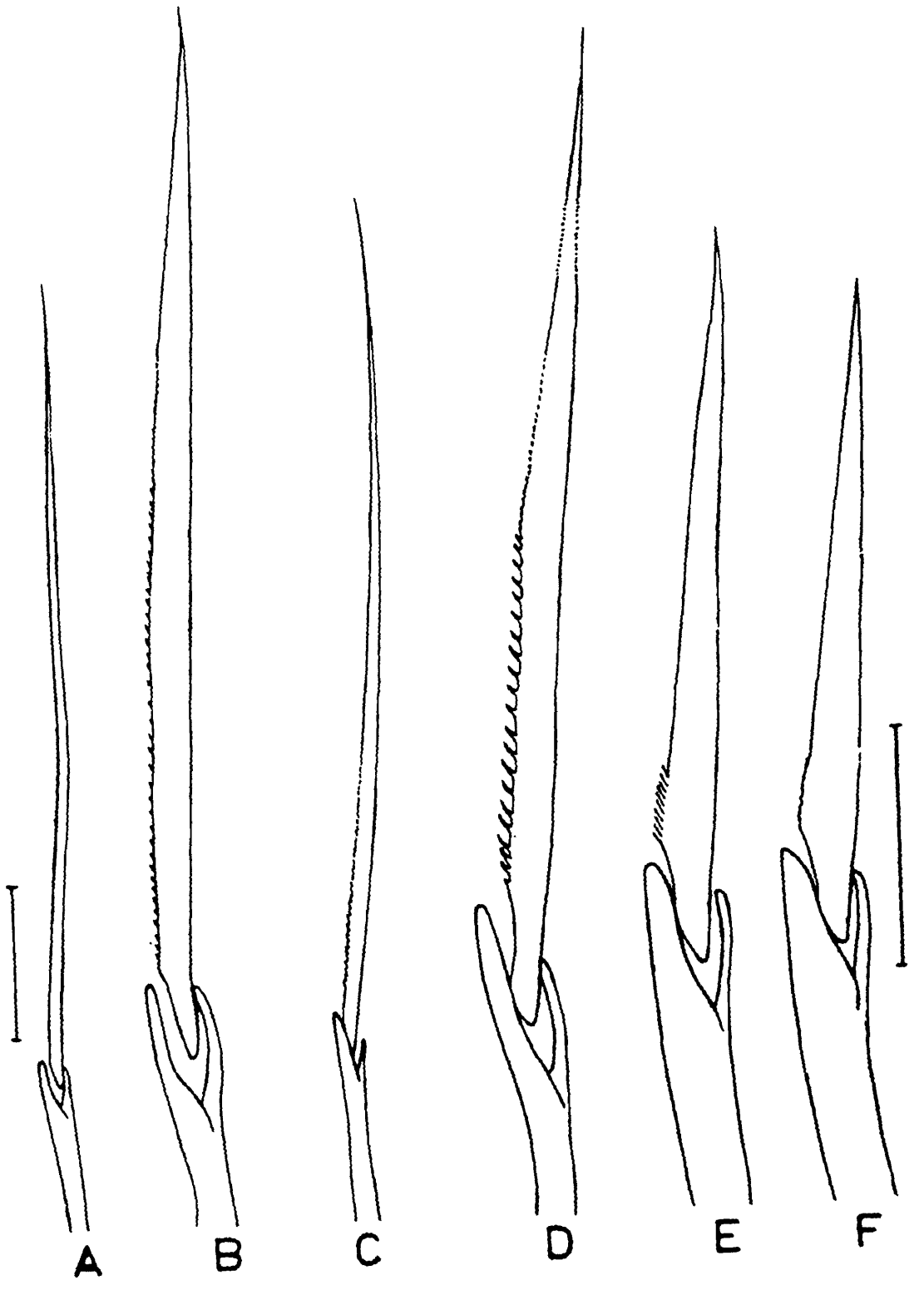

Figure 10. *Ganganereis sootai* (holotype) : A, B, Notosetae; C-F, neurosetae — C, D, finely - and coarsely- serrated setae, E, F, short supra- and infra-acicular setae. (Scales = 0.05 mm for A, C; 0.03 mm for B, D-F.)

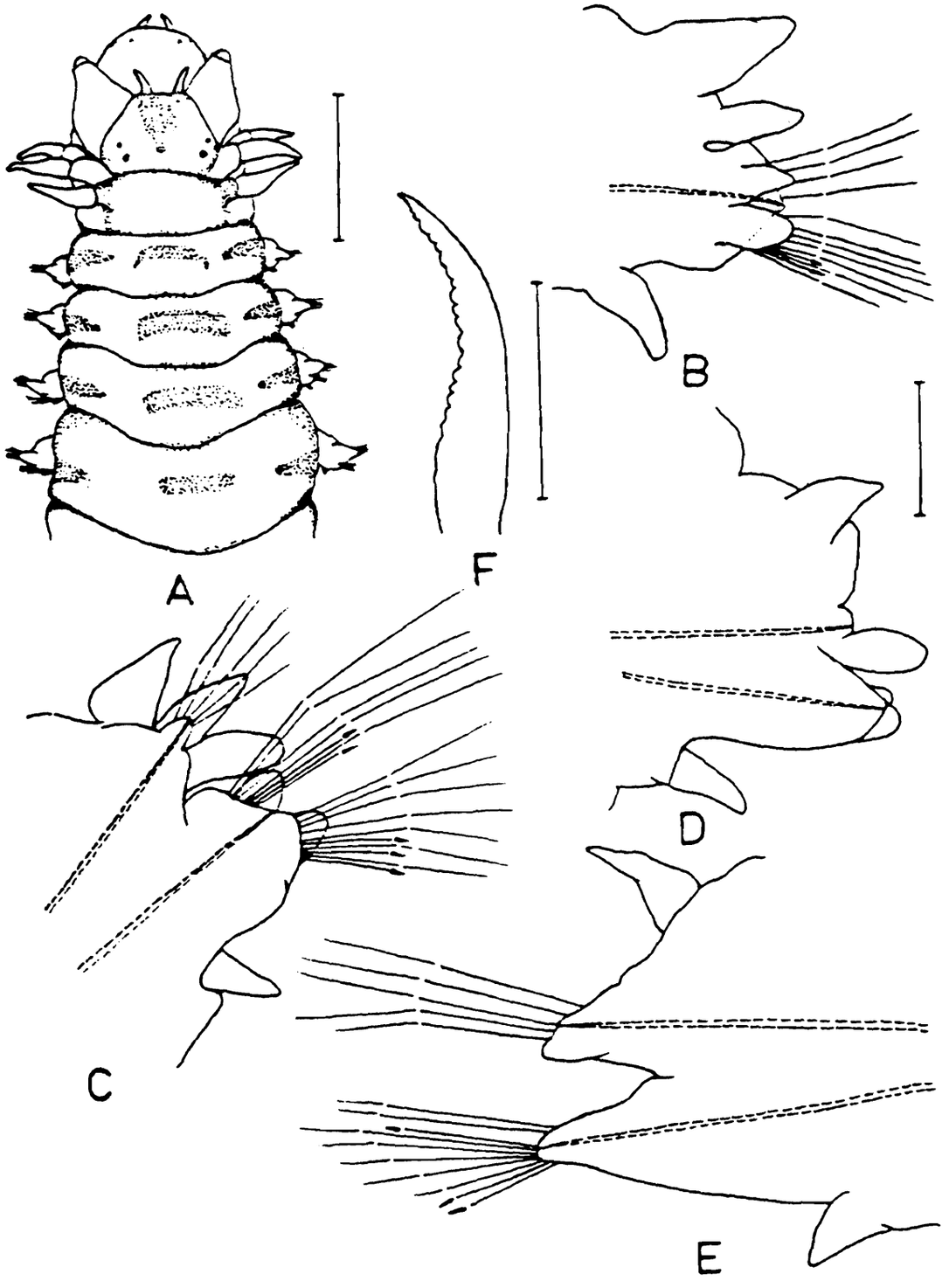

Figure 11. *Lycastonereis indica* : A, anterior end, dorsal view; b, right parapodium from setiger 2, posterior view; C-D, left parapodia from setiger 5 and 25, anterior view; E, left parapodium from setiger 100, posterior view; f, jaw. (Scales = 0.5 mm for A; 0.3 mm for B-E.)

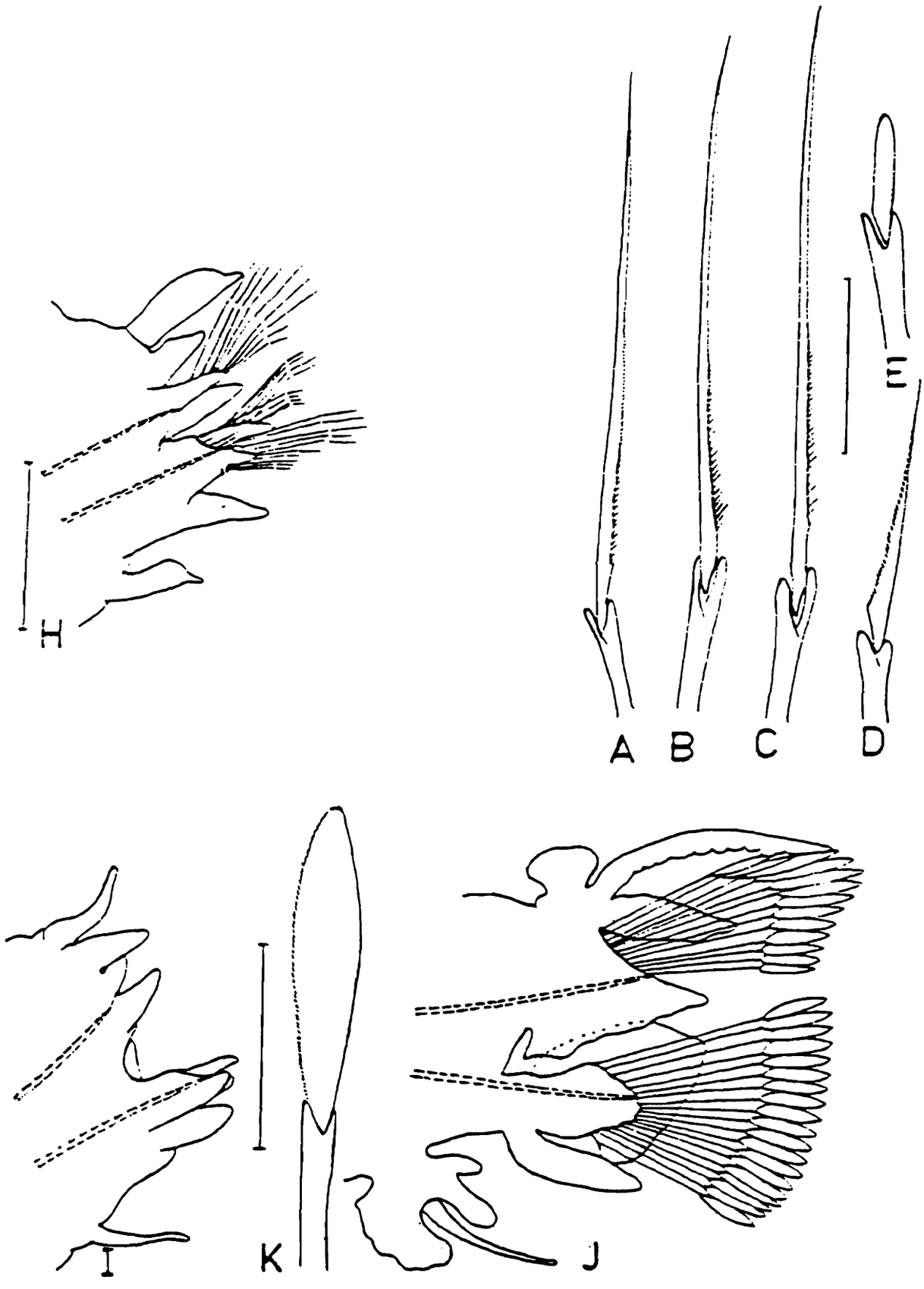

Figure 12. *Lycastonereis indica* : A, notoseta; B-D, neuropodia spinigers; E, neuropodial falcigers; *Neanthes chingrighattensis* : H-J, left parapodia of epitokous individual from setigers 5, 16 and 25, anterior view; K, oar seta; (Scales = 0.4 mm for H-J; 0.3 mm for A, B; 0.1 mm for K; 0.05 mm for C-E; 0.03 mm for F, G.)

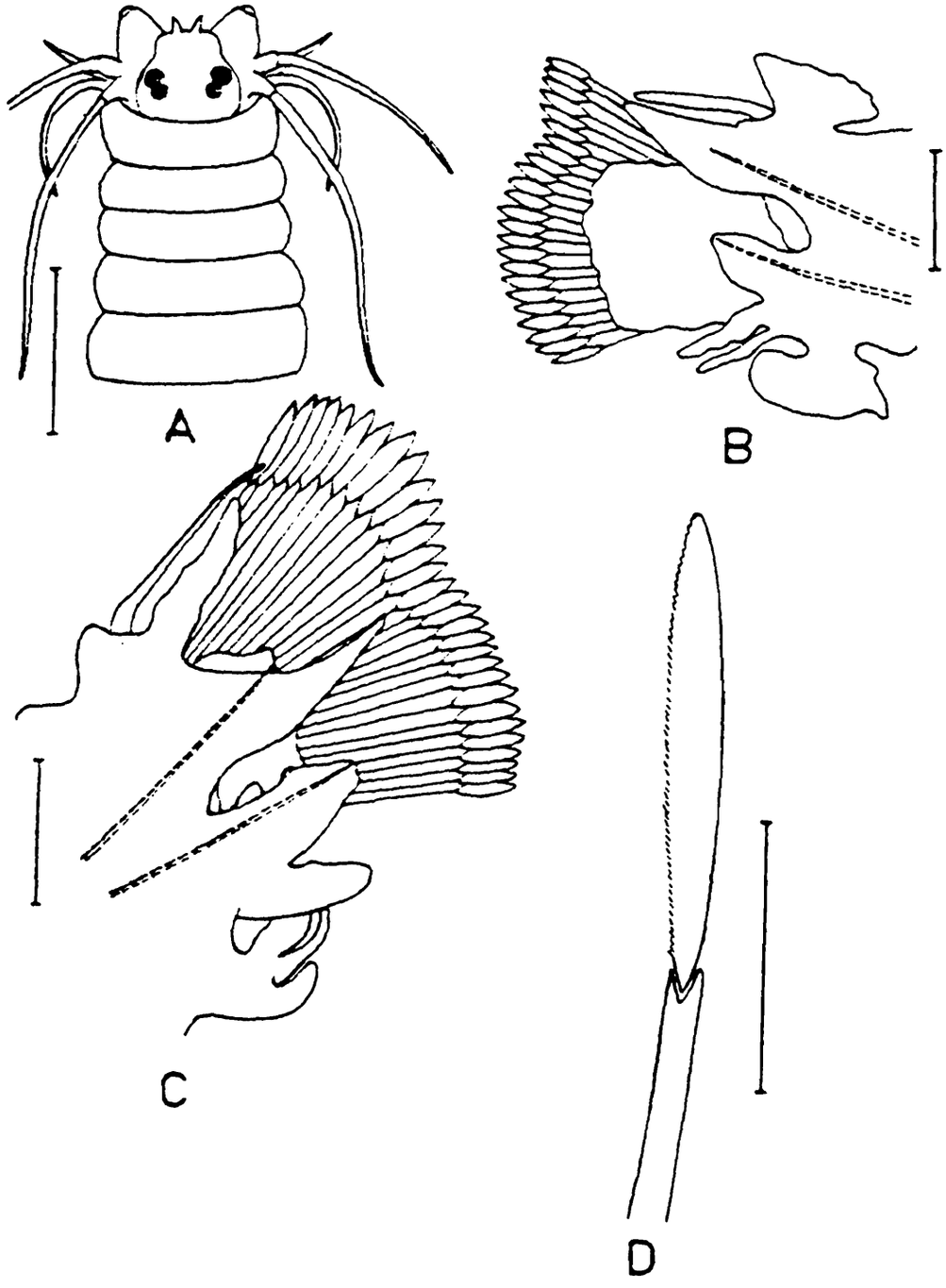

Figure 13. *Neanthes meggitti* (epitoke) : A, anterior end, dorsal view, parapodia omitted; B, natatory parapodium of male; C, same of female; d, oar seta. (Scales = 1 mm for A; 0.5 mm for B; 0.3 mm for C; 0.03 mm for D.)

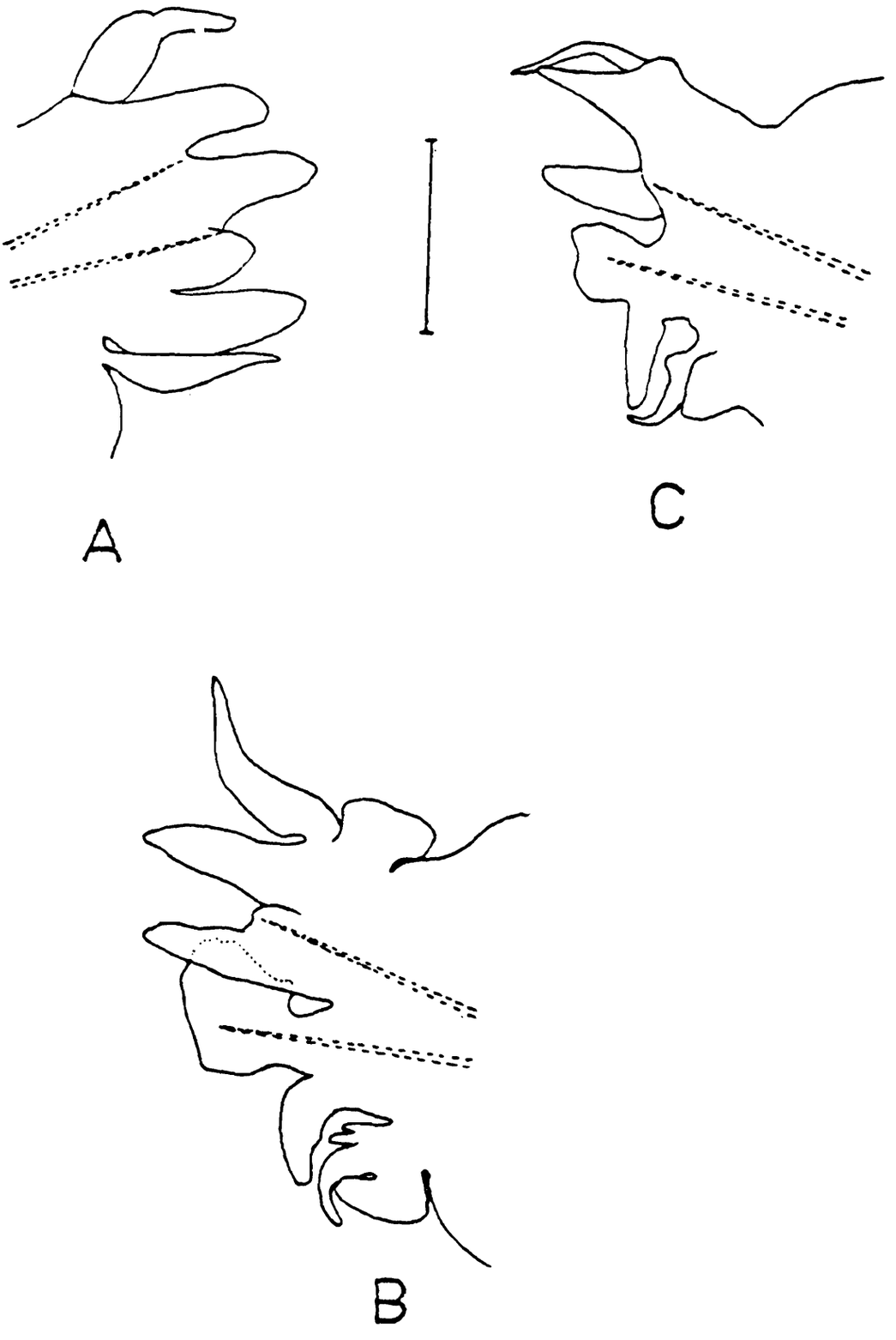

Figure 14. *Perinereis cultrifera* (epitoke) : A, left parapodium from setiger 5, anterior view; B, C, left parapodia from setigers 50 and 80, posterior view.

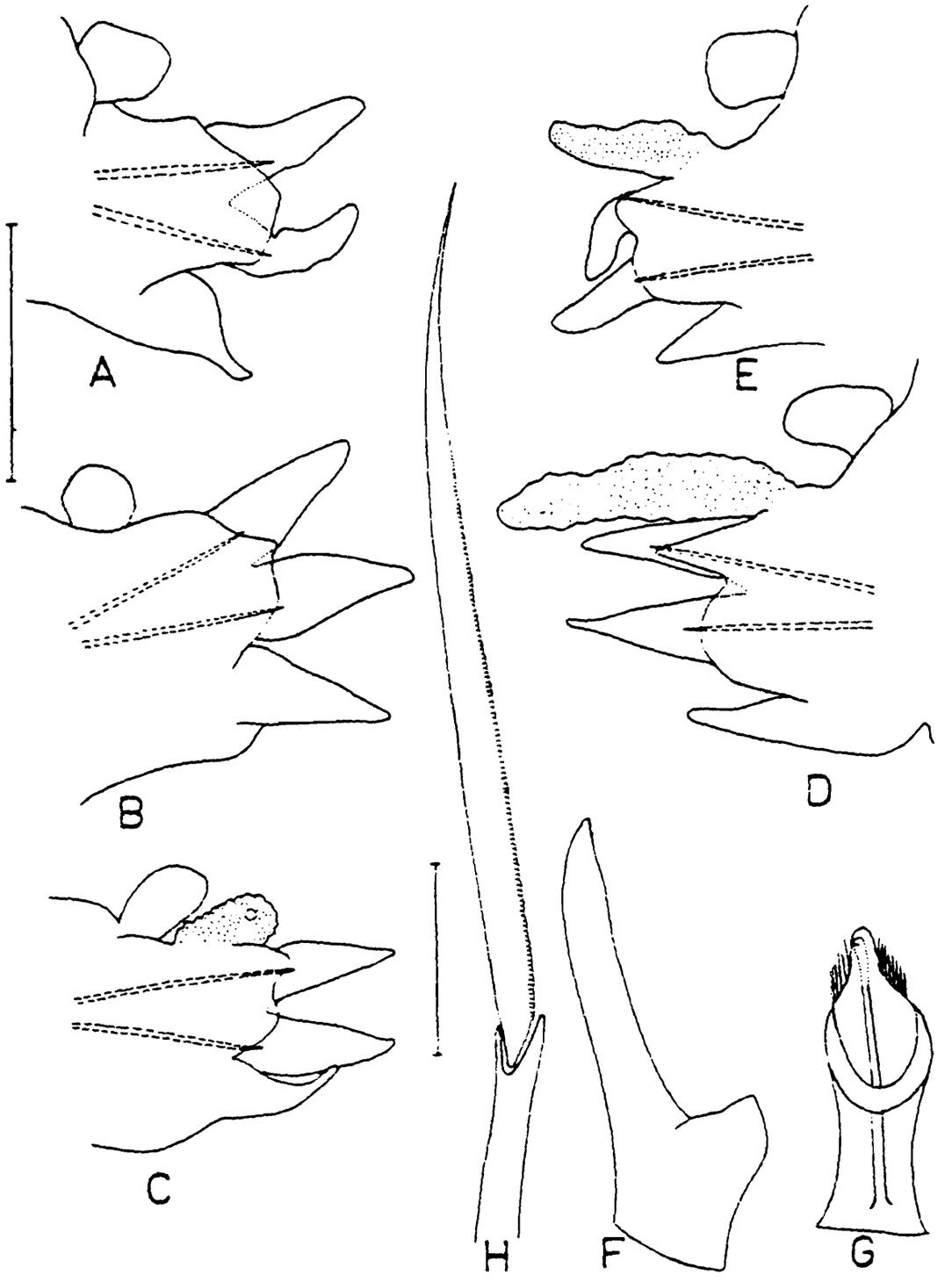

Figure 15. *Glycera convoluta* : A-C, right parapodia from setigers 10, 30 and 50, posterior view; D, E, left parapodia from setigers 60 and 80, posterior view; F, jaw support; G, pharyngeal papilla; H, neuroseta. (Scales = 0.2 mm for A-F; 0.03 mm for G, H.)

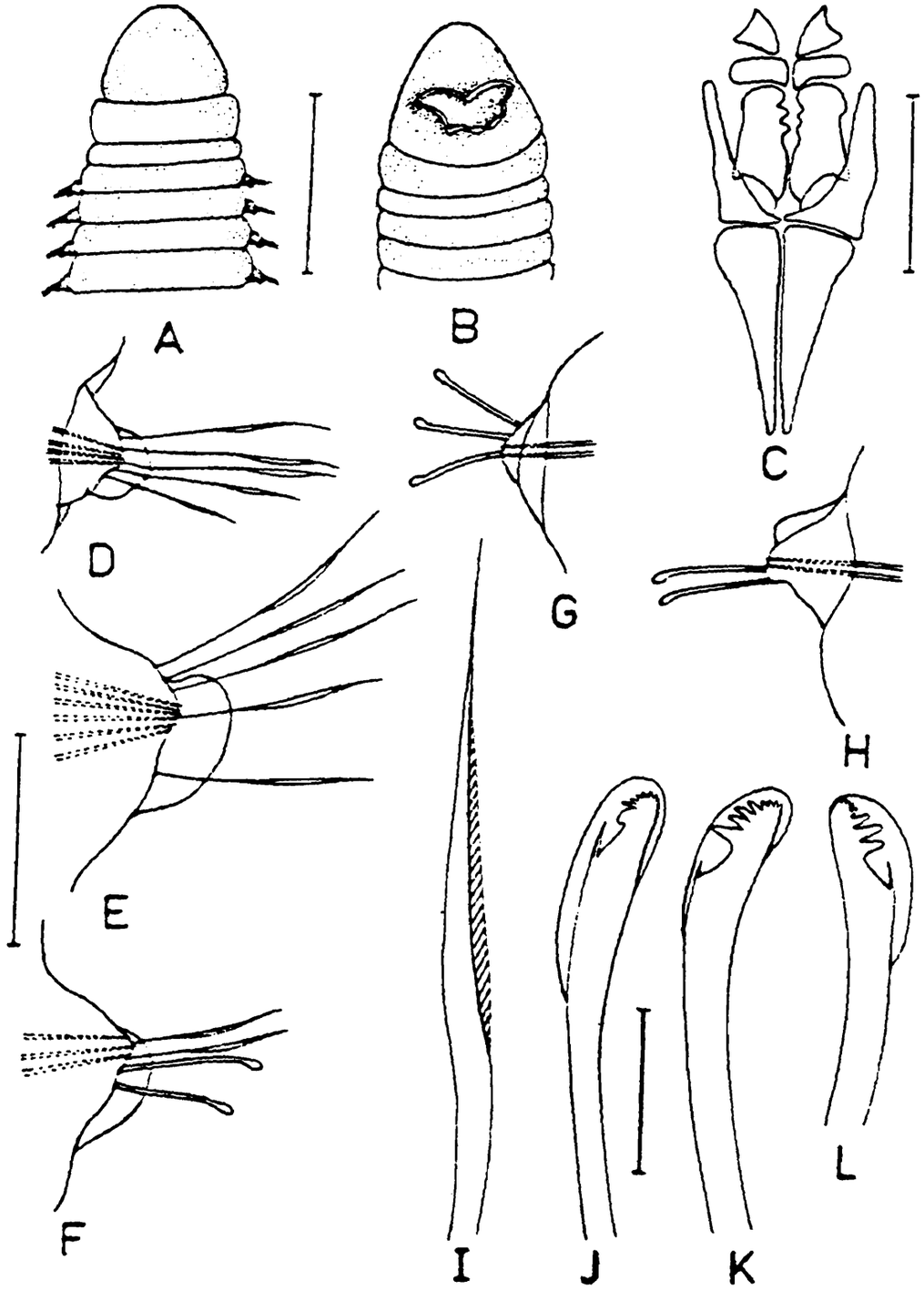

Figure 16. *Lumbrineris bilabiata* (holotype) : A, B, anterior end, dorsal and ventral view; C, maxillae; D-F, left parapodia from setigers 2, 10 and 25, anterior view; G, right parapodium from setiger 50, anterior view; H, left parapodium from setiger 150, posterior view; I, capillary seta; J-L, hooded hooks from setigers 25, 50 and 150. (Scales = 1 mm for A, B; 0.4 mm for C; 0.3 mm for D-H; 0.05 mm for I-L.)

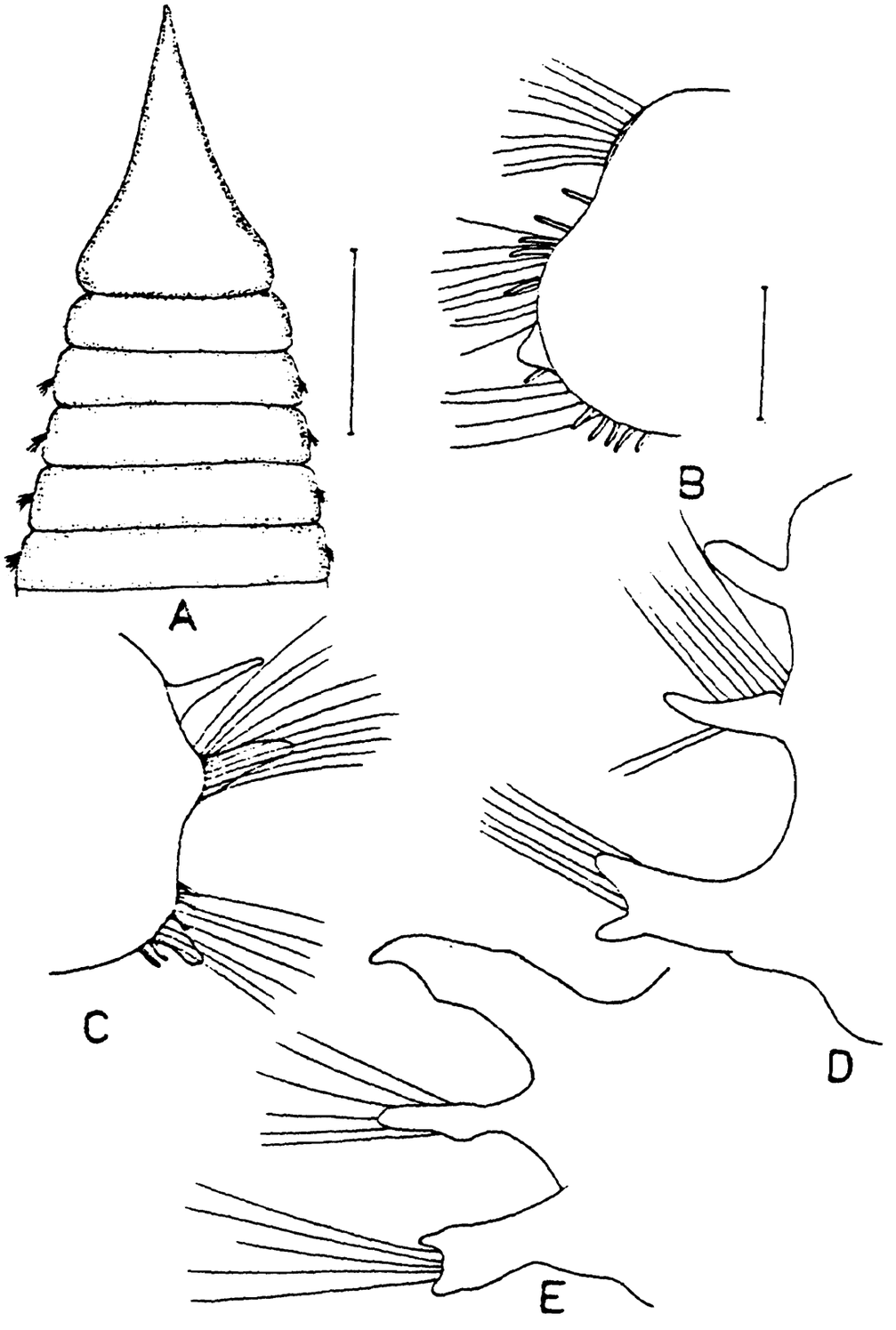

Figure 17. *Scoloplos (Scoloplos) sagarensis* (holotype) : A, anterior end, dorsal view; B, D, E, left parapodia from setigers 10, 21 and 50, posterior view; C, left parapodium from setiger 18, anterior view. (Scales = 0.4 mm for A; 0.1 mm for B-E.)

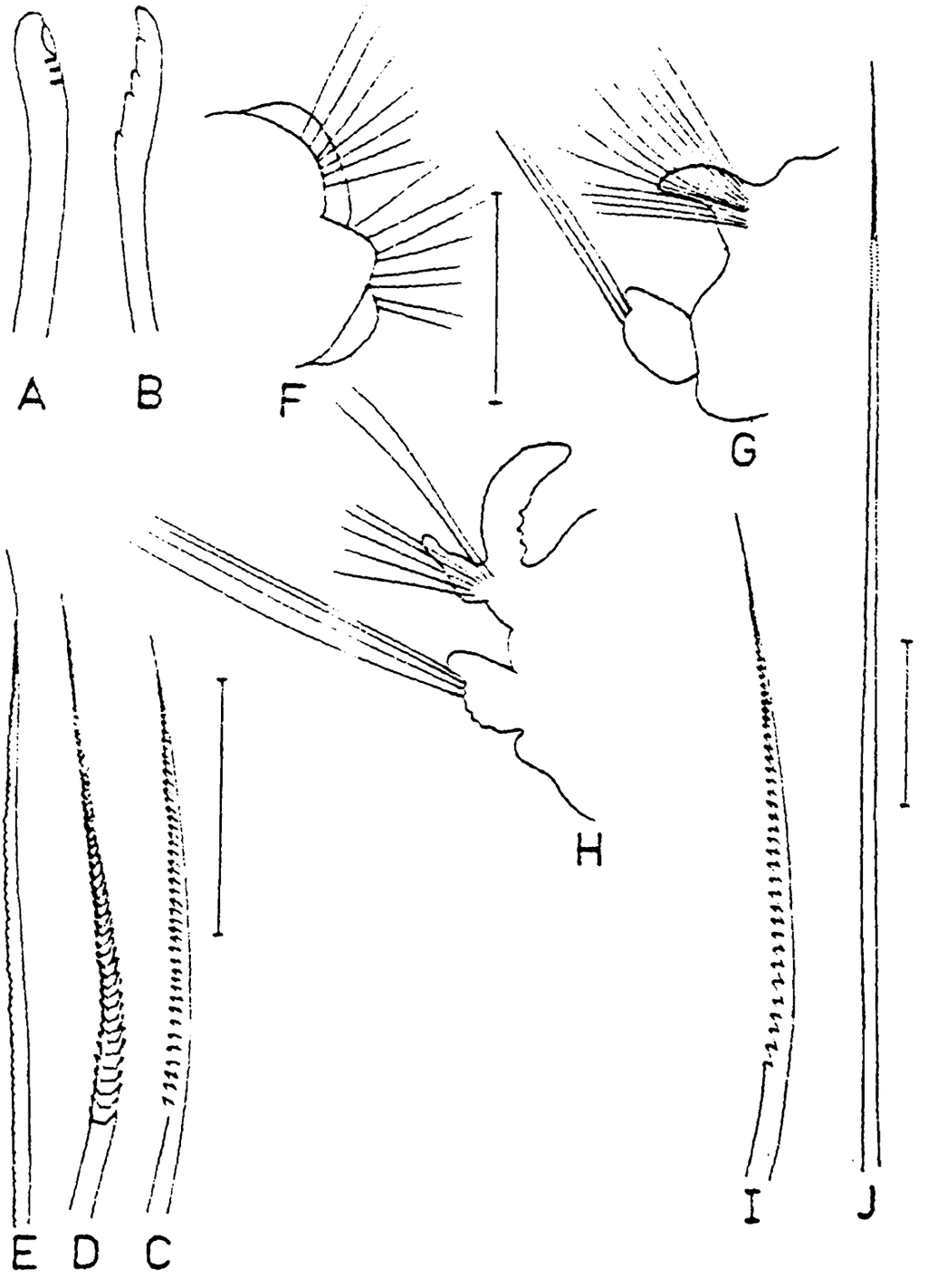

Figure 18. *Scoloplos (Scoloplos) sagarensis* (holotype) : A, B, thoracic hooks from setigers 10 and 18; C,D, capillary setae, side and front view; E, flail seta. — *Leitoscoloplos* sp. : F, left parapodium from setiger 10, anterior view; G, H, right parapodia from setigers 20 and 50, anterior view; I, short capillary seta. (Scales = 0.3 mm for F-H; 0.05 mm for J; 0.03 mm for A-E, I.)

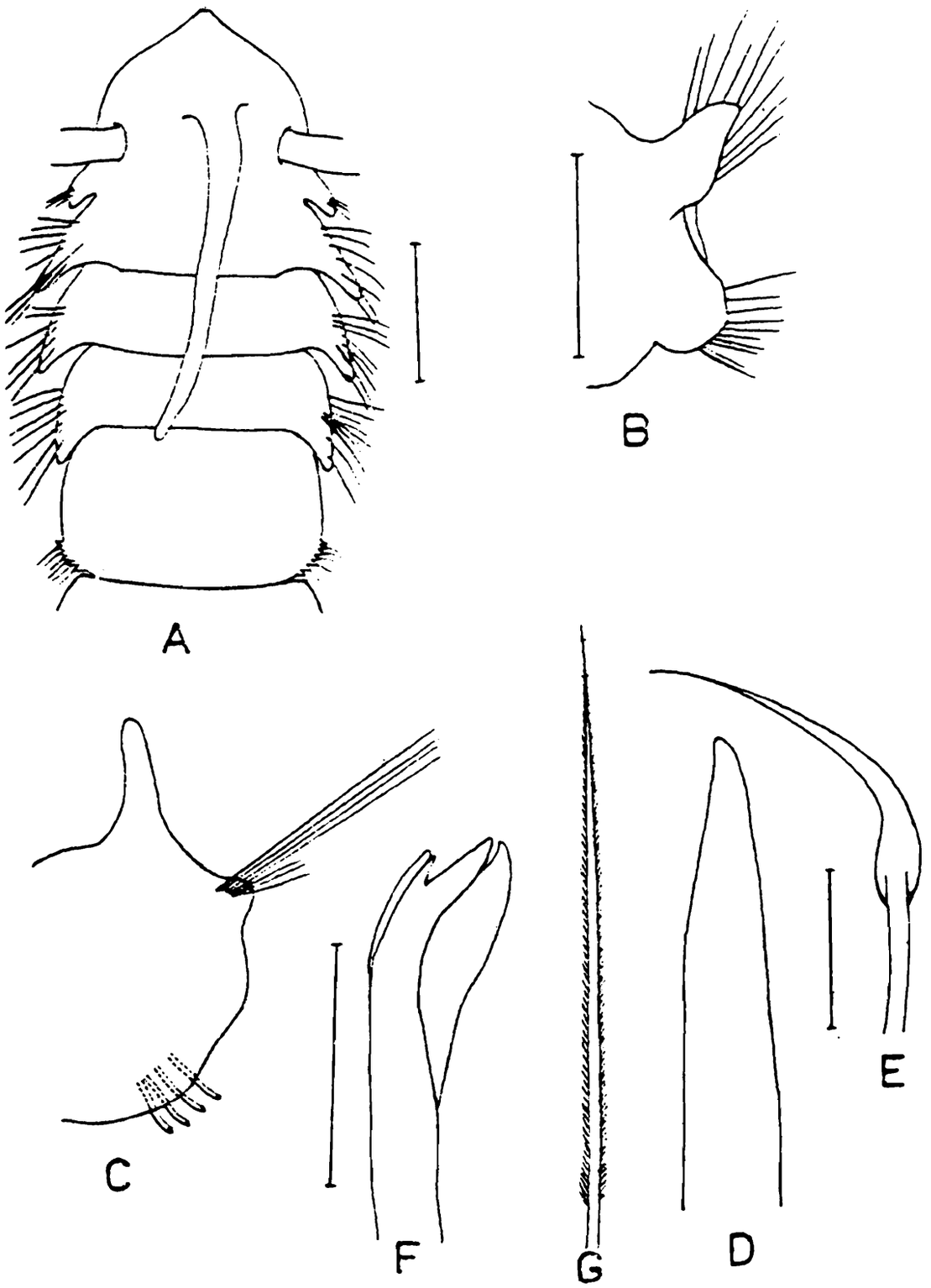

Figure 19. *Polydora* sp. : A, anterior end, dorsal view; B, C, right parapodia from setigers 6 and 20, posterior view; D, E, hook and companion seta from setiger 5; F, hooded hook, G, spinulose capillary seta. (Scales = 0.5 mm for A; 0.3 mm for B, C; 0.05 mm for D, E, G; 0.03 mm for F.)

SUMMARY

A comprehensive taxonomic study of the polychaete fauna of the estuarine and marine environs of the state of West Bengal, India, has been made on the basis of more than 2000 specimens. Seventy-two species of polychaetes including 5 undertermined species, spread over 50 genera and 27 families, have been presented here.

One family, Telehsapiidae, two genera, viz., *Sigatargis*, and *Ganganereis*, and seven species, viz., *Gattyana fauveli*, *Sigatargis commensalis*, *Dendronereides gangetica*, *Dendronereis dayi*, *Ganganereis sootai*, *Lumbrineris bilabiata*, *Scoloplos* (*Scoloplos*) *sagarensis*, are described as new to science.

Four species, viz., *Dendronereis arborifera* [*non* Peters], *Neanthes cricognatha* [*non* Ehlers], *Diopatra neapolitana* (part) [*non* delle Chiaje] and *Glycera alba* Rathke, recorded earlier from India are synonymized with *Dendronereis dayi* n.sp., *Neanthes meggitti* (Monro) *Diopatra cuprea* (Bosc) and *Glycera convoluta* Keferstein respectively. Two species, namely *Namalycastis fauveli* Rao and *Lycastonereis indica* Rao have been redescribed. Two species, *Namalycastis meraukensis* (Horst) and *Polydora normalis* Day are added to the Polychaete fauna of India.

The present study also registers the new locality records of nine genera, viz., *Gattyana*, *Sigambra*, *Lycastonereis*, *Glycinde*, *Leitoscoloplos*, *Scoloplos*, *Polydora*, *Parheteromastus* and *Owenia*, and eight species, viz., *S. constricta*, *N. fauveli*, *N. meraukensis*, *L. indica*, *G. oligodon*, *P. normalis*, *P. tenuis*, and *O. fusiformis* from the state of West Bengal.

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Zool. Surv. India
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ANNELIDA : HIRUDINEA

G.C. GHOSH
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INTRODUCTION

More than 300 species of leeches are reported from the world of which about 54 species have so far been recorded in Indian region. In West Bengal, however 18 species are now known to occur in varied ecological conditions from plains to the mountains, low to heavy rainfall areas and from river bed to ponds. Some species live permanently in water while others in damp bushes under rotten leaves, bricks and stones.

Leeches never destroy agriculture crops, fruits and vegetations and only subsist on blood of various animals. Sometimes they take small insect larvae.

Harding and Moore (1927) provided a comprehensive account of the Indian leeches. The other workers like Baugh (1960, 1934) and Sanjeeva Raj & Gladstone (1981) contributed their mights to the taxonomy of this group.

The present study is based on the material collected mainly by the autidor from different districts of West Bengal during 1983-1987. The material is represented by 13 species and 3 subspecies belonging to 9 genera under 3 families. Of these, one species forms a new locality record.

In addition to these 13 species and 3 subspecies 5 more species and 1 subspecies are available in literature from West Bengal which are not represented in the present material. These are *Ozobranchus shipleyi* Hording, *Placobdella fulva* Harding, *Placobdella horai* Baugh, *Dinobdella ferox* (Blanchard), *Haemadipsa ornata* Moore and *Haemadipsa zeylanica agilis* Moore.

The diagnostic characters and the keys for identification have been provided on the basis of the material studied and also from the literature. Economic importance, hosts and habitats and distribution of all the species have been mentioned. A general account of morphology and terminology as well as the method of narcotization and preservation have also been included.

MORPHOLOGY AND TERMINOLOGY

The body of the leech is dorsoventrally flattened and frequent tapering at the anterior. The body, exclusive of the posterior sucker, is divided by transverse furrows into annuli. A typical midbody segment is made up of five annuli. The total number of segments is always fixed at 34. The segments at both the extremities have been modified to form suckers. The anterior sucker is a depression on the ventral side and the mouth lies in it. The posterior sucker muscular and disk shaped, is clearly marked off from the body and is made up of seven fused segments. During breeding season the glandular clitellum is visible. It is always formed by the segments IX, X and XI. The anus is a very small aperture in the mid-dorsal line near the junction of the body and the posterior sucker.

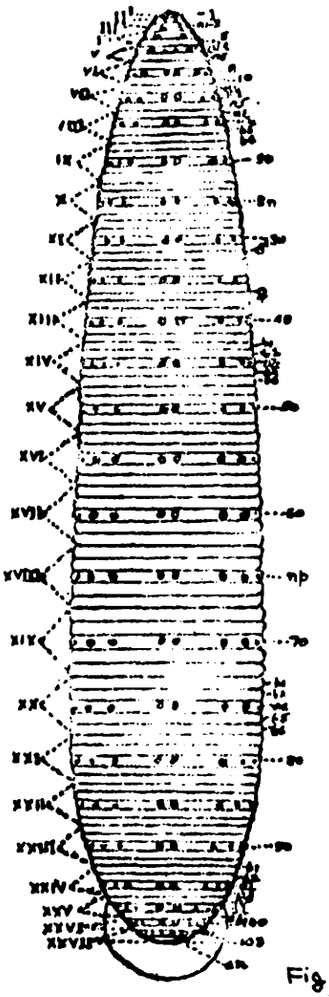

Fig. 1

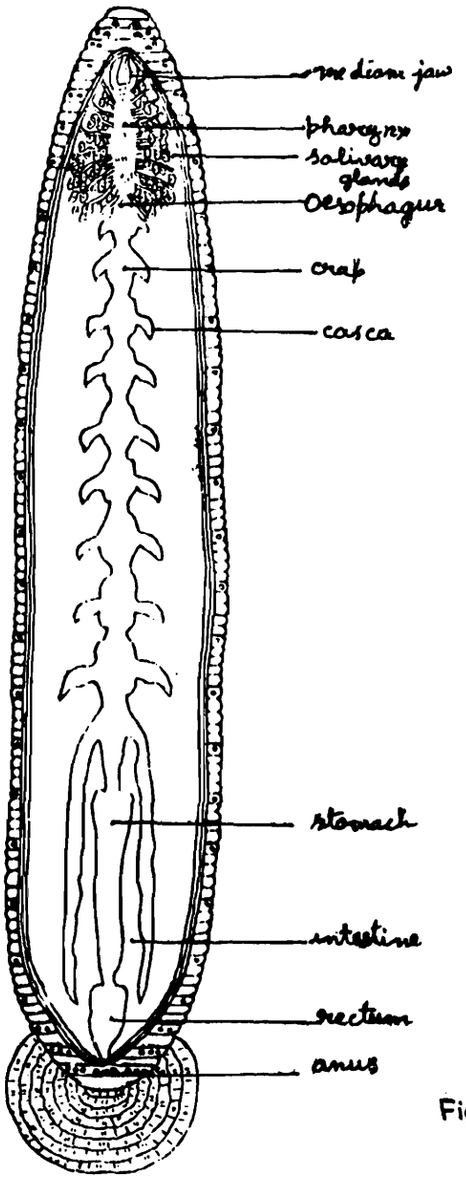

Fig. 2

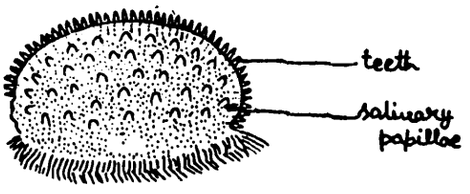

Fig. 3

Fig. 4

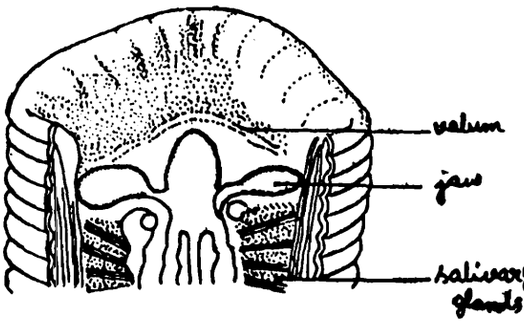

Fig. 5

Fig. 1. External metamerism and amulation of a typical leech. Abbr. used : an, anus; e, eye; c & o, conopores; np, nephropores; sn, metameric sensillae; I-XXVII indicate metamerism 1-103 annulation. Fig.2. Dorsal direction of body. Fig. 3. Jaw (Lateral view). Fig. 4. Crop with caeca, Fig. 5. Ventral direction of head.

Leeches are hermaphroditic and have well defined gonads with ducts opening to the exterior. The gonopores or external genital orifices are very small apertures in the midventral line. The male pore and female pore, both single, are located in the clitellar region and the formed is always found in front of the latter.

There are three principal kinds of sense organs on the surface of the body. Every annulus has receptor organs which may be seen to be raised on papillae. These are the annular receptors. There are also white areas on the middle ring of each segment. These are segmental receptors and are known as sensillae. Finally, there are 1-5 pairs of eyes. They are more light sensitive and appear as black dots on the head.

Leeches are blood sucking ectoparasites. The sucking mechanism takes place in several ways. In one group, there is a muscular proboscis which is forced out of a pore of the anterior sucker and pierce into the tissue of the hosts. In the other major group, the mechanism consist of three muscular ridges in the cavity of the mouth and which can be everted from the mouth and can also be pressed into the skin of the host. The blood is prevented from clotting by the secretion of numerous salivary glands and sucked into the gut by the pumping action of the muscular phranyx. The gut has been modified for the storage of large quantities of blood.

ECONOMIC RELATION

Though leeches are harmful, they create a considerable human interests. A large variety of animals prey upon leeches and their egg-cases. Fishes ducks, snipes and some other birds and animals get a considerable portion of food therefrom. Leeches destroy a large number of worms, insect larvae, of which some affect human interest. The use of leeches in medical practice is very ancient process. Hirudin extract is also employed as a haemolytic agent.

MATERIAL AND METHOD

To achieve the purpose of present work collections were made in different seasons from different habitats such as swamps, ditches, ponds, streams, rivers and damp bushes.

After making the collection, they were sorted out into two groups. One group of leeches (Rhynchobdellid) were placed in a tray with a small quantity of water and were slowly killed b anaesthetizing them with alcohal in which leeches sually die in an extended condition. Just after maceration, the leeches were kept in 70% alcohal for permanent preservation to study. The other group of leeches (Arhynchobdellid) were placed in a tray with a small quanitty of water and were slowly kikked by anaesthetizing them with alcohal till they no longer responded. Before maceration begin, they were rapidly passed between the fingers to remove the excess mucus and then straightened out and laid extended side by side in a flat dish. The fixing fluid (4% formaldehyde) as gently poured on it and the leeches were kept in it for 24 hours. After fixation, the material was washed properly in cold water and kept in 70% alcohal for permanent preservation to study.

SYSTEMATIC ACCOUNT

Phylum Annelida

Class Clitellata

Order Hirudinea

Suborder Rhynchobdellae

I. Family Ichthyobdellidae

1. Genus ***Ozobranchus*** Quatrefages, 1852

1. *O. shipleyi* Harding, 1909.

II. Family Glossiphonidae

2. Genus ***Glossiphonia*** Johnson, 1816.

2. *G. weberi* Blanchard, 1897.

3. Genus ***Helabdella*** Blandhard, 1896.

3. *H. nociva* Harding, 1924.

4. Genus ***Hemiclepsis*** vejdovsky, 1883.

4. *H. marginata* (Muller, 1774).

4a. *H. marginata marginata* (Muller, 1774).

4b. *H. marginata asiatica* Moore, 1924.

5. Genus ***Paraclepsis*** Harding, 1924.

5. *P. praedatrix* Harding, 1924.

6. Genus ***Placobdella*** Blanchard, 1893.

6. *P. emydae* Harding, 1920.

7. *P. fulva* Harding, 1924.

8. *P. horai* Baugh, 1960.

Suborder Arhynchobdellae

III. Family Erpabdellidae

7. Genus ***Herpodelloidea*** Kaburaki, 1921.

* 9. *H. indica* (Kaburaki, 1921).

10. *H. lateroculata* Kaburaki, 1921.

IV. Faily Hirudidae

8. Genus ***Dinobdella*** Moore, 1927.

11. *D. ferox* (Blanchard, 1896).

9. Genus ***Haemadipsa*** Tennent, 1859.

12. *H. montana* Moore, 1927.

13. *H. ornata* Moore, 1927.

14. *H. sylvestris* Blanchard, 1894.

15. *H. zeylanica* (Moquin-Tandon, 1826).

15a. *H. zeylanica* agilis Moore, 1927.

15b. *H. zeylanica montivindicis* Moore, 1927.

10. Genus ***Hirudinaria*** Whitman, 1886.

16. *H. granulosa* (Savigny, 1820)

17. *H. manillensis* (Lesson, 1842)

11. Genus ***Hirudo*** Linnaeus, 1758.

18. *H. birmanica* (Blanchard, 1894).

* Recorded for the first time from West Bengal.

KEY TO THE FAMILIES

1. Mouth a small pore on the oral sucker from which probosis may be protruded; jaws absent; blood colourless 2

   Mouth large, occupying entire cavity of the oral sucker; probosis absent; blood red 3

2. Body ovate, flattened; anterior sucker ventral and fused with the body; posterior sucker cupuliform, distinct from rest of the body; eyes confined to head; three annuli per mid-body segment; gastric caeca present ..... Glossiphonidae

   Body cylindrical and usually divided into distinct anterior and posterior regions; anterior sucker usually distinct; posterior sucker large discoid organ and marked off from the body; usually more than three annuli per segment; eyes may be present on head and neck ..... Ichthyobdellidae

3. Eyes 3-6 pairs in labial and buccal groups in two transverse rows; pharyynx logn; mouth with muscular ridges but without jaws; testes sacs small and numerous; gastric caeca absent .....

   ..... Erpodellidae.

   Eyes 5 pairs froming lateral crescents; pharyynx short; mouth with toothed jaws; tests arranged segmentally in pairs; gastric caeca present. ..... Hirudidae

I. Family ICHTHYOBDELLIDAE

Diagnosis : Body cylindrical or flattened, divided into two distinct regions; anterior and posterior suckers clearly marked off from body; sometimes gills on lateral margins; eyes when present on head and neck.

Remarks : Only one genus and one species have been recorded from West Bengal.

Genus 1. *Ozobranchus* Quatrefages

1852. *Ozzobranchus* Quatrefages, *Ann. Sci. Nat.*, **17(3)** : 325.

Diagnosis : Body flattened; paired lateral digitate branchiaeon posterior region; eyes one pair on head; mouth opening subterminal; a complete somite biannulate in anterior region and triannulate in posterior region.

1. ***Ozobranchus shipleyi*** Harding.

1909. *Ozobranchus shipleyi* Harding, *Proc. Comb. Phil. Soc.* **15** : 233.

1965. Ozobranchus shipleyi : Soosm Acta. Zool. Hung, **11 (3- 4):** 444.

Diagnosis : Body translucent and flattened; lateral digitate branchiae eleven pairs; branchiae colurless and body dull yellow; annuli 49; eyeson ring 5; male and female ducts open by a common pore between rings 19 and 20.

Host and habitat It is found in rivers as a parasite on tortoises, *Nicoria trijuga* Schwegg, *Kachuga intermedia* Blanf. and *K. smithi* Gray.

Distribution : India : West Bengal Calcutta; Orissa. *Outside India* : Sri Lanka.

II. Family GLOSSIPHONIDAE

Diagnosis : Dorsoventrally flattened leeches confined to fresh-water; anterior sucker ventral and fused with the body while posterior sucker cupuliform; crop with paired lateral caeca; intestine four pairs; eyes always on head.

KEY TO THE GENERA OF FAMILY GLOSSIPHONIDAE

1. Mouth opening within anterior sucker 2

   Mouth opening terminal or subterminal 4

2. Crop with six pair of caeca 3

   Crop with more than six pairs of caeca ..... ***Hemiclepsis*** Vejdovsky

3. Eyes one pair ..... ***Hellobdella*** Blanchard

   Eyes more than one pair ..... ***Glassiphonia*** Johnson

4. Mouth opening subterminal ..... ***Paraclepsis*** Harding

   Mouth opening terminal ..... ***Placobdella*** Blanchard

Genus 2. ***Glossiphonia*** Johnson

1816. *Glossiphonia* Johnson, 8°. London.

Diagnosis : Size small, with three or rarely two pairs of eyes; crop with six or rarely seven pairs lateral caeca; mouth opening within anterior sucker; complete somite formed of three rings.

Remarks : Only one species has been recorded from West Bengal.

2. ***Glossiphonia weberi*** Blanchard

1897. *Glossiphonia weberi* Blanchard, *Zool. Ergeb. einer Reise in Neiderlandisch Ost-Indien Max. Weber.* **4** : 332.

1969. Glossiphonia weberi : Soos, Acta, Zool. Hung., **15** : 414.

Material : Bankura dist.: 2 exs. Bishnupur, 28.xi.86; 2 exs., Susunia, 2 xii.86; Coll. G.C. Ghosh. Burdwan dist. : 8 exs., Burdwan town, 8.xii.86; Coll. G. C. Ghosh. Calcutta : 5 exs., Museum tank, 16.i.82, Coll. A. Misra. Coochbihar dist. : 2 exs., Dinhata, 15.iv.87, Coll. G. C. Ghosh. Hooghly

dist. : 3 exs., Pundooa, 10.iii.86, Coll. G. C. Ghosh. Howrah dist. : 5 exs., Domjur, 5.iv.86; 3 exs., Maurigram, 6.iv.86; Coll. G.C. Ghosh. Jalpaiguri dist. : 5 exs., Mohitnagar, 13.iv.87, Coll. G. C. Ghosh. Malda dist. : 4 exs., Bhatia bill near Gour, 16.iii.84; 2 exs., Malda town,17.iii.84; 17 exs., Gour, 20.iii.84; Coll. Dr. A. K. Das. Midnapur dist. : 2 exs., Contai, 25.iii.86; 9 exs., Gopiballavpur, 29.iii.86; 11 exs., Kolaghat, 29.iii.86; Coll. G. C. Ghosh. Purulia dist. : 12 exs., Manbazar, 2.iv.86; 20 exs., Baghmundi, 3.iv.86; 7 exs., Raghunathpur, 4.iv.86; Coll. G. C. Ghosh.

Diagnosis : Larger forms attain a length of about 12 mm.; general colour varies from greyish-white to light orange but usually white in preserved state; five longitudinal rows of dark brown spots; dorsal surface bears seven longitudinal rows of prominent papillae; eyes three pairs on rings 6, 7 and 8; male and female genital ducts open by a common pore between rings 27/28; rings 70; mouth opens within the anterior sucker; crop with six pairs of sublobate lateral caeca, the last and the longest pair reflected posteriorly.

Host and Habitat : It is met with on aquatic plants in ditches and ponds. It preys upon Gastropods. It also attacks aquatic beetles.

Distribution : India : West Bengal Bankura, Burdwan, Calcutta, Coochbihar, Hooghly, Howrah, Jalpaiguri., Malda, Midnapur, Purulia, 24-Parganas (S) districts; Assam; Bihar; Karnataka; Kashmir; Maharashtra; Manipur; Orissa; Rajasthan and Uttar Pradesh. *Outside India* Burma, Indonesia.

Remarks : In West Bengal, this species was known to occur from Calcutta and 24-Parganas (S) districts and now it is recorded for the first time from Bankura, Burdwan, Coochbihar, Hooghly, Howrah, Malda, Midnapur and Purulia districts.

Genus 3. ***Hellobdella*** Blanchard

1896. *Helobdella* Blanchard, *Bull. Mus. Zool. Torino*, **11** (263).

Diagnosis : Size small with one pair of eyes; crop with six pairs of simple lateral caeca; mouth opening within anterior sucker; complete somite formed of three rings.

Remarks : Only one species has been recorded from West Bengal.

3. ***Hellobdella nociva*** Harding

1924. *Hellobdella nociva* Harding, *Ann. & Mag. Nat. Hist.*, (9) **16** : 489.

1969. *Hellobdella nociva* : Soos, *Acta. Zool. Hung.*, **15** : 419.

Material : Bankura dist. : 2 exs., Balitha, 15.x.82, Coll. Dr. R. Roy. Calcutta : 1 ex., Museum tank, 16.i.82, Coll. A. Misra. Howrah dist. : 1 ex., Maurigram, 6.iv.86; 3 exs., Bagnun, 7.iv.86; Coll. G. C. Ghosh. Midnapur dist. : 2 exs., Contai, 25.iii.86, Coll. G. C. Ghosh. Purulia dist. : 7 exs., Raghunathpur, 4.iv.86, Coll. G. C. Ghosh. 24-Parganas (S) dist. : 1 ex., Balia near Garia, 15.iv.86, Coll. K. R. Halder.

Diagnosis : Larger forms attain a length of about 7.5 mm. and the greatest width about 1.5 mm; body translucent, dull green but usually white in preserved state; dorsal surface with five brown longitudinal stripes; papillae two pairs on dorsal side; eyes one pair on ring 4; male and female ducts open between 28/29 and 30/31 respectively; rings 70; mouth opens within anterior sucker; crop with six pairs of simple lateral caeca.

Host and Habitat : It is found on under surface of leaves of aquatic plants and also under pieces of bricks and earthenwares and fallen leaves submerged in water. As a fish parasite, it is recorded from *Chana striata.*

Distribution : India : West Bengal Bankura, Calcutta, Howrah, Midnapur, Purulia, 24-Parganas (S) districts; Himachal Pradesh; Orissa. Occurs only in India.

Remarks : In West Bengal, this species was so far known to occur from Calcutta only and now it is recorded for the first time from Bankura, Howrah, Midnapur, 24-Parganas (S) and Purulia districts.

Genus 4. ***Hemiclepsis*** Vejdovsky

1883. *Hemiclepsia* Vejdovsky, *Sitzb. des Konigl. Bohm. Gesel. des Wissensch, Prag*, pp. 35-51.

Diagnosis : Size medium with two pairs of eyes; complete somite formed of three rings; head region distinct from rest of the body; crop with more than seven pairs of lateral diverticula; mouth opens within anterior sucker.

4. ***Hemiclepsia marginata*** (Muller)

1774. *Hirudo marginata* Muller, *i. Pars 2.4*, Havniae et Lipsiae.*
1921. *Hemiclepsia marginata* : Kaburaki, *Rec. Ind. Mus.*, **22** : 689.
1969. *Hemiclepsia marginata* : Soos, *Acta. Zool. Hung.*, **15** : 425.

Diagnosis : Body flattened and claviform in shape; ground colour light- yellow, profusely sprinkled above with bright green but this green colour disappears in preserved state; lemon-yellow spots arrange in seven longitudinal rows on dorsal surface; rings 72; eyes two pairs; male pore and female pores open between rings 29/30 and 31/32 respectively.

Remarks : Only two subspecies have been recorded from West Bengal.

KEY TO THE SUBSPECIES OF GENUS ***Hemiclepsis***

1. Somite III biannulate; eyes two pairs of same size .....*Hemiclepsis marginata marginata* (Muller)

   Somite III uniannulate; eyes two pairs but the first pair very small.....
   .....*Hemiclepsis marginata asiatica* Moore.

4a. ***Hemiclepsis marginata marginata*** (Muller)

1774. *Hirudo marginata* Muller, *i. Pars 2.4° Havniae et Lipsiae.*
1927. *Hemiclepsis marginata marginata* Moore, *Fauna British India : Hirudinea*, pp. 83-86.
1977. *Hemiclepsis marginata marginata* : Soota & Ghosh, *Newsl. zool. Surv. India*, **3** (6) : 359.

Material : Howrah dist. : 2 exs., Shyampur, 7.iv.86; 6 exs., Bagnun, 7.iv.86; Coll. G.C. Ghosh. Malda dist. : 2 exs., Bhatia bill near Gour, 16.iii.84, Coll. Dr. A. K. Das. Purulia dist. : 3 exs., Baghmundi, 3.iii.86, Coll. G.C. Ghosh.

Diagnosis : Body claviform attains a length about 15 mm and the greatest width of about 5 mm.; ground colour light yellow; lemon-yellow spots arranged in seven longitudinal rows on dorsal surface; rings 72; eyes two pairs on rings 3 and 4; male and female pores open between rings 29/30 and 31/32 respectively; crop with eleven pairs of branching diverticula.

Host and habitat : It is found on aquatic plants and various other submerged objects in the freshwater ponds and lakes. It attacks molluscs.

Distribution : India : West Bengal Calcutta, Howrah, Malda, Murshidabad, Purulia districts; Bihar, Maharastra; Madhya Pradesh; Orissa; Rajasthan and Uttar Pradesh. *Outside India :* Palearctic Region.

Remarks : In West Bengal, this species was known to occur from Calcutta and Murshidabad districts and presently it is recorded for the first time from Howrah, Malda and Purulia districts.

4b. ***Hemiclepsis marginata asiatica*** Moore

1924. *Hemiclepsis marginata* asiatica Moore, *Proc. Acad. Nat. Sci. Philadelphia*, **86 :** 343.
1969. *Hemiclepsis marginata asiatic* : Soos, *Acta Zool. Hung.*, **15 :** 425.

Material : Burdwan dist. : 2 exs., Burdwan town, 8.xii.86, Coll. G.C. Ghosh. Calcutta : 1 ex., Dhakuria lake, 29.ix.61, Coll. N.S. Kumar; 3 exs., Museum tank, 23.v.64, Coll. S.B. Roy. Jalpaiguri dist. : 2 exs., Jalpaiguri town, 9.iv.87; 4 exs., Lataguri, 11.iv.87; Coll. G.C. Ghosh. 24-Parganas (S) dist. : 1 ex., Gosaba, 27.v.85, Coll. B.P. Halder.

Diagnosis : Body translucent, attains a length of about 16 mm and the greatest width of about 6 mm.; head region dilated and distinct from rest of the body; colour reddish brown but generally white in preserved stated; transverse stripes broken, pale-yellow in colour found on the dorsal surface; eyes two pairs on rings 3 and 4 but the anterior pair very minute; male and female pores open between rings 29/30 and 31/32 respectively; crop with eleven pairs of lateral diverticula; somite III uniannulate.

Host and habitat : It is found on under surface of leaves of aquatic plants in ponds and lakes. No host is known so far.

Distribution : India : West Bengal Burdwan, Calcutta, Jalpaiguri, 24-Parganas (S) districts; Himachal Pradesh; Jammu & Kashmir; Meghalaya and Uttar Pradesh. *Outside India :* Pakistan and Sumatra.

Remarks : In West Bengal, this subspecies was known to occur in Calcutta and now it is recorded for the first time from Burdwan, Jalpaiguri and 24-Parganas (S) districts.

Genus 5. ***Paraclepsis*** Harding

1924. *Paraclepsis* Harding, *Ann. & Mag. Nat. Hist.*, (9) **14 :** 489.

Diagnosis : Size medium; eyes three pairs; mouth opening subterminal; crop with more than seven pairs of lateral diverticula.

Remarks : The genus is represented by only a single species in West Bengal.

5. ***Paraclepsis praedatrix*** Harding

1924. *Paraclepsis praedatrix* Harding, *Ann. & Mag. Nat. Hist.*, (9) **14 :** 489.
1969. *Paraclepsis praedatrix* : Soos, *Acta. Zool. Hung.*, **15 :** 428.

Material : Bankura dist. : 2 exs., Bishnupur, 28.xi.86, Coll. G.C. Ghosh. Midnapur dist. : 1 ex., Belda, 25.iii.86, Coll. G.C. Ghosh.

Diagnosis : Larger forms attain a length of about 15 mm and a width of about 4 mm; colour pinkishish-white with dull green pigmented cells on the dorsal side; body smooth ventraly but rough dorsally; middle ring of each somite bears three pairs of larger dorsal papillae; eyes three pairs arranged in two subparallel columns; first, second and third pairs of eyes lie on ring 3, 4 and 7 respectively; male and female pores open between 29/30 and 31/32 respectively; rings 73; mouth subterminal; crop with nine pairs of lateral diverticula.

Host and habitat : It is found on submerged leaves and various other articles in ponds and lakes. It attacks tortoises and snakes.

Distribution : India : West Bengal Bankura, Midnapur, Purulia districts; Andhra Pradesh; Assam; Himachal Pradesh; Maharastra and Rajasthan. Occurs only in India.

Remarks : In West Bengal, this species was known to occur only from Purulia district and now it is recorded for the first time from Bankura and Midnapur districts.

Genus 6. ***Placobdella*** Blanchard

1893. *Placobdella* Blanchard, *Bull. Soc. Zool. France*, **18** : 93.

Diagnosis : Body flattened with one pair of eyes; anterior sucker imperforate and mouth opens upon its anterior rim; crop with seven pairs of branching diverticula.

KEY TO THE SPECIES OF GENUS PLACOBDELLA

1. Dorsal papillae small, closely set; gonopores open at 24/24 and 26/27 ..... *P. horai* Baugh.
   Dorsal papillae large; gonopores open at 26/27 and 27/28 ..... 2.
2. Rings 71; eyes on ring 3 ..... *P. emydae* Harding.
   Rings 67; eyes on ring 2 ..... *P. fulva* Harding.

6. ***Placobdella emydae*** Harding

1924. *Placobdella emydae* Harding, *Mem. Ind. Mus.*, **5** (7) : 510.
1969. *Placobdella emydae* : Soos, *Acta. Zool. Hung*, **15** : 431.

Material : Calcutta : 1 ex., Dhakuria lake, 22.viii.62, Coll. N. Kumar. 24-Parganas (N) dist. : 2 exs., Ichamati river near Bangaon, 1.x.73, Coll. Dr. A.K. Mandal. 24-Parganas (S) dist. : 2 exs., Gosaba, 24.v.85, Coll. B.P. Halder.

Diagnosis : Larger forms attain a length of about 13 mm and a width of about 5 mm; Translucent, elliptic body with head region dilated; colour greyish-green; three pairs of papillae on dorsal surface, intermediate pair being largest; male and female pores open between rings 26/27 and 28/29 respectively; rings 71; anterior sucker with a shallow anterior cup; mouth opens terminal.

Host and habitat : It is found on under the submerged bricks, earthwares and fallen leaves in ponds and rivers. Mud turtle is the only host so far recorded.

Distribution : India : West Bengal Calcutta, Hooghly, Purulia, 24- Parganas (N), 24-Parganas (S) districts, Himachal Pradesh and Orissa. *Outside India* : Burma.

Remarks : In West Bengal, this species was known to occur from Calcutta, Hooghly and Purulia districts and now it is recorded for the first time from 24-Parganas (N) and 24-Parganas (S) districts.

7. *Placobdella fulva* Harding

1924. *Placobdella fulva* Harding, *Ann. & Mag. Nat. Hist.*, (9) **16** : 489.
1969. *Placobdella fulva* : Soos, *Act. Zool. Hung.*, **15** : 431.

Diagnosis : Body flattened but very slender anteriorly; head region continuous with the body; upper surface bright reddish-yellow but ventral surface white; each ring bears a large median papilla while middle ring of each somite bears on an intermediate and a marginal pair of papillae; rings 67; eyes one pair on ring 2; male and female pores open between rings 26/27 and 28/29 respectively.

Host and habitat : It is found in streams. No specific host is recorded.

Distribution : India : West Bengal Purulia district only. *Outside India :* Java, Sumatra.

8. *Placobdella horai* Baugh

1960. *Placobdella horai* Baugh, *Parasitology*, **50** : 287.
1969. *Placobdella horai* : Soos, *Acta. Zool. Hung.*, **15** : 431.

Diagnosis : Body ovate-acuminate; upper surface light brown; papillae small, closely set on dorsal surface; eyes one pair, closely placed; rings 66; crop with seven pairs of branched caeca; male and female pores open between rings 24/25 and 26/27 respectively.

Host and habitat : It is found under stones in small pools. No positive host is recorded.

Distribution : India : West Bengal Purulia district only. Occurs only in India.

III. Family ERPOBDELLIDAE

Diagnosis : Small or medium sized, aquatic in habit; terete or subterete anteriorly and flattened towards the posterior end; eyes three to six pairs arranged in two transverse rows on labial and buccal groups; phrynx long; mouth with muscular ridges but without jaws; testes sacs small and numerous; gastric caeca absent.

Remarks : Two species under a single genus have been recorded from West Bengal.

Genus 7. *Herpobdelloidea* Kaburaki

1921. *Herpobdelloidea* Kaburaki, *Rec. Ind. Mus.*, **18** : 705.

Diagnosis : Eyes one pair on head and five pairs on somites IV to IX; gonopores separated by five annuli.

KEY TO THE SPECIES OF GENUS *Herpobdelloidea*

1. First pair of eyes on IV; gonopores separated by two and one- half to three annuli..... ..... *H. lateroculata* Kaburaki.

   First pair of eyes on III; gonopores separated by five annuli..... *H. indica* (Kaburaki)

9. *Herpobdelloidea indica* (Kaburaki)

1921. *Nematobdella indica* Kaburaki, *Rec. Ind. Mus.*, **18** : 706-707.
1927. *Herpobdelloidea indica* : Moore, *Fauna British India : Hirudinea*, pp. 144-148.
1976. *Herpobdelloidea indica* : Mahajan & Chandra, *Rec. Zool. Surv. India*, **71** : 146.

Material : Birbhum dist. : 2 exs., Bolpur, 29.ix.83, Coll. K.R. Halder. 24-Parganas (N) dist. : 1 ex., Bangaon, 1.xii.85, Coll. Dr. C.K. Sinha.

Diagnosis : Larger forms attain a length of about 20 mm and width about 3 mm; form very slender, attnuated anteriorly; colour bright buff when alive but fades away in preserved state; eyes six pairs, the first pair larger and dorsal on somite III; remaining five pairs smaller, submarginal on somites V to IX; gonopores separated by five annuli.

Host and habitat : It is found on the stem of paddy and water hyacinth. No specific host is recorded.

Distribution : India : West Bengal Birbhum, 24-Parganas (N) districts; Himachal Pradesh; Madhya Pradesh; Maharastra; Rajasthan and Uttar Pradesh. Occurs only in India.

Remarks : This is the first record of this species from West Bengal.

10. ***Herpobdelloidea lateroculata*** Kaburaki

1921. *Herpobdelloidea lateroculata* Kaburaki, *Rec. Ind. Mus.*, **18** : 705.
1976. *Herpobdelloidea lateroculata* : Mahajan & Chandra, *Rec. Zool. Surv. India*, **71** 147.

Material : Bankura dist. : 2 exs., Bishnupur, 28.xi.86, Coll. G.C. Ghosh. Burdwan dist. : 8 exs., Galsi, 6.xii.86; 11 exs., Burdwan town, 8.xii.86; Coll. G.C. Ghosh. Coochbihar dist. : 2 exs., Dinhata, 15.iv.87; 6 exs., Mathabhanga, 16.iv.87; 2 exs., Coochbihar town, 19.iv.87; Coll. G.C. Ghosh. Hooghly dist. : 7 exs., Chinsura, 12.xii.86; Coll. G.C. Ghosh. Jalpaiguri dist. : 15 exs., Jalpaiguri town, 9.iv.87; 7 exs., Lataguri, 11.iv.87; 6 exs., Mohitnagar, 13.iv.87; 8 exs., New Alipurdwar, 17.iv.87; Coll. G.C. Ghosh. Midnapur dist. : 5 exs., Belda, 25.iii.86; 7 exs., Midnapur town, 26.iii.86; 6 exs., Gopigram, 26.iii.86; Coll. G.C. Ghosh. West Dinajpur dist. : 9 exs., Jordighi, 5.iv.87, 5 exs., Raigunge town; 7.iv.87; Coll. G.C. Ghosh.

Diagnosis : Larger forms attain a length of about 27 mm and width of about 3 mm; form very slender, attenuated anteriorly; colour pale buff when alive but generally white in preserved state; eyes five or six pairs, the first pair larger and dorsal on somite IV; the remaining submarginal on somites V to VIII; gonopores separated by two and one-half to three annuli.

Host and habitat : it is found on the stem of water hyacinth in the ponds. No specific host is known.

Distribution : India : West Bengal Bankura, Burdwan, Coochbihar, Hooghly, Jalpaiguri, Midnapur, West Dinajpur districts; Assam; Madhya Pradesh; Maharastra; Manipur; Rajasthan and Uttar Pradesh. Occurs only in India.

Remarks : In West Bengal, this species was known to occur from Hooghly district only and now it is recorded for the first time from Bankura, Burdwan, Coochbihar, Jalpaiguri, Midnapur and West Dinajpur districts.

IV. Family HIRUDIDAE

Diagnosis : Size medium to large; colour variable green, brown or reddish with pattern of black stripes; eyes five pairs forming lateral crescents; pharynx short; mouth with toothed jaws; testes arranged segmentally in pairs, gastric caeca present.

KEY TO THE GENERA OF FAMILY HIRUDIDAE

1. Third and fourth pair of eyes usually on continuous annuli; auricle present ..... ***Haemadipsa*** Tennent.

   Third and fourth pair of eyes separated by an annulus; auricle absent ..... 2.

2. Salivary papillae on jaws numerous and large; lip with median ventral fissure ..... ***Hirudinaria*** Whitman.

   Salivary papillae on jaws absent; lip without median ventral fissure ..... 3.

3. Teeth well developed. ..... ***Hirudo*** Linnaeus

   Teeth absent. ..... ***Dinobdella*** Moore

Genus 8. ***Dinobdella*** Moore

1896. *Whitmania* Blanchard, *Mem. Soc. Zool. France*, **9** : 316.
1927. *Dinobdella* Moore, *Fauna British India : Hirudinea*, p.175.

Diagnosis : Size large, colour nearly green, without any pattern; eyes small, five pairs; jaws small and smooth; gastric caeca well developed; autrium and vagina elongated; vaginal sac little enlarged.

Remarks : Only one species has been recorded from West Bengal.

11. ***Dinobdella ferox*** (Blanchard)

1896. *Whitmania ferox* Blanchard, *Mem. Soc. Zool. France*, **9** : 316-330.
1927. *Dinobdella ferox* : Moore, *Fauna British India* : *Hirudinea*, pp. 175-185.
1969. *Dinobdella ferox* : Soos, *Acta. Zool. Hung.*, **15** : 164.

Diagnosis : Size large; colour nearly green, without any pattern head small; caudal sucker large; gonopores at X1 b5/b6 and XII b5/b6; eyes small, five pairs, the first pair being the largest; jaws small, without teeth and papillae; autrium and vagina elongated; ejaculatory bulb small.

Host and habitat : It attacks domestic cattles. Aquatic in nature but sometimes found in the air passage of mammals.

Distribution : India : West Bengal Darjeeling district; Assam; Himchal Pradesh; Manipur and Uttar Pradesh. *Outside India* : Burma, China, Ceylon, Taiwan and Thailand.

Genus 9. ***Haemadipsa*** Tennent

1859. *Haemadipsa* Tennent, *Ceylon Leeches*, **1** : 301.

Diagnosis : Terrestrial in habit; size small, form slender; colour brown, usually longitudinally striped; eyes five pairs, large, the first four pairs usually on continuous annuli but the third and fourth pairs may be separated by a partial or complete annulus; gonopores separated by five annuli; jaws three, prominent but without papillae.

KEY TO THE SPECIES OF GENUS *Haemadipsa*

1. Prehensile papillae well developed 2

   Prehensile papillae less developed 3

2. Eyes 3 and 4 on continuous annuli colour motted with a median dorsal black stripe..... ..... *H. zeylanica* (Moquin Tandon)

   Eyes 3 and 4 separated by a complete or partial annalus; colour pattern reticulated or longitudinally chain-striped.....*H. montana* Moore.

3. Eyes 3 and 4 separated by a complete annulus; longitudinally three black stripes..... ..... *H. sylvestris* Blanchard.

   Eyes 3 and 4 separated usually by a complete annulus; colour velvety alternating with cream stripes .....*H. ornata* Moore.

12. ***Haemadipsa montana*** Moore

1927. *Haemadipsa montana* Moore, *Fauna British India* : *Hirudinea*, pp. 269-276.
1967. *Haemadipsa montana* : Soos, *Acta. Zool. Hung*, **13** (3-4) : 425.

Material : Darjeeling dist. : 5 exs., Palmaju, 3.vii.72, Coll. R.K. Ghosh; 4 exs., Tiger hill, 24.vii.79, Coll. S.S. Saha.

Diagnosis : Size small about 35 mm long, slender, cylindroid; colour yellow to buff with median dorsal black stripe, one pair of black intermediate chain-stripes and black submarginal stripes; third and fourth pair of eyes separated by a complete or partial annulus; caudal sucker with less developed prehensile papillae.

Host and habitat : No specific information regarding host but strictly a mountain species.

Distribution : India : West Bengal Darjeeling district; Arunachal Pradesh; Sikkim and Tamil Nadu. *Outside India* : Burma.

13. ***Haemadipsa ornata*** Moore

1927. *Haemadipsa ornata* Moore, *Fauna British India* : *Hirudinea*, pp. 284-289.
1967. *Haemadipsa ornata* : Soos, *Acta Zool. Hung.*, **13**(3-4) : 425.

Diagnosis : Size medium; on dorsum, velvety black and cream coloured stripes, the black stripes a median and a pair of intermediate; venter light red; suckers pale blue; eyes 3 and 4 separated usually b a incomplete annulus; sucker rays 86-94.

Host and habitat : No specific host is recorded but strictly a mountain species.

Distribution : India : West Bengal Darjeeling district; Assam. *Outside India* : Nepal.

14. ***Haemadipsa sylvestris*** Blanchard

1894. *Haemadipsa sylvestris* Blanchard, *Ann. Mus. civico di Storia Naturelle, Genova*, (2) **14** : 114.
1967. *Haemadipsa sylvestris* : Soos, *Acta. Zool. Hung.*, **13** (3-4) : 425.

Material : Birbhum dist. : 3 exs., Nalhati, 27.ix.83; 7 exs., Nischintapur, 30.ix.83; Coll. K.R. Halder. Calcutta : 1 exs., Salt Lake, 23.viii.64, Coll. Dr. B. Biswas. Darjeeling dist. : 1 exs., Neora valley, 23.iv.81, Coll. R. K. Ghosh. Hooghly dist. : 2 exs., Chinsura, 12.xii.86, Coll. G.C. Ghosh. Howrah dist. : 11 exs., Khantora, 27.ix.75, Coll. M. Chatterjee; 7 exs., Ulubaria, 14.x.85; 6 exs., Amta, 15.x.85; 5 exs., Bagnun, 16.x.85; Coll. G.C. Ghosh. Jalpaiguri dist. : 2 exs., Kartick forest, 20.xii.84; 1 ex., Bhutang gate, 21.xii.84; Coll. K.R. Halder; 1 ex. Lataguri, 11.iv.87, Coll. G.C.

Ghosh. Midnapur dist. : 1 ex., Tamluk, 8.x.85; 2 exs., Kharagpur, 15.x.85; 1 ex., Talpukur village, 17.x.86; Coll. G.C. Ghosh. Murshidabad dist. : 40 exs., Pakuria village, 21.ix.83; 5 exs., Kalyanpur village, 23.ix.83; Coll. K.R. Halder. Nadia dist. : 3 exs., Subhas nagar, 16.ix.83; 3 exs., Kalyani, 19.xi.83; 4 exs., Beldanga, 18.ix.83; Coll. K.R. Halder. 24-Parganas (s) dist : 1 ex., Garia, 10.x.79, Coll. K.R. Halder.

Diagnosis : Larger forms about 50 mm long, dorsum convex and venter flattened, colour brown but the mid dorsal field paler with three dorsal black stripes of which median narrower, sometimes broken; third and fourth pair of eyes separated by a complete annulus; prehensile papilla absent.

Host and habitat : It is found in the damp places under bricks and stones or burried in the moist soil. It is also found in the vicinity of water and sometimes enters water voluntarily. It can swims well. It attacks man and domestic animals.

Distribution : India : West Bengal all districts; Andaman Is.; Arunachal Pradesh; Assam; Meghalaya; Sikkim and Uttar Pradesh. *Outside India* : Borneo, Burma, Java and Sumatra.

Remarks : Widely distributed in West Bengal.

15. ***Haemadipsa zeylanica*** (Moquin-Tandon)

1826. *Sanquisuga zeylanica* Moquin-Tandon, *Monographie de la famille des Hirudinees Montpellier*, p. 120.

1894. *Haemadipsa zeylanica* : Blanchard, *Ann. Mus. civ. di Storia Nat., Genova*, (2)**14** : 113.

1970. *Haemadipsa zeylanica* : Chandra, *Rec. zool. Surv. India*, **64** (1-4) : 109.

Diagnosis : Size small, slender, cylindroid, tapering from posterior sucker pedicel to head; colour brown, mottled or flecked with black, with a median dorsal dark strip and marginal pale yellow stripes; eyes five pairs, third and fourth pairs on continuous annuli: well developed prehensile papilla on caudal sucker; sucker rays 71-73.

Remarks : Only two subspecies have been recorded from West Bengal.

KEY TO THE SUBSPECIES OF SPECIES ***Haemadipsa zeylanica***

1. Median head tessellae present; dark blotched pattern present ..... *H. zeylanica agilis* Moore.

   Median head tessellae absent; dark blotched pattern absent..... *H. zeylanica montivindicis* Moore.

15a. ***Haemadipsa zeylanica agilis*** Moore

1927. *Haemadipsa zeylanica agilis* Moore, *Fauna British India : Hirudinea*, p. 266.

1967. *Haemadipsa zeylanica agilis* : Soos, *Acta. Zool. Hung.*, **13**(3-4) : 426.

Diagnosis : Size small, slender; colour brown with black flecks and a median dorsal black stripe; median head tessellae present; dorsal intermediate and paramedian segmental papillae prominent.

Host and habitat : It is common land leech of Western Himalayas. It attacks grazing cattle.

Distribution : India : West Bengal Darjeeling district; Andaman Is.; Arunachal Pradesh; Himachal Pradesh and Uttar Pradesh. Occurs only in India.

15b. *Haemadipsa zeylanica montivindicis* Moore.

1927. *Haemadipsa zeylanica montivindicis* Moore, *Fauna British India : Hirudinea*, p. 267.
1967. *Haemadipsa zeylanica montivindicis* : Soos, *Acta. Zool. Hung.*, 13(3-4) : 427.

Material : Bankura dist. : 2 exs., Garati river near Garumara, 30.xi.82, Coll. S.K. Roy.

Darjeeling dist. : 4 exs., Tiger hill, 24.vii.79, Coll. S.S. Saha.

Diagnosis : Size small, very slender, cylindrical; colour yellowish- brown with mid-dorsal field paler and a continuous back median line; paramedian and intermediate segmental papillae very prominent; prehensile papillae small but well developed; median head tessellae and dark-blotched pattern absent.

Host and habitat : It is found under stones on dump ground in the hilly area.

Distribution : India : West Bengal - Bankura and Darjeeling districts; Arunachal Pradesh; Assam and Sikkim. Occurs only in Eastern Himalayas and adjacent areas.

Remarks : In West Bengal, this species was so far known to occur from Darjeeling district and presently it is recorded for the first time from Bankura district.

Genus 10. *Hirudinaria* Whitman

1886. *Hirudinaria* Whitman, *Quart. Jurn. Micr. Sci.*, **26** : 317.

Diagnosis : Size medium to large; colour variable-green, brown or reddish with pattern of black stripes; lip with median ventral fissure; eyes five pairs gonopores separated by five or seven annuli; jaws large with tooth and numerous prominent papillae.

KEY TO THE SPECIES OF GENUS *Hirudinaria*

1. Vaginal stalk well developed; vaginal caecum and common oviduct opening into vaginal stalk.... ..... *H. granulosa* (Savigny)

   Vaginal stalk absent; vaginal caecum and common oviduct opening into bursa..... ..... *H. manillensis* (Lesson)

16. *Hirudinaria granulosa* (Savigny)

1820. *Sanguisuga granulosa* Savigny, *Systeme des Annelids, Paris.*
1927. *Hirudinaria granulosa* : Moore, *Fauna British India : Hirudinea*, p. 226
1977. *Hirudinaria granulosa* : Soota & Ghosh, *Newsl. zool. Surv. India*, 3(6) : 360.

Material : Birbhum dist. : 1 ex., Kashim Bazar, 29.ix.83, coll. K.R. Halder. Murshidabad dist. : 3 exs., Berhampur, 21.ix.83, 3 exs., Beniagram, 22.ix.83; Coll. K.R. Halder.

Diagnosis : Size large, form robust; colour brown dorsally and light-green ventrally; narrow olive-green stripes four pairs on dorsum, gradually disappears with the increase of size; gonopores separated by five annuli; sensillae prominent, elliptical; lip with median ventral fissure; jaws large with numerous prominent papillae and more than one hundred teeth; autrium pyriform with penis-sac larger than prostate; vaginal stalk well developed; vaginal caecum and common oviduct opening into vaginal stalk.

Host and habitat : It is found in swamps, ditches and ponds. It attacks man and domestic animals.

Distribution : India : West Bengal - Almost all the districts; widely distributed in India. *Outside India* : In the upper-hand (about 500 m) of entire Oriental Region.

Remarks : Widely distributed in West Bengal.

17. *Hirudinaria manillensis* (Lesson)

1842. *Hirudo manillensis* Lesson, *Revue Zoologique Societe Cuvierieme*, p.8.
1927. *Hirudinaria manillensis* : Moore, *Fauna British India : Hirudinea*, p.218.
1977. *Hirudinaria manillensis* : Soota & Ghosh, *Newsl. zool. Surv. India*, 3 (6) : 360.

Material : Bankura dist. : 5 exs., Bagri Bandh near Bishnupur, 27.xi.86; 6 exs., Jammuna Bandh, Bishnupur, 28.xi.86; 4 exs., Veda Sole, 30.xi.86; Coll. G.C. Ghosh. Birdbhum dist. : 33 exs., Bahara village, 27.ix.83; 4 exs., Madunir bill near Saithea, 28.ix.83; 5 exs., Kashim Bazar, 29.ix.83; 3 exs., Bolpur, 29.ix.83; Coll. K.R. Halder. Burdwan dist. : 2exs., Katowa, 5.xii.86; 2 exs., Galsi, 6.xii.86; 2 exs., Raina, 7.xii.86; Coll. G.C. Ghosh. Calcutta : 6 exs., Salt Lake, 21.vi.65, Coll. Dr. B. Biswas; 1 ex., Rajarhat, 15.vii.63; Coll. J.C. Naskar. Hooghly dist. : 4 exs., Kamarpukur, 1.xii.86; 4 exs., Andal, 3.xii.86; Coll. G.C. Ghosh. Jalpaiguri dist. : 2 exs., Lataguri, 11.iv.87, Coll. G.C. Ghosh. Malda dist. : 1 ex., Dakia bill near Gour, 16.iii.84, Coll. Dr. A.K. Das. Midnapur dist. : 4 exs., Kharagpur, 5.x.84; 3 exs., Paskura, 9.x.85; 5 exs., Chaitannyapur, 10.x.85; 7 exs., Ghatal, 13.x.85; Coll. G.C. Ghosh. Murshidabad dist. : 7 exs., Raghunathgunge, 24.ix.83; Coll. K.R. Halder. Nadia dist. : 4 exs., Krishnanagar, 16.ix.83; 5 exs., Champta bill, 17.ix.83; 7 exs., Gopia bill near Krishnanagar, 18.ix.83; 7 exs., Kalyani, 19.ix.83; Coll. K.R. Halder. Purulia dist. : 5 exs., Purulia town, 1.iv.86; Coll. G.C. GHosh. 24-Parganas (N) dist. : 4 exs., Barrackpur, 26.viii.81, Coll. G.C. Ghosh. 24-Parganas (S) dist. : 1 ex., Canning, 27.v.85, Coll. B.P. Halder. West Dinajpur dist. : 5 exs., Kutubdighi near Raigunge, 4.iv.87; 2 exs., Jordighi, 5.iv.87; 9 exs., Karandighi, 6.iv.87; Coll. G.C. Ghosh.

Diagnosis : Size large, form robust; colour brown dorsally and light green ventrally; narrow olive-green stripes four pairs on dorsum gradually disappears with the increase of size; eyes five pairs; gonopores separated by five annuli; sensillae prominent; lip with median ventral fissure; jaws large with prominent papillae of two sizes; teeth about open hundred; epididymis large and ejaculatory bulb fusiform; autrium short and pyriform; vaginal stalk absent; common oviduct and vaginal duct opening together directly into female bursa.

Host and habitat : It is found in the paddy field, ponds, canals, swamps and ditches. It attacks man and domestic animals.

Distribution : India : West Bengal - Almost all the districts; coastal provinces of India. *Outside India* : In the lowland of entire Oriental Region.

Remarks : Widely distributed in West Bengal.

Genus 11. *Hirudo* Linnaeus

1858. *Hirudo* Linnaeus, *Systema Naturae, 10th ed.*

Diagnosis : Size medium; colour pattern usually longitudinally striped; eyes five pairs, well developed; gonopores at XIb5/b6 and XIIb5/b6; jaws with tooth; autrium pyriform with penis sac non-elongated; ejaculatory bulb well developed; vaginal duct fusiform; vaginal duct and common oviduct always continuous.

Remarks : Only one species has been recorded from West Bengal.

18. ***Hirudo birmanica*** (Blanchard)

1894. *Haemopis birmanica* Blanchard, *Ann. Mus. civico di storia Naturelle, Genova,* **2** (14) : 113.
1927. *Hirudo birmanica* : Moore, *Fauna British India : Hirudinea,* p.192.
1977. *Hirudo birmanica* : Soota & Ghosh, *Newsl. zool. Surv. India,* **3** (6) : 360.

Material : Bankura dist. : 3 exs., Noonjhor, 29.xi.86, Coll. G.C. Ghosh. Calcutta : 3 exs., Dum Dum, 31.v.65, Coll. K.S. Rao; 1 ex., Salt Lake, 20.vi.65, Coll. Dr. B. Biswas. Coochbihar dist. : 8 exs., Tufangunge, 17.iv.87, Coll. G.C. Ghosh. Darjeeling dist. : 7 exs., Siliguri, 10.iv.87, Coll. G.C. Ghosh. 24-Parganas (S) dist. : 1 ex., Balia near Garia, 17.xi.86, Coll. K.R. Halder.

Diagnosis : Length about 70 mm, form slender; head small; colour brown with seven dark brown dorsal stripes; eyes five pairs, small; lip without median ventral fissure; jaws short, without papillae; ejaculatory bulb well developed, vaginal sac fusiform, without caecum.

Host and habitat : It is found in swamps, ponds, streams and rivers. It attacks man and domestic animals.

Distribution : India : West Bengal - Bankura, Calcutta, Coochbihar, Darjeeling, 24-Parganas (S) districts; Andhra Pradesh; Himachal Pradesh; Karnataka; Maharastra; Punjab; Rajasthan; Tamil Nadu and Uttar Pradesh. *Outside India* : Afganistan, Sri Lanka and Iran.

Remarks : Widely distributed in West Bengal.

TABLE 1

Districtwise distribution of leeches in West Bengal

Sl. No.	Name of species / Name of districts	Bankura	Birbhum	Burdwan	Calcutta	Coochbihar	Darjiling	Hooghly	Howrah	Jalpaiguri	Malda	Midnapore	Murshidabad	Nadia	Purulia	West Dinajpur	South 24 Parganas	North 24 Parganas
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	*Ozobranchus shipleyi* Harding				+													
2.	*Glossiphonia weberi* Blanchard	+	+		+	+		+	+	+	+	+			+			+
3.	*Hellobdella nociva* Harding	+			+				+			+			+			+
4a.	*Hemiclepsis marginata marginata* Muller				+				+		+	+			+			
4b.	*Hemiclepsis marginata asiatica* Moore			+	+					+								+
5.	*Paraclepsis praedatrix* Harding	+										+			+			
6.	*Placobdella emydae* Harding				+			+							+		+	+
7.	*Placobdella fulva* Hading														+			
8.	*Placobdella horai* Baugh														+			
9.	*Herpobdelloidea indica* (Kaburaki)		+														+	
10.	*Herpobdelloidea lateroculata* Kaburaki	+		+		+		+		+		+				+		
11.	*Dinobdella ferox* (Blanchard)						+											
12.	*Haemadipsa montana* Moore						+											
13.	*Haemadipsa ornata* Moore						+											
14.	*Haemadipsa sylvestris* Blanchard	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
15a.	*Haemadipsa zeylanica agilis* Moore						+											
15b.	*Haemadipsa zeylanica montivindicis* Moore	+					+											
16.	*Hirudinaria granulosa* (Savigny)	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
17.	*Hirudinaria manillensis* (Lessor)	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
18.	*Hirudo birmanica* (Blanchard)	+			+	+	+											

TABLE 1

Districtwise distribution of leeches in West Bengal

Sl. No.	Name of species / Name of States	Andaman & Nicobar Is.	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Goa	Gujarat	Haryana	Himachal Pradesh	Kashmir
		1	2	3	4	5	6	7	8	9	10
1.	*Ozobranchus shipleyi* Harding										
2.	*Glossiphonia weberi* Blanchard				+	+					+
3.	Hellobdella nociva Harding									+	
4a.	Hemiclepsis *marginata marginata* (Muller)					+					
4b.	*Hemiclepsis marginata asiatica* Moore									+	+
5.	Paraclepsis praeda*trix* Harding		+		+					+	
6.	Placobdella emy*dae* Harding									+	
7.	Placobdell*a fulva* Harding										
8.	*Placobdella horai* Baugh										
9.	*Herpodelloidea indica* (Kaburaki)									+	
10.	Herpodeo*oidea lateroculata* Kaburaki				+						
11.	Dinobdella ferox (Blanchard)				+					+	
12.	Haemadipsa montana Moore			+							
13.	Haemadipsa orna*ta* Moore				+						
14.	*Haemadipsa sylvestris* Blanchard	+		+	+						
15a.	Haemadipsa ze*ylanica agilis* Moore	+		+						+	
15b.	*Haemadipsa zeylanica montivindicis* Moore			+	+						
16.	Hirudinaria granu*losa* (Savigny)		+		+	+					
17.	Hirudinaria manillensis (Lesson)		+		+	+					
18.	Hirudo birmanica (Blanchard)		+							+	

Karnataka	Kerala	Lakshadive Is.	Madhya Pradesh	Maharastra	Manipur	Meghalaya	Mizoram	Nagaland	Orissa	Pondicherry	Punjab	Rajasthan	Sikkim	Tamil Nadu	Tripura	Uttar Pradesh
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
									+							
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SUMMARY

The present account deals with 18 species and 4 subspecies from West Bengal. Of these, one species is recorded for the first time from the area. The diagnostic characters and keys for identification of genera and species of leeches of this state have been provided. Economic importance, hosts, habitats and distribution of all the species have been mentioned. A general account of morphology and terminology as well as the methods of nrcotization and preservation of leeches have been included.

ACKNOWLEDGEMENT

My thanks are due to the Director, Zoological Survey of India, Calcutta, for providing necessary facilities. My sincere thanks are also due to Dr. A.K. Ghosh, Joint Director of the same department for his constant interest and guidance during the course of my studies.

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THE FRESHWATER CLADOCERA (CRUSTACEA : BRANCHIOPODA)

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INTRODUCTION

The Cladocera of West Bengal is poorly known up to the present. The only papers dealing with this region are of Gurney (1906, 1907), Sewell (1953) and Sharma (1978) recording 4, 5 and 24 species respectively. During an intensive survey of the Wetlands of West Bengal (excepting some of the northern districts), I came across 53 species of freshwater Caldocera 23 are new records to this region, excluding 4 species not found in the present study but recorded by Sharma (1978).

Cladocera samples were collected from all types of wetlands including brackish water and rice fields in three different seasons (premonsoon, monsoon and post monsoon). The collections were made with a hand plankton net having a diameter of 18 inches and with a throw net having a diameter of 24 inches. About 490 zooplankton samples were collected from 96 different wetlands during the years 1989-1993. All the samples were examined with a monocular microscope and the species were identified by making temporary slides in dilute glycerine.

The arena of Wetlands in West Bengal provides a multitude in dimensions, ranging from small ponds to larger ones covering more than 5 sq. km. area. A few wetlands are very important not only because of their very rich invertebrate assemblages but also due to their importance as an abode of avifauna. The wetlands such as Santragachi jhill, Kashipur Jhill, Malanchaberia, Dadkhali, Dankuni jhill, Khnayn Bandar jhill, Chotomolla, Baluguri jhill, Ballavpur sanctuary, Tilpara barriage and Dhatin jhill are noteworthy in this study for the gamut of fauna and flora. These wetlands besides attracting aquatic migratory birds, also provide congenial conditions for the alien fauna and flora which are brought by the migratory birds, to colonise these aquatic ecosystems. Most of these wetlands are used by the locals as fishing grounds and for irrigation purposes. These wetlands have a variety of both floating and submerged macrophytes, which harbour many species of Cladocera and other zooplankton.

This study focuses on the taxonomy and distribution of Cladocera in West Bengal (districts where the freshwater habitats are more in number, excepting a few in northern region). In West Bengal, the order Cladocera is represented by six families : Sididae, Daphniidae, Moinidae, Bosminidae, Macrothricidae and Chydoridae. The majority of Cladocera range in size from 0.2 to 3.0 mm. The body is not clearly segmented and the thoracic and abdominal regions are covered by a single piece of carapace folded ventrally with or without reticulations. In the head, a large compound eye and a small ocellus are situated. The antennules are usually inconspicuous, unsegmented and with a group of sensory setae on the apex. The antennae are large with a stout basal segment and two branches of segmented rami and ventral ramus bear a variable number of plumose setae. In many of the Macrothricidae and Chydoridae, the labrum bears a keel which is of important taxonomic value. The postabdomen is curved anteroventrally and bears 2 long nototorial setae, two claws, basal spine and a series of anal denticles and lateral spinules.

The study on the males are not included at present though it is of significant value in the identification of a few species. Males are distinguished from females by the presence of large antennules, a hook in the first thoracic leg and a modified postabdomen. Since the males are rare, the description of species in the present study is restricted to parthenogenetic females only.

Abbreviations used

HAD	-	Haora	PVC	-	Posteroventral corner
HYD	-	Hugli	AVC	-	anteroventral corner
24PN	-	North 24 Parganas	AI	-	antennule
MID	-	Medinipur	PA	-	postabdomen
BIR	-	Birbhum	L	-	labrum
BAR	-	Bardhaman			

SYSTEMATIC ACCOUNT

TheCladocera are usually ranked as a distinct order of the subclass Branchiopoda but they are sometimes regarded as a suborder and placed together with the order Diplostraca. The recent classification includes the families Sididae and Holopedidae under the super family Sidoidae. The other four families namely Daphiidae, Bosminidae, Macrothricidae and Chydoridea belong to the super-family Chydoroidea. The family Polyphemidae belongs to super family Polyphemoidae. Thus, the order Cladocera consists of eight well defined families. In addition to this, a new family Moinidae and four subfamilies under the family Chydoridae are also established (Goulden, 1968; Frey, 1966).

CLASSIFIED SPECIES LIST OF WEST BENGAL CLADOCERA :

(* - new records to West Bengal; ** - not found in the present study).

Family I SIDIDAE Sars, 1865

Genus ***Latonopsis*** Sars, 1888

1. *Latonopsis australis* (Sars, 1888)*

Genus ***Pseudosida*** Herrick, 1884

2. *Pseudosida bidentata* Herrick, 1884

Genus ***Diaphanosoma*** Fischer, 1850

3. *Diaphanosoma excisum* Sars, 1885
4. *Diaphanosoma sarsi* Richard, 1894
5. *Diaphanosoma brachyurum* (Lieven, 1848)*

Family II DAPHNIIDAE Straus, 1820

Genus ***Ceriodaphnia*** Dana, 1853

6. *Ceriodaphnia cornuta* Sars, 1885

7. *Ceriodaphnia reticulata* (Jurine, 1820)*

Genus ***Daphnia*** Muller, 1785

8. *Daphnia lumholtzi* Sars, 1885
9. *Daphnia similis* Claus, 1876*
10. *Daphnia carinata* King, 1853**

Genus ***Simocephalus*** Schoedler, 1853

11. *Simocephalus vetulus* (O.F. Muller, 1776)
12. *Simocephalus exspinosus* (Koch, 1841)
13. *Simocephalus latirostris* Stingelin, 1906*

Genus ***Scapholeberis*** Schoedler, 1853

14. *Scpholeberis kingi* Sars, 1903

Family **MOINIDAE** Goulden, 1967

Genus III. ***Moina*** Baird, 1850

15. *Moina micrura* Kurz, 1874
16. *Moina weismanni* Ishikawa, 1896*

Genus ***Moinodaphinia*** Herrick, 1887

17. *Moinodaphnia macleayi* (King, 1853)

Family IV. BOSMINIDAE Sars, 1865

Genus ***Bosmina*** Baird, 1945

18. *Bosmina longirostris* (O.F. Muller, 1776)

Genus ***Bosminopsis*** Richard, 1895

19. *Bosminopsis deitersi* Richard, 1895*

Family V. MACROTHRICIDAE Baird, 1843

Genus ***Macrothrix*** Baird, 1843

20. *Macrothrix spinosa* King, 1852*
21. *Macrothrix goeldii* Richard, 1897**

Genus ***Echinisca*** Lieven, 1848

22. *Eschinisca triserialis* (Brady, 1886)

Genus ***Guernella*** Richard, 1892

23. *Guernella raphaelis* Richard, 1892*

Genus ***Grimaldina*** Richard, 1892

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24. *Grimaldina brazzai* Richard, 1892*

Genus ***Ilyocryptus*** Sars, 1862

25. *Ilyocryptus spinifer* Herrick, 1882

Family VI. CHYDORIDAE Stebbing, 1902

Sub-family CHYDORINAE Frey, 1967

Genus ***Pleuroxus*** Baird, 1843

26. *Pleuroxus similis* Varva, 1900
27. *Pleuroxus denticulatus* Birge, 1879

Genus ***Chydorus*** Leach, 1816

28. *Chydorus sphaericus* (O.F. Muller, 1776)
29. *Chydorus ventricosus* Daday, 1896*
30. *Chydorus eurynotus* Sars, 1901*
31. *Chydorus faviformis* Birge, 1893*
32. *Chydorus barroisi* (Richard, 1894)
33. *Chydorus pubescens* Sars, 1901*

Genus ***Dunheveidia*** King, 1853

34. Dunhevedia crassa King, 1853
35. *Dunhevedia serrata* Daday, 1898*

Genus ***Pseudochydorus*** Fryer, 1968

36. *Pseudochydorus globosus* (Baird, 1843)**

Genus ***Alonella*** Sars, 1862

37. *Alonella excisa* (Fischer, 1854)*

Sub-Family ALONINAE Frey, 1967

Genus ***Alona*** Baird, 1843

38. *Alona rectangula* Sars, 1862
39. *Alona pulchella* King, 1853
40. *Alona monacantha* Sars, 1901*
41. *Alona costata* Sars, 1862*
42. *Alona davidi* Richard, 1895
43. *Alona quandrangularis* (O.F. Mullwe, 1785)
44. *Alona kwangsiensis* Chiang, 1963*
45. *Alona affinis* Leydig, 1860

17—B—187/ZSI/Cal/98

46. *Alona karua* (King, 1853)
47. *Alona verrucosa* Sars, 1901*
48. *Alona intermedia* Sars, 1862*

Genus ***Camptocercus*** Baird, 1843

49. *Camtocercus rectirostris* Schoedler, 1862**
50. *Camptocercus australis* Sars, 1896*

Genus ***Graptoleberis*** Sars, 1862

51. *Graptoleberis testudinaria* (Fischer, 1848)

Genus ***Oxyurella*** Dybowski and Gronshowski, 1894

52. *Oxyurella singalensis* (Daday, 1898)

Genus ***Kurzia*** Dybowski and Growshowski, 1894

53. *Kurzia longirostris* (Daday, 1898)
54. *Kurzia latissima* (Kurz, 1875)

Genus ***Euryalona*** Sars, 1901

55. *Euryalona orientalis* (Daday, 1898)

Genus ***Notoalona*** Rajapaksa and Fernando, 1987

56. *Notoalona globulosa* (Daday, 1898)

Genus ***Leydigia*** Kurz, 1875

57. *Leydigia acanthocercoides* (Fischer, 1854)

Key to Families of West Bengal Cladocera

1. Six pairs of legs of similar structure ..... SIDIDAE Baird, 1850
   Five or six pairs of legs of different structure 2
2. Dorsal ramus of antennae 4-segmented, ventral ramus 3-segmented 3
   Dorsal and ventral rami 3-segmented 5
3. Antennules not mobile ..... DAPHNIIDAE Straus, 1820
   Antennules mobile 4
4. Antennules situated on anteroventral end of the head ..... MACROTHRICIDAE Baird, 1843
   Antennules situated on the ventral margin of the head but not at anterior and ..... MOINIDAE Goulden, 1967
5. Antennules fused with the rostrum, forming a probosis-like structure ..... BOSMINIDAE Sars, 1895

Antennules are at base of ocellus covered by head shield or rostrum
.....CHYDORIDAE Stebbing, 1902

Family I. SIDIDAE

Key to West Bengal Genera* and Species of Sididae

(*Generaic diagnosis of the genera with only one species are not given)

1. Postabdomen without anal spines .....***Diaphanosoma*** Fischer, 1850
   Postabdomen with anal spines 2
2. Rostrum present .....*Pseudosida bidentata* Herrick, 1884
   Rostrum absent .....*Latonopsis australis* Sars, 1888

1. ***Latonopsis australis*** Sars, 1888
(Figs. 1-3)

1888. *Latonopsis australis* Sars, *Forth. Vidensk. Selsk. Christiania,* 8 : 1-46

1892. Latonopsis occidentalis Birge, Trans. Wis. Acad. Sci. Arts and Letts., 4 : 77-109.

Material examined : Kashipur Hugla Jhill, Shibadaha, Santragachi Jhill of HAD; Dankuni Jhill, Baluguri Jhill and Kamarkund Jhill of HYD; Calcutta and BIR districts.

Female : Body size, 1.70 mm. Head large with antennule on the ventral side. Eye large, situated very near to anterior margin of the head; ocellus conspicuous; setae on antenna : 4-7/0-1-4. Ventral Margin ornamented with row of long hairs at the anterior side, medium hairs at the middle and three long setae at the posteroventral corner. Postabdomen broad with two spines at the base of the claws, and denticles 10-12.

Distribution : India-Rajasthan, Tripura and Tamil Nadu.

2. ***Pseudosida bidentata*** Herrick, 1894
(Figs. 4-7)

1884. *Pseudosida bidentata Herrick, Coel and Nat. Hist. Survey Minnesota, Ann. Rep.*, **12** : 1-91.

1953. *Pseudosida szalayi Brehm, Ost. Zool. Zeit.*, **4** : 241-345.

Material examined : Kashipur Hugla Jhill and Malanchaberia of HAD; 24PN and 24PS; Calcutta and BIR districts.

Female : Body size 1.20 mm. Body elongated oval; head short; eye relatively small and situated near to the anteroventral corner. Antennules unsegmented, long and attached to the posteroventral part of the head. Antenna not extending beyond the posterior margin of valves. Ventral margin with a series of long setae followed by a series of spinules on the posteroventral corner. Postabdomen with 10 groups of lateral spines. Claw long with 3 basal spines.

Distribution : India-Andaman and Nicobar Islands, Rajasthan, Tripura and Tamilnadu. Elsewhere-South East Asia, South Africa and South America.

Key to West Bengal species of ***Diaphanosoma***

1. Posteroventral corner of valve with spine 2
   Posteroventral corner of valve with spine and setae .....
   ..... *Diaphanosoma brachyurum* (Lieven, 1848)

2. Posteroventral corner of valve with 6-7 spines..... *Diaphanosoma excisum* Sars, 1885

Posteroventral corner of valve with more than 10 spines *Diaphanosoma sarsi*.... Richard, 1895

3. ***Diaphanosoma excisum*** Sars, 1885

1885. *Diaphanosoma excisum* Sars, *Norske. Vidensk. Selsk. Forhandl. Christiania.*, **8** : 1-46.

1933. *Diaphanosoma paucispinosum* Brehm, *Arch. Hydrobiol. Suppl.* **11** : 631-771.

Material examined : Synop cotton Mill, Natibpur Jhill, Bagnan Jhill, Shibpur, Gadiara, Santragachi, Golapota, Udayanarayanpur of HAD; Hatgacha Jhill, Rupnarayan River, Khnayan of HYD; Rajgram and Sainthia bill of BIR; 24PS and MED districts.

Female : Size 1.05 mm. Head large and rounded anteriorly. Eye small. Posteroventral corner broadly rounded with 5-9 marginal denticles followed by a series of fine setules. Claw serrated on the distal convex surface; concave surface with three long basal spines.

Distribution : India - Andaman and Nicobar Islands, Rajasthan, Tamil Nadu and Tripura states. Elsewhere- common in tropical regions.

Remarks : Very common occurs in all types of habitat except in marshes.

4. ***Diaphanosoma sarsi*** Richard, 1894

1894a. *Diaphanosoma sarsi* Richard, *Ann. MUs. Civico. Stor. nat. Genova.*, **14** : 565-578.

1898. *Diaphanosoma singalense* Daday, *Terms. Fuzetek.*, **21** : 1-123.

Material examined : 24PN and 24PS; Natibpur Jhill, Bagnan Jhill, Santragachi Jhill of HAD; Ballavpur sanctuary, Dhatin jhill, Bakreswar pond and Gole Park - Rampurhat of BIR district.

Female : Body size 1.25 mm. Eye large, fills the head almost completely. Long setae on margin of ventral fold. Posteroventral corner with 17-23 spines. Postabdomen with characteristic setae on the lateral side.

Distribution : India-Bihar, Rajasthan, Meghalaya, Tamil Nadu and Tripura.

5. ***Diaphanosoma brachyurum*** (Lieven, 1848)

1848. *Sida brachyura Lieven, Achr. Naturf. Ges. Danzig.*, **4** : 22.

1900. *Diaphanosoma brachurum* Lilljeborg. Nova *Acta Reg. Soc. Sci. Upsaliensis, Ser.* III, **19** : 1-701.

Material examined : Jagatpur Jhill, Khanakur of HYD; Hooghly river of Calcutta and Damodar river of HAD.

Female : Body size 0.8 mm. Head large, without rostrum, fornix or ocellus. Carapace almost oblong; posterodorsal corner with a distinct angle, dorsal margin slightly rched. Ventral margin of valves with series of setae, distal part of ventral margin small denticles. Head large, with sloping anterior margin. Eye large; located near the anterior ventral margin of head, Postabdomen narrow. Claw with three basal spines decreasing in the size proximally.

Distribution : India-Kashmir. Elsewhere-Bangladesh, China and Holarctic.

Family II DAPHNIIDAE

Key to West Bengal Genera and Species of Daphniidae

1. Valves with elongated posterodorsal spine..... 2

Valves without posterodorsal spine..... 3

2. Valves with only one posterior spine long in size ..... ***Daphnia*** O.F. Muller, 1785

   Valves with more than one spine short and less visible..... ***Ceriodaphnia*** Dana, 1853

3. Ventral margin straight ending with a large spine at posteroventral corner .....

   ..... *Scapholeberis kingi* Sars, 1903

   Ventral margin curved ending smoothly at posteroventral corner .....

   ..... ***Simocephalus*** Schoedler, 1858

Key to the West Bengal species of ***Ceriodaphnia***

1. Ventral side of head with a short beak..... *Ceriodaphnia cornuta* Sars, 1885

   Ventral side of head without a short beak..... *Ceriodaphnia reticulata* (Jurine, 1820)

6. *Ceriodaphnia cornuta* Sars, 1885

1885. *Ceriodaphnia cornuta Sars, Norske. Vidensk. selsk. Forhandl. Chirstiania*, **8** : 1-46.

1894b. *Ceriodaphnia rigaudi* Richard, *Revue. Biol. Nord. France*, **6** : 360-378.

Material examined : 24PN and 24PS; Shibpur, Gadhiara, Santragachi Jhill, Damodar river of HAD; Dankuni Jhill, Triveni jhill, Baluguri jhill, Rupnarayan river and Krishnanagar Digni of HYD; Ballavpur sanctuary and Tilpara barriage of BIR.

Female : Body size 0.39 mm. Head depressed and separated from the carapace by a dorsal impression. Antennules short and broad, with a long seta and a group of sensory setae on the apex. Eye large, ocellus absent. Postabdomen with four or five curved denticles. Claw long, gently curved with a series of setules along the concave surface.

Remarks : Very common. Occurs in all types of habitat, especially shallow ponds. Both horned and hornless individuals are found together with D. excisum and M. micrura.

Distribution : India-Andaman and Nicobar Islands, Rajasthan, Meghalaya, Tamil Nadu and Tripura states. Elsewhere-South East Asia, China and other tropical regions.

7. *Ceriodaphnia reticulata* (Jurine, 1820)
(Figs. 8-9)

1820. *Ceriodaphnia reticulatus* Jurina, *Geneve et Paris*, 1-260 pp.

1901. *Ceriodaphnia reticulata* Sars. *Arch. Math. Nat.*, **23** : 1-102.

Material examined : Shibadaha, Dadkhali and Santragachi jhill of HAD.

Female : Body size 0.82 mm. Valves reticulated. Head rounded, antennule small; sensory seta near apex of antennule. Eye large filling frontal region of head; ocellus small. Postabdomen with 7 marginal spines and claw with a distinct pecten of 5-6 teeth.

Distribution : India Bihar and Rajasthan. Elsewhere Africa, South America and Holarctic regions.

Key to the West Bengal species of ***Daphnia***

1. Anterior side of head with a spine of variable length..... *Daphnia lumholtzi* Sars, 1885

   Anterior side of head rounded..... *Daphnia similis* Claus, 1876

8. ***Daphnia lumholtzi*** Sars, 1885

1885. *Daphnia lumholtzi Sars, Norske idensk Selsk. Forhand. Christiania.*, **8** : 1-46.

Material examined : 24PN and 24 PS; Natibpur jhill, Bagnan jhill, Birshibpur, Udayanarayanpur of HAD; Dhankuni jhill and Hatgacha jhill of HYD; Ballavpur sanctuary and Tilpara barrage of BID and MED districts.

Female : Body size 1.52 mm. Head with pointed helmet. Rostrum small, Fornex well developed. Body rounded. Dorsal and ventral margins with a series of spines. Postabdomen long and narrow with 9-11 denticles on the dorsal side.

Distribution : India-Orissa, Andhrapradesh, Rajasthan, Bihar and Tamil Nadu. Elsewhere-Malaysia, Africa, Australia and Europe.

9. ***Dapnia similis*** Claus, 1876
(Figs. 10-11)

1876. *Daphnia similis* Claus, *Wissen Sch. Zool.*, **27** : 363-402.

Material examined : Udayanarayanpur of HAD; Ballavpur sanctuary and Rajgram flood plains of BIR.

Female : Body size 2.24 mm. Body slightly compressed, elliptical in shape. Head rounded anteriorly, rostrum pointed ventrally; antennules short, attached to the posterior margin of the rostrum. Eye large, situated slightly closer to the anteroventral margin of the head. Postabdomen narrow distally with about nine pointed denticels and with a depression at 1/3 from the distal region.

Distribution : India-Rajasthan and Tamil Nadu. Elsewhere - South East Asia.

10. ***Daphnia carinata*** King, 1853

Material examined : Bon-Hooghly, Sarisha, Thakurpukur of 24PS, Baranagar of Calcutta.

Remarks : There is confusion in the identification of this species in India and South East Asia. Fernando (1980) identified this species as Daphnia similis and further concluded that D. carinata occurs in temperate and subtemperate regions.

Key to the West Bengal species of ***Simocephalus***

1. Posterior margin of carapace with a short protuberance.....
.....*Simocephalus latirostris* Stingelin, 1906
Posterior margin of carapace with or without a protuberance.....2

2. Postabdomen with more than 10 anal spines ..... *Simocephalus vetulus* (O.F. Muller, 1776)
Postabdomen with 5 anal spines.....*Simocephalus exspinosus* (Koch, 1841)

11. ***Simocephalus vetulus*** (O.F. Muller, 1776)

1776. *Daphnia vetula* O.F. *Muller, Havniae*, 1-282 pp.

1898. *Simocephalus vetuloides* Sars, *Zool. Mus. Imp. Acad.* Sc. 3.

1971. *Simocephalus elizabethae* (King) Biswas, *Rec. Zool. Soc. India.*, **16** : 92-98.

Material examined : Natibpur jhill, Bagnan jhill, Kashipur Hugla jhill, Santragachi jhill, Udayanaranpur of HAD; Dankuni jhill, Triveni jhill, Baluguri jhill, Jagarpur jhill of HYD; Ballavpur sanctuary, Dhatin jhill, Sathsowtheen dighi of Karkaria mode and Gole Park of Rampurhat of BIR; Achipur, Amtala, Bon-Hooghly of 24PS, Behala, Baranagar, Dhakuria lake, Indian Museum tank and Thakurpukur of Calcutta.

Female : Body size 2.2 mm. Shape broadly oval or rhomboid. Dorsal margin moderately to strongly arched; posterior part of dorsal margin with distinct denticles. Head small with large eye and elongated ocellus. Postabdomen with 10 anal spines and a long, curved and denticulated claw.

Distribution : India-Punjab, Kashmir, Karnataka, Bihar and Tripura.

12. ***Simocephalus exspinosus*** (Koch, 1841)

1841. *Daphnia exspinosa* Koch, *Rosenberg. Hefts.* 8, 35, 36, 37.

1916. *Simosa australiensis* Sars, *Ann. S. Afr. Mus.*, **15** : 303-451.

Material examined : Shibadaha, Dadkhali, Santragachi jhill, Amta Guest House pond of HAD; Dhankuni jhill, Triveni jhill, and Hatgacha jhill of HYD, Budge Budge. Memanpur of 24PS and Ballavpur sanctuary of BIR.

Female : Body size 1.8 mm. Shape sub-rhomboidal, expanded posteriorly. Head projecting with curved anterior end. Ventral margin of carapace with denticles. Eye small and ocellus rhomboid in shape. Postabdomen with 10-12 ciliated denticles. Claw long with a distinct basal pecten at the base.

Distribution : India - Meghalaya and Rajasthan. Elsewhere-cosmopolitan.

13. ***Simocephalus latirostris*** Stingelin, 1906

1906. *Simocephalus latirostris* Stingelin, *Zool. Jahrb. Syst.*, **21** : 327-367.

Material examined : Shibadaha, Dadkhali, Santragachi jhill of HAD; Dhankuni jhill of HYD.

Female : Body size 1.32 mm. Carapace almost oval in outline produced posteriorly into a distinct conical spin bearing hyaline spinules near tip. Posterior region of dorsal margin of valve with spinules. Eye large, ocellus rhomboid shape. Antennuels slightly longer than rostrum, slightly tepering, lateral seta inserted near the tip. Postabdomen with 5 anal spines.

Distribution : India - Rajasthan and Tripura.

14. ***Scapholeberis kingi*** Sars, 1903

1903.*Scapholeberis kingi Sars, Arch. Math. Nat.*, 25 : 1-44.

1853.*Daphnia mucronata* King, *Proc. R. Soc. van. Diemans Land*, **2** : 243-263.

Material examined : Natibpur jhill, Kashipur Hugle jhill, Santragachi jhill, Damodar River and Udyanarayanpur of HAD; Dhankuni jhill, triveni jhill, Baluguri jhill and Gholla Kirshnanagar dighi of HYD; Baranagar of Calcutta; Bon-Hooghly of 24PS and Ballavpur sanctuary of BIR.

Female : Body size 0.59 mm. Body rounded dorsally. Head small and slightly depressed, rostrum rounded and projecting ventrally. Eye large, ocellus small, situated closer to the rostrum than to the eye. Valves with lines and reticulations; posterior ventral margin has a long denticle. Postabdomen broad, dorsal margin with five or six denticles. Claw curved dorsally with spinules along the concave surface.

Distribution : India - Andaman and Nicobar Islands, Kashmir, Rajasthan, Meghalaya, Assam and Tamil Nadu. Elsewhere - Africa, North and South America, South East Asia and China.

Remarks : Occurs in the surface of the water body.

Family III. MOINIDAE

Key to the West Bengal Genus and Species of Moinidae

1. Ocellus present.....*Moinodaphnia macleayi* (King, 1853)
   Ocellus absent.....2

2. Claw with strong pecten ..... *Moina weismanni* Ishikawa, 1896

   Claw lacking a distinct pecten ..... *Moina micrura* Kurz., 1874

15. *Moina micrura* Kurz, 1874

1820. *Monoculus rectirostris* Jurine, Paris, 1-260.

1874. *Moina micrura* Kurz, *Sitzber. K. Acad. wiss. Wein. Math. Nat.*, **69** : 40-46.

1892. *Moina dubia Guerne et* Richard, *Mem. Soc. Zool. France.*, **5** : 526-538.

Material examined : 24PN and 24PS; Natibpur jhill, Kashipur Hugla jhill, Shibadaha, Udyanarayanpur of HAD; Hatrgacha jhill, Jugihido dighi, Jagatpur jhill and Madrasipara dighi of HYD; Behala of Calcutta, Barisha, Barrackpore, Baruipur, Amtala, Mahestala, Sarisha of 24PS; Rajgram flood plains and Tilpara barriage of BIR.

Female : Body size 0.73 mm. Head large, rounded with a deep cervical depression posteriorly. Eye large, ocellus absent. Antennules long and movable with a group of sensory setae on apex. Postabdomen with 6-8 ciliated lateral spines. Claw long, slightly curved dorsally, with pecten at base.

Distribution : India - Bihar, Rajasthan, Tamil Nadu, Tripura and Andaman and Nicobar Islands. Elsewhere - Africa, USSR, South East Asia and Europe.

Remarks : Very common. This is the most widely distributed species of the genus Moina.

16. *Moina weismanni* Ishikawa, 1896

1896. *Moina weismanni* Ishikawa, *Zool. Mag. Tokyo.*, **8** : 1-6.

1953. *Moina van mandi-floue* Brehm, *Ost. Zool. Zeit.*, **4** : 241-345.

Material examined : Gholla Krishnanagar Dighi of HYD.

Female : Body size 1.23 mm. Supraocular depression apparent; head broadly rounded, eye large and situated near front margin of head. Antennule situated on the ventral side of hed with rows of small spines and hair like processes at the posterior margin upto the tip. Ventral rim of the valve with seventeen to twentyone setae followed by groups of shorter spines numbering five to seven increasing in size posteriorly. Postabdomen with 7-9 lateral feathered teeth and a bident tooth. Claw with setae on concave margin.

Distribution : India - Gujarat and Tamil Nadu. Elsewhere Japan, China and South East Asia.

17. *Moinodaphnia macleayi* (King, 1853)

1853. *Moina macleayi* King, *Pap. Proc. R. Soc. van. Diemans Land*, **2** : 243-263.

1901. *Moinodaphnia macleayi* Sars, *Arch. Math. Nat.*, **23** : 1-102.

Material examined : Santragachi jhill of HAD and Bon-Hooghly of 24PS.

Female : Size 0.81 mm. Head with distinct cervical depression. Eye large, ocellus small, situated closer to antennules than to eye. Antennules slender with long lateral seta and a group of sensory setae on the apex. Ventral margin of valve rounded with series of short marginal spines. Postabdomen without anal denticles, lateral surface with 8-10 ciliated spines. Claw long with a series short setules along concave surface.

Distribution : Andaman and Nicobar Island, Rajasthan and Tamil Nadu.

Remarks : Not very common. Occurs only in the marshes.

Family IV. BOSMINIDAE

Key to the West Bengal Genera and species of Bosminidae

1. Antennules of female not united at the base, almost parallel to each other ..... *Bosmina longirostris* (O.F. Muller, 1776)

   Antennules united at base and diverging at apex ..... *Bosminopsis deitersi* Richard, 1895

18. *Bosmina longirostris* (O.F. Muller, 1776)

1776. *Lynceus longirostris* O.F. Muller, *Havniae* 1-273.

1862. *Bosmina longirostris* Sars, *Forhandl. vidensk. Selsk.* Christiania., 144-167.

Material examined : Damodar river of HYD; Hooghly River, Calcutta and Barisha of 24PS.

Female : Body size 0.59 mm. Shape oval. Posterodorsal corner distinctly angular, posteroventral corner with spines. Eye large. Antennules curved. Postabdomen quadrate. Claw with spinules.

Distribution : India-Kashmir and Meghalaya. Elsewhere cosmopolitan.

19. *Bosminopsis deitersi* Richard, 1895
(Figs. 12-13)

1895. *Bosminopsis deitersi* Richard, *Bull. Soc. Zoll. de France.*, 20 : 96-98.

1984. Bosminopsis *devndrai* Rana, *J. Bombay Nat. Hist. Soc.*, **81** : 668-669.

Material examined : Kashipur Hugla jhill, Santragachi jhill, Damodar river of HYD; Hooghly River, of Calcutta.

Female : Body size 0.38 mm. Body oval. Head rounded, rostrum long with two lateral branches. Eye large. Valves with polygonal reticulation, dorsal margin with cervical depression, ventral margin with a long and pointed marginal spine on the posteroventral corner. Postabdomen with 4-6 groups of short spinules. Claw serrated with a large basal spine.

Distribution : India - Delhi and Rajasthan. Elsewhere South East Asia, Africa, North and South America.

Remarks : Not common. Occurs in open waters and rivers.

Family V. MACROTHRICIDAE

Key to the West Bengal genera and Species of MACROTHRICIDAE

1. Postabdomen with long spines..... *Ilyocryptus spinifer* Herrick, 1882.

   Postabdomen with small spines 2

2. Antennules short and broad and not widening distally..... *Guernella raphalis* Richard, 1892

   Antennules long and widening distally 3

3. Ventral setae of the carapace not arranged in groups..... *Grimaldina brazzai* Richard, 1892

   Ventral surface of the carapace arranged in groups of three 4

4. Exopodite of the leg IV with three bristles..... *Macrothrix spinosa* King, 1852

20. *Macrothrix spinosa* King, 1852

(Figs. 14-15)

1853. *Macrothrix spinosa* King, *Pap. Proc. R. Soc. van Diemans Land*, **2** : 243-263.

1915. *Macrothrix spinosa dentata* Phayfair, *Proc. Linnean Soc. N.S. Wales.*, **34** : 93-151.

Material examined : Synop cotton mill, Natibpur jhill, Kashipur jhill, Shibpur, Birshipur, Santhragachi jhill, Damodar river of HYD; Dhankuni jhill, Triveni jhill, Jugihido dighi, Baluguri jhill and Kanakund jhill of HYD; Ballavpur sanctuary, Tilpara Barriage and Sainthia jhill of BIR.

Female : Body size 0.41 mm. Body rounded oval; dorsal margin serrated. Head rounded, ventral margin slightly concave with slightly pointed anteroverntal corner. Antennules short, with a long seta near its base. Eye large, ocellus small and situated much nearer to the base of antennules than to the eye. Postabdomen broadly rounded. Claw short and serrated on the concave surface.

Distribution : India - Andaman and Nocobar Islands, Manipur, Rajasthan, Tripura and Tamil Nadu. Elsewhere - Cosmopolitan.

Remarks : Very common. Occurs in all types of habitates.

21. *Macrothrix goeldii* Richard, 1897

Material examined : Museum tank Calcutta collected by Dr. N. Annandale 26-3-1903 (Vial contains no specimens. Michael and Sharma, 1989).

Female : Body size 0.56 mm. Shape oval with minute serrations on dorsal margin of carapace. Antennule with row of bristles at distal end and anterior margin with 6 notches. Postabdomen with sharp teeth and bristles. Claw with setae on concave margin.

Distribution : India - Rajasthan. Elsewhere South America and Africa.

Remarks : Not found in the present study.

22. *Echinisca triserialis* Brady, 1886

1886. *Echinisca triserialis* Brady, *Intellectual Observer*, 12 : 416-424.

1971. *Echinisca triserialis* Smirnov, *USSR Acad. Sci. Zool. Institute Nova. Ser. No. 101. Leningrad*, 539 pp.

Material examined : Kashipur Hugla jhill, Shibpur, Kulai, Birshipur jhill, Malanchaberia jhill and Santragachi jhill of HAD, Dhankuni jhill, Jagatpur jhill and Kanakund jhill of HYD, Amtala, Baranagar, Bon-Hooghly and Sarisha of 24PS and Ballavpur sanctuary, Dhatin jhill of BIR.

Female : Size 0.56 mm. Body oval, dorsal margin with a slight cervical depression. Eye large, ocellus small and situated nearer to the apex of rostrum than to the eye. Antennules long with a long lateral seta. Antennae short with a longest seta having two or three longer spines in the middle. Postabdomen bilobed with rows of spines increasing in size proximally. Claw short and serrated without basal spine.

Distribution : India - Andaman and Nicobar Islands, Rajasthan and Tamil Nadu. Elsewhere Cosmotropical.

Remarks : Very common. Occurs in all the marshes of West Bengal.

23. *Guernella raphaelis* Richard, 1892

(Figs. 16-17)

1892. *Guernella raphalis* Richard, *Mem. Soc. Zool. France.*, **5** : 213-225.

Material examined : Malanchaberia and Santragachi jhill of HAD; and Dhatin jhill of BIR.

Female : Body size 0.38 mm. Body slightly oval. Head concave ventrally, eye large, ocellus situated closer to apex of rostrum. Antennules short and broad with a group of sensorysetae at apex. Valves with polygonal reticulations and serrated without setae. Postabdomen slightly bilobed with transverse rows of spinules and without anal denticles. Claw short without basal spines.

Distribution : India - Rajasthan and Andaman and Nicobar Islands.

Remarks : Not commoη, but occurs in decaying marshy regions.

24. ***Grimaldina brazzai*** Richard, 1892
(Figs. 18-19)

1892. *Grimaldina brazzai* Richard, *Mem. Soc. Zool. France*, **5** : 213-225.

Material examined : Malanchaberia jhill and Santragachi jhill of HAD.

Female : Body size 0.87 mm. Body quadrangular oval. Head small, eye large. Ocellus small and situated closer to apex of rostrum than to eye Antennules long and slightly segmented. Postabdomen bilobed with broadly rounded preanal margin. Postanal margin with two groups of long spines. Preanal corner with 2 large spines followed by a series of short spinules proximally. Claw long with basal spines.

Distribution : India - New Record. Elsewhere - Sough East Asia.

Remarks : Rare. Only a few specimens occurred in marshes.

25. ***Ilyocryptus spinifer*** Herrick, 1882

1882. *Ilyocryptus spinifer* Herrick, *10th Annual Rep. Ceol.* and *Nat. Hist. Surey Minn.*, 235-252.

1914. *Ilyocryptus halyi* var *longiremis* Stingelin, Mem. Soc. *neuchatel. Sci. Nat.*, **5** : 600-638.

Material examined : Synop cotton mill, Shibadaha, Damodar river of HAD; Kanakund jhill of HYD, Ballavpur sanctuary of BIR.

Female : Body size 0.76 mm. Body small. Eye large, ocellus small, situated about halfway between eye and base of antennules. Antennules long with a group of sensory setae on distal end. Valves with a series of long feather-like setae on ventral side. Postabdomen with slight depression in the middle. Preanal margin with eight marginal denticles, postanal margin with 12 denticles up to anal groove and with five long and stout spines on the lateral surface.

Distribution : India - Andaman, and Nicobar Islands, Rajasthan, Tamilnadu, Tripura and Meghalaya. Elsewhere South East Asia, China, Australia and North and South America.

Family VI. CHYDORIDAE

Key to the West Bengal Subfamilies of Family CHYDORIDAE

1. Two separate main head pores and two small pores situated between main pores .....
..... Sub family CHYDORINAE Stebbing, 1902

Two or three main pores and two small pores situated lateral to main pores at a distance .....
..... Sub family ALONINAE Frey, 1967

Key to the West Bengal Genera and Species of Subfamily CHYDORINAE

1. Valves with setae on the entire ventral margin 2

Valves with setae on inner side of ventral margin 3

2. Rostrum long ..... ***Pleuroxus*** Baird, 1843

Rostrum short and blunt ..... Alonella excisa (Fischer, 1854)

3. Posteroventral corner with more than one spine ..... ***Dunhevedia*** King, 1853

Posteroventral corner with or without spine 4

4. Labrum without plate-shaped process ..... Pseudochydorus globosus (Baird, 1843)

Labrum with plate shaped process ..... ***Chydorus*** Leach, 1816

Key to the West Bengal Species of Genus ***Pleuroxus***

1. Valves without striation ..... *Pleuroxus similis* Vavra, 1900

Valves with striation ..... *Pleuroxus deniculatus* Birge, 1879

26. ***Pleuroxus similis*** Vavra, 1900

1900. *Pleuroxus similis* Vavra, *Hamburger Magalhaensische Sammelreise, 2 Hamburg*, 23-24.

1914. *Pleuroxus similis* var *fuhrmanni Stingelin, Mem. Soc. neuchatel. Sci. Nat.*, **5** : 600-638.

Material examined : Synop cotton mill, Kashipur Hugla jhill, Santragachi jhill of HAD; Achipur, Baruipur, Memanpur and Takurpukur of 24PS; Ballavpur sanctuary and Goal Park of Rampurhat of BIR.

Female : Body size 0.38 mm. Posteroventral corner with 1-3 denticles. Carapace without ornamentations. Antennules small. Labrum with convex anterior margin. Postabdomen tapering distally with 10-13 anal spines.

Distribution : India Kashmir and Rajasthan. Elsewhere South East Asia, Australia, China and South America.

27. ***Pleuroxus denticulatus*** Birge, 1879

1879. *Pleuroxus denticulatus* Birge, *Trans. Wis. Acad.Sci. Arsts and Letts.*, **4** : 77-109.

Material examined : Shibadaha, Malanchaberia, Santragachil jhill, Burrul jetty Ghat of HAD; Takurpukur of 24 PS and Ballavpur sanctuary of BIR.

Female : Body size of 0.42 mm. Shape broadly oval with striated carapace. Posteroventral corner with 2-4 denticles. Rostrum long and pointed. Ocellus situated nearer to the eye than to apex of rostrum. Postabdomen with 14-16 denticles with two basal spines on the claw.

Distribution : India Andaman and Nicobar Islands. Elsewhere North and south America, Africa, China and Europe.

Key to the West Bengal species of genus ***Chydorus***

1. Valves without deep polygons 2

Valves with deep polygon ..... *Chydorus faviformis* Birge, 1893

2. Plate of labrum with denticles ..... *Chydorus barroisi* (Richard, 1894)

Plate of labrum without denticles 3

3. Plate of labrum pointed ventrally ..... *Chydorus ventricosus* Daday, 1898

Plate of labrum broadly rounded 4

4. Valves with short hair on the surface..... *Chydorus pubscens* Sars, 1901

   Valves without hair on the surface 5

5. Valves with strong reticulations ..... *Chydorus sphaericus* (O.F. Muller, 1776)

   Valves without strong reticulations ..... *Chydorus eurynotus* Sars, 1901

28. *Chydorus sphaericus* (O.F. Muller, 1776)

1776.. *lynceus sphaericus* O.F. Muller, *Havniae*, 1-273.

1971. *Chydorus sphaericus sphaericus* Smirnov, USSR Acad. Sci. Zool. Institute Noa Ser. No. 101. Leningrad, 539 pp.

1988. *Chydorus sphaericus* (O.F. Muller) Michael and Sharma, Fauna of India, Cladocera, 262 pp.

Material examined : Amtala, Mahestala, Takurpukur of 24PS and Baranagar, Dhakuria lake and Behala of Calcutta.

Female : Body size 0.32 mm. Shape spherical with posterodorsal corner of the valve distinct. Valves with pentagonal reticulation. Ocellus nearer to the eye than the apex of rostrum. Postabdomen with 7-10 anal denticles and claw with two basal spines.

Distribution : India Jammu and Kashmir, Meghalaya and Tamil Nadu. Elsewhere - Cosmopolitan.

29. *Chydorus ventricosus* Daday, 1898
(Figs. 20-21)

1898. *Chydorus ventricosus* Daday, *Termes. Fuzetek.*, **21** : 1-123.

1966. *Chydorus eurynotus* brehmi comb. n. Smirnov. *USSR Acad. Sci. No. 101. Leningrad*, 539 pp.

1971. *Chydorus brehmi* Biswas, *Crustaceana*, **11** : 113-114.

Material examined : Kashipur Hugla jhill, Shibadaha, Birshipur jhill, Malanchaberia of HAD; Baluguri jhill and Gholla Krishnanagar Dighi of HYD and Ballavpur sanctuary, Dhatin jhill of BIR.

Female : Body size 0.74 mm. Body oval. Posteroventral corner rounded, with denicle. Valves with hexagonal markings. Rostrum long and pointed. Labrum long, curved anteriorly and sightly pointed. Postabdomen long with distinct preanal corner. Dorsal margin with 9-10 anal denticles. Claw setulated along concave surface with basal spines.

Distribution : India - Gujarat, Andaman and Nicobar Islands, Rajasthan and Tamil Nadu Elsewhere South East Asia, Srilanka, China and Africa.

30. *Chydorus eurynotus* Sars, 1901
(Figs. 22-23)

1901. *Chydorus eurynotus* Sars, *Arch. math. Nat.*, **23** : 1-102.

Material examined : Kashipur Hugla jhill, Shibadaha, Birshipur jhill, Malanchaberia, Santragachi jhill, Barul jetty ghat, Damodar river of HAD and Dankuni jhill and Baluguri jhill of HYD.

Female : Body size 0.24 mm. Body oval, posterodorsal and posteroventral corners distinct. Valves with faint reticulation. Rostrum slightly curved posteriorly. Ocellus smaller than eye, situated closer to eye, than to apex of rostrum. Postabdomen with 10-12 short denticles. Claw with two basal spines.

Distribution : Elsewhere South East Asia, Africa and South America.

31. ***Chydorus faviformis*** Birge, 1893
(Figs. 24-25)

1893. *Chydorus faviformis* Birge, *Transc. Wis. Acad. Sci. Arts* and *Letts.*, **4** : 77-109.

Material examined : Kashipur Hugla jhill of HAD.

Female : Body size 0.45 mm. Shape rounded or oval. Posterodorsal and posteroventral corners of valves not distinct. Valves and shield with deep hexagonal cells. Ocellus smaller than eye situated much closer to the eye than to the apex of rostrum. Labral plate with convex anterior margin and blunt at the apex. Postabdomen with 8-10 anal spines. Claw with two basal spines.

Distribution : India Kashmir and Tripura. Elsewhere - South East Asia, Australia, China and North America.

32. ***Chydorus barroisi*** Richard, 1894

1894a. *Pleuroxus barroisi* Richard, *Revue Biol. Nord. France*, **6** : 360-378.

1895. *Chydorus barroisi* Sars, *Vidensk. Selsk. Skrifter* I. *Math.* Naturv. Klasses : 1-56.

1982. *Ephemeroporus barroisi* (Richard) Frey, *Hydrobiologia*, **86** : 231-261.

Material examined : Baranagar, Dhakuria lake of Calcuttta, Bon-Hooghly, Sarisha of 24P S, Shibadaha Birshipur jhill, Malanchaberia jhill, Santragachi jhill, Burrul jetty ghat, Damodar river of HAD; Dhankuni jhill, Baluguri jhill, Kanakund jhill and Khegnan Bandar jhill of HYD; Ballavpur sanctuary and Dhatin jhill of BIR.

Female : Body size 0.32 mm. Body elliptical in shape with a spine in the posteroventral corner. Carapace ornamented with striation. Labrum with 3-5 denticles. Postabdomen with 7-9 unequal spines and a long basal spine.

Distribution : India Gujarat, Rajasthan, Tamilnadu, Tripura and Andaman and Nicobar Islands.

33. ***Chydorus pubescens*** Sars, 1901

1901. *Chydorus pubescens* Sars, *Arch. Math. Nat.*, **23** : 1-102.

1955. *Chydorus kallipygos* Harding, *Trans. Linn. Soc. London.*, **1** : 329-354.

Material examined : Natibpur jhill Kashipur Hugla jhill, Goalapota, Garchmuke of HAD.

Female Body size 0.26 mm. Body rounded, dorsal and ventral margin bulge. Valves reticulated with dots within the hexagonal cells. Surface of valves with short hairs. Postabdomen narrow distally with 8-9 pointed denticles. Claw with 2 basal spines.

Distribution : India Assam. Elsewhere South East Asia.

Key to the West Bengal species of genus ***Dunhevedia***

1. Plate of labrum with denticles ..... *Dunhevedia serrata* Daday, 1898

   Plate of labrum without denticles ..... *Dunhevedia crassa* King, 1853

34. ***Dunhevedia crassa*** King, 1853

1853. *Dunhevedia crassa* King, *Pap. Proc. R. Soc. van Diemans Land*, **2** : 243-263.

1971. *Dunhevedia crassa crassa* Smirnov. USSR Acad. Sci. Zool. *Institute. Nova. ser. No. 101. Leningrad.* 539 pp.

Material examined : Bagnan jhill, Shibadaha, Birshipur, Malanchaberia, Santragachi jhill, Barul jetty ghat and Garchumke of HAD; Dhankuni jhill and Baluguri jhill of HYD, Ballavpur sanctuary jhill of HYD, Ballavpur sanctuary, Tilpara barriage, Dhatin jhill and and Sainthia bill of BIR.

Female : Body size 0.53 mm. Body curved dorsally. Posteroventral corner of valves with a bifurcated denticle. Rostrum blunt, labrum rounded with pointed apex. Ocellus small and situated slightly closer to eye than to apex of rostrum. Postabdomen with groups of scattered spinules, claw setulated with one basal spine.

Distribution : India Gujarat, Rajasthan, Tamil Nadu, Tripura and Andaman Nicobar Islands. Elsewhere : South East Asia, Australia and USSR.

Remarks : Not common. Occurs in marshes.

35. ***Dunhevedia serrata*** Daday, 1898
(Figs. 26-27)

1898. *Dunhevedia serrata Daday, Termes. Fuzetek.*, **21** : 1-123.

Material examined : Kashipur Hugla jhill of HAD and Khanayn Bandar jhill of HYD.

Female : Body size 0.63 mm. Body evenly curved dorsally, maximum height slightly before middle. Valves with distinct longitudinal lines. rostrum blunt. Ocellus smaller than eye, plate of labrum rounded and serrated on the anterior margin with pointed apex. Dorsal surface of postabdomen covered by groups of scattered spinules, and denticles slightly increasing in size distally. Claw with one basal spine.

Distribution : India Tamilnadu and Nicobar Islands and Rajasthan.

Remarks : Rare. Occurred in ponds and ricefields with aquatic macrophytes.

36. ***Pseudochydorus globosus*** (Baird, 1843)

Material examined : Calcutta.

Distribution : India Tamil Nadu and Meghalaya.

Remarks : Guerney (1907) recorded this species from Calcutta and after that it is not found again either by Sharma (1978) or during the present study.

37. ***Alonella excisa*** (Fischer, 1854)
(Figs. 28-29)

1853. *Lynceus nanus* Lilljeborg, Lund. 15, 222.

1854. *Lynceus excisus* Fischer, *Bull. Soc. Imp. Nat. Mosc.*, **27** : 423-434.

1988. *Alonella excisa* (Fischer) Michael and Sharma, Fauna of India, Cladocera, 262 pp.

Material examined : Shibadaha, Amta and Malanchaberia of HAD and Dhankuni jhill and Khnayn Bandar jhill of HYD.

Female : Body size 0.48 mm. Dorsal margin of valve arched, posterior margin straight with a denticle at the posteroventral corner. Valves with reticulation to form a honey-comb pattern. rostrum curved posteriorly. Postabdomen long with 7-8 groups of anal denticles and 6-8 groups of lateral setules. Claw with two basal spines.

Distribution : India Kashmir, Madhya Pradesh and Tripura.

Key to the West Bengal Genus and Species of the Subfamily ALONINAE

1. Lateral setae of postabdomen large ..... *Leydigia acanthocercoides* (Fischer, 1854)
   Lateral setae of postabdomen not large 2
2. Postabdomen tapering distally and short 3
   Postabdomen stright and long 4
3. Two or three main head pores ..... ***Alona*** Baird, 1843
   One main head pore 5
4. Body much longer than height ..... *Euryalona orientalis* (Daday, 1898)
   Body rounded ..... *Oxyurella singalensis* (Daday, 1898)
5. Posteroventral corner with small inconsipicuous spines on the margin .....
   ..... *Camptocercus australis* Sars, 1896
   Posteroventral corner without spines 6
6. Carapace with strong rectangular reticulation ..... *Graptoleberis testudinaria* (Fischer, 1848)
   Carapace without reticulations 7
7. Plate of labrum with serrated anteroventral margin ..... *Notoalona globulosa* (Daday, 1898)
   Plate of labrum without serration ..... ***Kurzia*** Dybowski and Growshowski, 1894

Key to the West Bengal species of ***Alona***

1. Average size usually more than 0.6 mm, postabdomen with more than 10 anal denticles 2
   Average size less than 0.6 mm, postabdomen with less than 10 anal denticles 3
2. Three connected median pore ..... *Alona quadrangularis* (O.F. Muller, 1785)
   Two connected median pore ..... *Alona affinis* Leydig, 1860
3. Labral plate convex anteriorly without a denticle 4
   Labral plate convex and with a denticle 5
4. Valves with longitudinal and transverse lines forming a rectangular pattern
   ..... *Alona rectangular* Sars, 1862
   Valves with only longitudinal lines 6
5. Postabdomen broadly rounded with long lateral setae and short basal spine .....
   ..... *Alona karua* (King, 1852)
   Postabdomen slightly tapering distally with long basal spine ..... *Alona monacantha* Sars, 1901
6. Valves with longitudinal lines, ventral margin forming an angle ... *Alona davidi* Richard, 1895
   Valves without or faint longitudinal lines 7

7. Distal end of postabdomen rounded 9

   Distal end of postaddomen projecting 8

8. Anal groove of postabdomen bordered by groups of spines or setae, dorsal distal corner forming an angle of 60° ..... *Alona guttata* Sars, 1862

   Valves with faint longitudinal lines and anal groove of postabdomen not bordered by groups of spines or setae ..... *Alona costata* Sars, 1862

9. Plate of labrum setulated on posterior margin ..... *Alona intermedia* Sars, 1862

   Plate of labrum not setultated on posterior margin 10

10. Head shield with 3 main pores ..... *Alona pulchella* King, 1853

    Head shield with 2 main pores ..... *Alona verrocosa* Sars, 1901

38. *Alona rectangula* Sars, 1862

1862. *Alona rectangula* Sars, *Forhandl. vidensk. selask.* Christiania, 144-167.

1971. *Alona rectangula rectangula Smirnov, USSR Acad. Sci. Zool. Institute Nova. Ser. No. 101. Leningrad.* 539 pp.

Material examined : Kanakund jhill of BIR, Amta, Bon-Hooghly, Shovakole, Takurpukur, Sarisha of 23PS, Saintia jhill of BIR.

Female : Body size 0.31 mm. Shape rectangular, maximum height slightly before middle. Posterodorsal corner with a slight angle, posteroventral corner rounded without denticle. Valves with striations forming a rectangular pattern. Antennules not reaching the apex of rostrum. Postabdomen with 7-8 groups of anal denticles and claw with long basal spine.

Distribution : India - Gujarat, Rajasthan, Meghalaya and Kashmir. Elsewhere — South East Asia, Africa and USSR.

39. *Alona pullchela* King, 1853

1853. *Alona pullchela* King, *Pap. Proc. R. Soc. van Diemens Land.*, **2** : 243-263.

1933. *Alona arenaria* Brehm, *Arch. Hydrobiol., Suppl.* **11** : 631-771.

Material examined : Synop cotton mill, Shibpur, Shibadaha, Birshipur, Malanchaberia, Santragachi, Barul jetty ghat of HAD; Jagatpur jhill of HYD, Ballavpur sanctuary of BIR; Budge-budge, Memanpur and Mahestala of 24PS.

Female : Body size 0.52 mm. Shape oval, without spines on the posteroventral corners and reticulations on the carapace. Antennules not reaching apex of rostrum. Labrum with pointed apex. Postabdomen with straight dorsal margin and 7-9 anal denticles present. Claw with a medium sized basal spine.

Distribution : India - Gujarat. Elsewhere-Cosmotropical.

40. *Alona monacantha* Sars, 1901
(Figs. 30-31)

1904. *Alona acuticostata* var. *tridentata* Stingelin, *Zool., Jahrb.* syst., **21** : 327-367.

1971. *Alona monachantha tridentata* Smirnov, *USSR Acad. Sci. Zool. Institute. Nova Ser. No. 101 Leningrad*, 539 pp.

1983. *Alona monacantha* (Stingelin) Idris, Penerbit University Pertanian Malaysia, 153 pp.

18-B—187/ZSI/Cal/98

Material examined : Malanchaberia of HAD.

Female : Body size 0.29 mm. Valves with longitudinal lines. Posterodorsal and posteroventral corner with 1-3 denticles attached submarginally. Ocellus smaller than eye. Antennules not reaching the apex of rostrum. Plate of labrum with a denticle on the anterior margin. Postabdomen with 7-8 anal denticles. Claw with long basal spine.

Distribution : India - Tamil Nadu and Rajasthan. Elsewhere - South East Asia.

41. ***Alona costata*** Sars, 1862
(Figs. 32 - 33)

1862. *Alona costata* Sars, *Forhandl. idensk. Selask. Christiania*, 250-302.

1900. *Lynceus costata* Lilljeborg, *Nova Acta, Reg. Soc. Sci. Upsala Ser. III*, 19, 465-468.

Material examined : Kashipur Hugla jhill, Shibadaha, Birshipur, Malanchaberia, Santragachi jhill and Barul jetty ghat of HAD.

Female : Body size 0.39 mm. Valves with longitudinal line, posterodorsal and posteroventral corners rounded. Antennules not reaching apex of rostrum. Ocellus smaller than eye, situated halfway between eye and apex of rostrum. Postabdomen with 9-11 anal denticles and 8-10 groups of lateral setae. Claw with a basal spine.

Distribution : India - Manipur and Uttarpradesh. Elsewhere - South East Asia, South America and USSR.

Remarks : New record to West Bengal.

42. ***Alona davidi*** Richard, 1895

1895. *Alona davidi* Richard, *Mem. Soc. Zool. France*, **7** : 237-243.

1971. *Alona davidi davidi* Smirnov, *USSR Acad. Sci. Zool. Institute Nova Ser. No. 101. Leningrad*, 539.

Material examined : Bagnan jhill, Kashipur Hugla jhill, Shibadaha, Kulai river and Santragachi jhill of HAD; Budge-Budge, Sarisha Mahestala, Memanpur of 24PS and Sainthia bill of BIR.

Female : Body size 0.35 mm. Maximum height slightly before middle. Posterodorsal and posteroventral corners rounded. Rostrum blunt. Ocellus smaller than eye. Postabdomen with prominent preanal and postanal corners. Claw with short basal spine.

Distribution : India - Rajasthan, Andaman and Nicobar Islands and Tamil Nadu.

Remarks : Common. Occurs only in marshes.

43. ***Alona quadrangularis*** (O.F. Muller, 1776)

1776. *Lynceus quadrangularis* O.F. Muller, *Havniae* : 1-273.

1850. *Alona quadrangularis* Baird, *Roy. Soc. London*, 1-364.

Material examined : Kashipur Hugla jhill, Birshipur and Malanchaberia of HAD and Dhatin jhill of BIR.

Female : Body size 0.83 mm. Shape rectangular with maximum height towards posterior side. Posterodorsal corner rounded and posteroventral corner with a row of spinules running towards dorsal side in groups. Valves ornamented with longitudinal lines usually forming rectangular cells. Ocellus smaller than eye. Postabdomen with 12-14 anal spines and a claw with basal spine.

Distribution : India - Assam and Tamil Nadu. Elsewhere - South East Asia, Ethiopian, Holarctic and Neotropical regions.

44. ***Alona kwangsiensis*** Chiang, 1965

1963. *Alona kwangsiensis* Chiang, *Acta. Zool. Sinica.*, **15** : 255-262.

Material examined : Gholla Krishnanagar Dighi of HYD and Santragachi jhill of HAD.

Female : Body size 0.45 mm. Shape oval in outline, maximum height slightly before middle. Ventral margin of valves with a series of setae, posteroventral corner rounded with 5 denticles attached marginally upto one third of the posterior region, followed by a row of setules running dorsally. Postabdomen with 7-8 denticles attached submarginally followed by 3 groups of spines along the anal grove. Claw with a very short basal spine basal spine close to the base.

Distribution : India Tripura. Elsewhere China.

45. ***Alona affinis*** Leydig, 1860

1860. *Lynceus affinis* Leydig, *Tubingen* : 1-252.

1971. *Biapertura affinis affinis* Smirnov, *USSR Acad. Sci. Zool. Institute Nova Ser. No. 101 Leningrad*, 539 pp.

Material examined : Shibpur and Santragachi jhill of HAD, Dhankuni jhill and Gholla Krishnanagar Dighi of HYD and Gole Park, Rampurhat of BIR and MED.

Female : Body size 0.73 mm Shape oblong with maximum height at the middle. Valves with hexagonal markings. Antennules not reaching the apex of rostrum. Labrum with anterior margin pointed. Postabdomen with 12-14 anal spines and a long basal spine.

Distribution : India Kashmir, Gujarat and Tripura. Elsewhere - South East Asia, USSR and Central Asia.

46. ***Alona karua*** King, 1853

1853. *Alona karua* King, *Pap. Proc. R. Soc. van Diemans Land* **2** : 243-263.

1971. *Biapertura karua* Smirnov. *USSR Acad. Sci. Zool. Institute Nova ser. No. 101. Leningrad.* 539 pp.

Material examined : Bagnan jhill, Kashipur Hugla jhill, Shibadaha, Kulai river, Birshipur jhill, Malanchaberia, Santragachi jhill of HAD; Dhankuni jhill, Hatgacha jhill, Baluguri jhill and Kanakund jhill of HYD and Amtala, Bon-Hooghly, Budge-Budge, Sarisha, Mahestala and Manikpur of 24PS.

Female : Body size 0.29 mm. Body with distinct lines and polygonal pattern. Posteroventral corner rounded with 2-3 denticles followed by a row of setules. Antennules not reaching apex of rostrum. Ocellus small situated closer to eye. Postabdomen broadly rounded. Claw with a short basal spine.

Distribution : India Andaman and Nicobar Islands, Meghalaya, Tamilnadu and Tripura. Elsewhere-Cosmopolitan.

Remarks : Very common. Occurs in all marshy habitats of West Bengal.

47. ***Alona verrucosa*** Sars, 1901
(Figs. 34-35)

1901. *Alona verrucosa* Sars, *Arch. Math. Nat.*, **23** : 1-102.

1988. *Biapertura verrucosa* Michael and Sharma, Fauna of India, Cladocera, 262 pp.

Material examined : Kashipur Hugla jhill, Shibadaha, Brishipur, Malanchaberia and Santragachi jhill of HAD and Dhankuni jhill of HYD.

Female : Body size 0.28 mm. Body elongated oval. Posteroventral and posterodorsal corners rounded. Antennules not reaching apex of rostrum. Ocellus small, situated slightly closer to eye than to apex of rostrum. Postabdomen with 5-6 denticles. Claw with a short basal spine.

Distribution : India Gujarat, Tamilnadu, Rajasthan and Tripura. Elsewhere South East Asia, Ethiopian and Neotropical regions.

48. ***Alona intermedia*** Sars, 1862

1890. *Alona intermedia* Sars, Forth. *vidensk. Selsk. Christiania.*, **7** : 1-74.

Material examined : Dhankuni jhill and Baluguri of HYD and Santragachi jhill of HAD and Ballavpur sanctuary of BIR.

Female : Body size 0.33 mm. Valves with longitudinal lines, posterodorsal and posteroventral corners rounded. Rostrum blunt, antennules not reaching apex of rostrum. Ocellus smaller than the eye and situated about half way between eye and apex of rostrum. Plate of labrum rounded anteriorly with a group of setules ventrally. Postabdomen with 8-9 anal denticles of 9-10 groups of lateral setae. Claw with a basal spine.

Distribution : India New Record. Elsewhere South East Asia.

49. ***Camptocercus rectirostris*** Schoedler, 1862

Material examined : Tank opposite to Park Street, Calcutta (Sharma 1978) (not found in the present study).

Female : Body size 0.76 mm. Shape oval with 3-5 denticles in the posteroventral corners. Rostrum pointed and directed anteriorly. Ocellus smaller than eye. Postabdomen long with 15-17 anal denticles and a long claw with a long basal spine.

Distribution : India Kashmir, Gujarat and Meghalaya. Elsewhere Holarctic, Ethiopian, South East Asia, Australia and USSR.

50. ***Camptocercus australis*** Sars, 1896
(Figs. 36-37)

1896. *Camptocercus australis* Sars, Arch. Math. Nat. 18 : 1-81.

Material examined : Kulai of HAD and Baluguri jhill of HYD.

Female : Body size 0.87 mm. Valves with longitudinal lines. Head smoothly curved. Posteroventral margin slightly convex with 3-4 small denticles. Ocellus smaller than eye, situated closer to the eye than to the tip of rostrum. Labrum wedge-shaped and slightly rounded at apex. Postabdomen long with 16-18 anal denticles. Claw long, curved dorsally.

Distribution : India New record, Elsewhere South East Asia.

51. ***Graptoleberis testudinaria*** (Fischer, 1851)
(Figs. 38-39)

1843. Alona reticulata Baird, Ann.. mag. Nat. Hist., 68 : 81-95.

1851. Lynceus testudinaria Fischer, mem. Acad.Sci. St. Petersb. Mem. Sav. entrang. 7 : 1-14.

1988. Graptoleberis testudinaria (Fischer) Michael and Sharma, Fauna of India, Cladocera, 262.

Material examined : Kashipur Hugla jhill of HAD.

Female : Body size 0.38 mm. Dorsal margin arched and ventral margin almost straight. Posteroventral corner with 3 denticles. Valves with longitudinal lines. Ocellus smaller than eye, situated closer to the eye than to the apex of rostrum. Postabdomen tapering distally with 6-7 groups of lateral setae. Claw with short basal spine.

Distribution : India - Kashmir and Tamil Nadu. Elsewhere - Cosmopolitan.

52. ***Oxyurella singalensis*** (Daday, 1898)

1898. *Alonopsis singalensis* Daday, *termes. Fuzetek.*, **21** : 1-123.

1957. *Oxyurella singalensis* Fryer, *Arch. Hydrobiol.*, **53** : 223-239.

Material examined : Kashipur Hugla jhill, Shibadaha and Santragachi jhill of HAD; Dhankuni jhill and Baluguri jhill of HYD; Barisha and Mahestala of 24PS and Ballavpur sanctuary of BIR.

Female : Body size 0.82 mm. Valves evenly rounded. Rostrum blunt, antennules not reaching the apex. Ocellus smaller than the eye and situated closer to the eye than to the apex of rostrum. Labrum round. Postabdomen long with 10-12 anal denticles which decrease in size proximally. Claw long with a long basal spine and three short spines proximal to the basal spine.

Distribution : India - Andaman and Nicobar Island, Rajasthan and Tamil Nadu. Elsewhere - South East Asia and Ethiopian regions.

Remarks : Not common. Occurs in the marshes only.

Key to the West Bengal species of ***Kurzia***

1. Antennules almost reaching apex of rostrum.....*Kurzia latissima* (Kurz., 1875)

   Antennules reaching to middle of rostrum.....*Kurzia longirostris* (Daday, 1898)

53. ***Kurzia longirostris*** (Daday, 1898)

1898. *Alona longirostris* Daday, *Termis. Fuzetek.*, **21** : 1-123.

1957. *Kurzia longirostris* Harding, *Explor. hydrobiol. Lac. Tanganyika Result. Scientifique.*, **3** : 53-89.

Material examined : Shibadaha, Kulai, Malanchaberia and Santragachi jhill of HAD; Kanakund jhill of HYD; Ballavpur sanctuary, Tilpara barriage, Gole park of Rampurhat of BIR, Sarisha of 24PS and Calcutta.

Female : Body size 0.45 mm. Valves without longitudinal lines. Rostrum long, antennules short, reaching half of the rostrum. Ocellus smaller than eye, situated nearer to the eye than to the apex of rostrum. Labrum with slightly pointed apex. Postabdomen long with 12 groups of denticles present dorsally; lateral side with 11-12 groups of short setules. Claw long with a short basal spine.

Distribution : India - Andaman and Nicobar Islands, Rajasthan and Tamilnadu. Elsewhere - Cosmotropical.

Remarks : Rare. Occurs among the weeds.

54. ***Kurzia latissima*** (Kurz, 1875)

1874. *Alona tenuirostris* Hellich, *Suzber. R. Bohm. ges. Wiss. Prag.*, **7** : 205-220.

1959. *Kurzia latissima* Frey, *Int. Rev. ges.Hydrobiol.*, **44** : 27-50.

Material examined : Kulai, Malanchaberia and Santragachi jhill of HAD; Barisha of 24PS, Ballavpur sanctuary and Dhatin jhill of BIR.

Female : Body size 0.52 mm. Shape slightly rectangular, with posterodorsal and posteroventral corner rounded without spines. Valves marked with longitudinal reticulations. Antennules not reaching the apex of the rostrum. Ocellus situated nearer to the eye than to apex of rostrum. Postabdomen long with 12 denticles and a basal spine.

Distribution : Elsewhere - Holarctic, Neotropical and USSR.

55. ***Euryalona orientalis*** (Daday, 1898)

1898. *Alonopsis orientalis* Daday, *Termes. Fuzetek.*, **21** : 1-123.

1905. *Euryalona orientalis* Daday, *Zoologica Stutgart.*, **18** : 154-233.

Material examined : Baramolla jhill, Kulai and Santragachi jhill of HAD; Rupnarayan river, Gholla Krishnanagar Dighi and Kegnan Bandar of HYD; Baranagar of Calcutta and Mahestala of 24PS.

Female : Body size 0.99 mm. Valves with rectangular reticulations.

Posteroventral margin of valves with series of setae. Rostrum blunt, antennules almost reaching apex of rostrum. Labrum rounded with a nipple-like structure on apex. Postabdomen long with 20 pointed denticles decreasing in size proximally. Claw with a very short basal spine.

Distribution : India - Andaman and Nicobar Islands, Rajasthan, Tamilnadu and Tripura. Elsewhere - South East Asia, Ethiopian and Neotropical regions.

Remarks : Common among weeds.

56. ***Notoalona globulosa*** (Daday, 1898)

1898. *Alona globulosa* Daday, *Termes. Fuzetek.*, **21** : 1-123.

1987. *Notoalona globulosa* Rajapaksa and Fernando, *Hydrobiologia*, **144** : 131 - 153.

Material examined : Kashipur Hugla jhill, Shibadaha, Birshipur jhill, Malanchaberia of HAD; Rupnarayan river, Gholla Krishnanagar dighi, and Kegnan Bandar of HYD; Achipur, Baruipur, Memanpur of 24PS and Ballavpur sanctuary and Dhatin jhill of BIR.

Female : Body size 0.36 mm. Valves with striations. Rostrum short and blunt, antennules not reaching the apex. Ocellus smaller than the eye, situated closer to the eye than to the apex of rostrum. Labrum serrated on anteroventral margin. Postabdomen long with 12 to 13 anal denticles, claw long with short basal spine.

Distribution : India - Andaman and Nicobar Islands, Rajasthan and Tamilnadu. Elsewhere - South East Asia, Neotropical and Neoarctic regions.

Remarks : Rare, Occurs in small numbers in marshes.

57. ***Leydigia acanthocercoides*** (Fischer, 1854)

1854. *Lynceus acanthocercoides* Fischer, *Bull. Soc. Imp. Nat. Mose.*, **27** : 423 - 434.

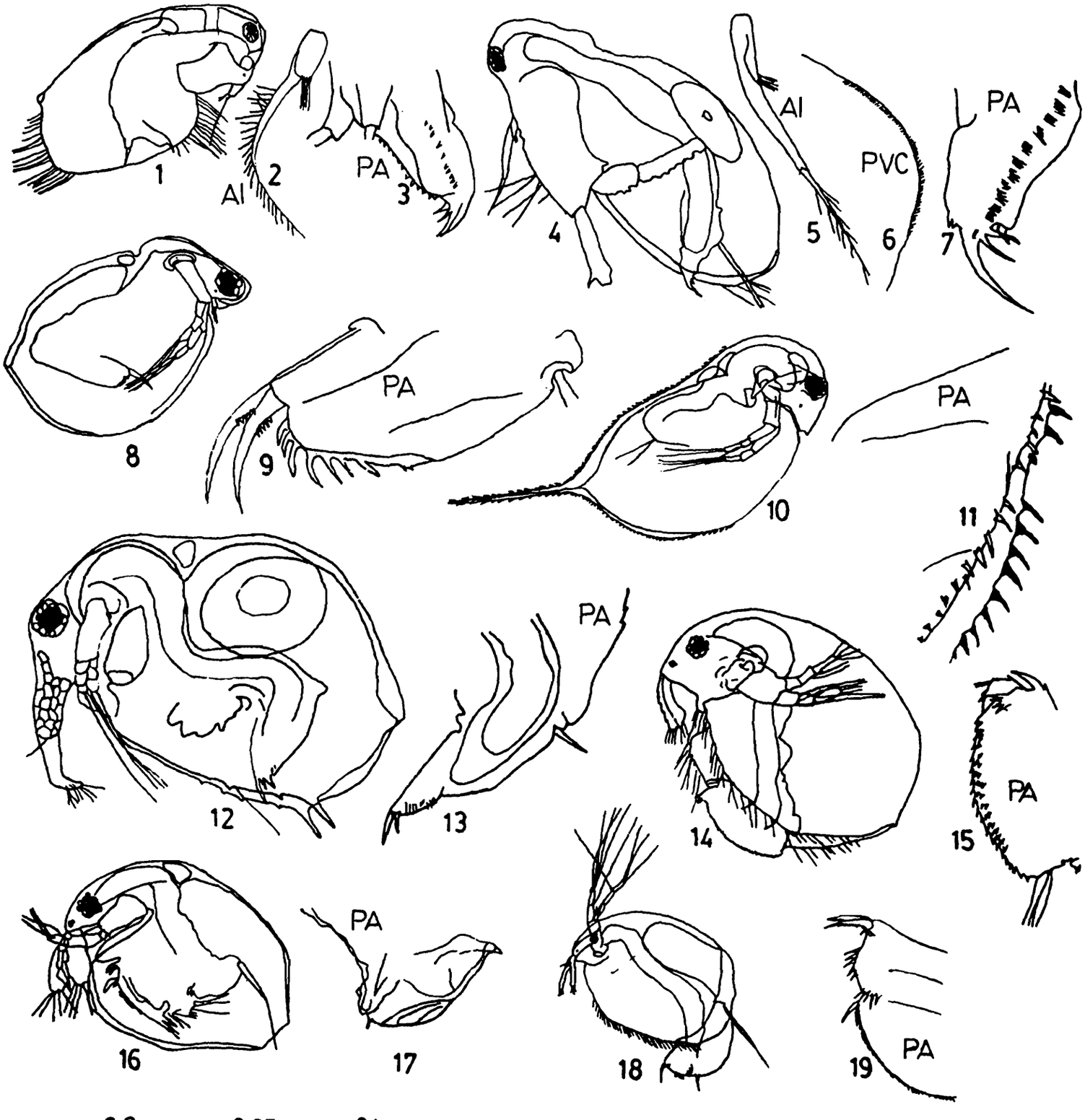
1875. *Leydigia acanthocercoides* Kurz, *Sitzber. K. Acad. wiss. Wein. Math. Nat.*, **69** : 40-46.

Material examined : Synop cotton mill of HAD; Ballavpur sanctuary of BIR; Bon-hooghly of 24PS and tank opposite Lindsay Street of Calcutta.

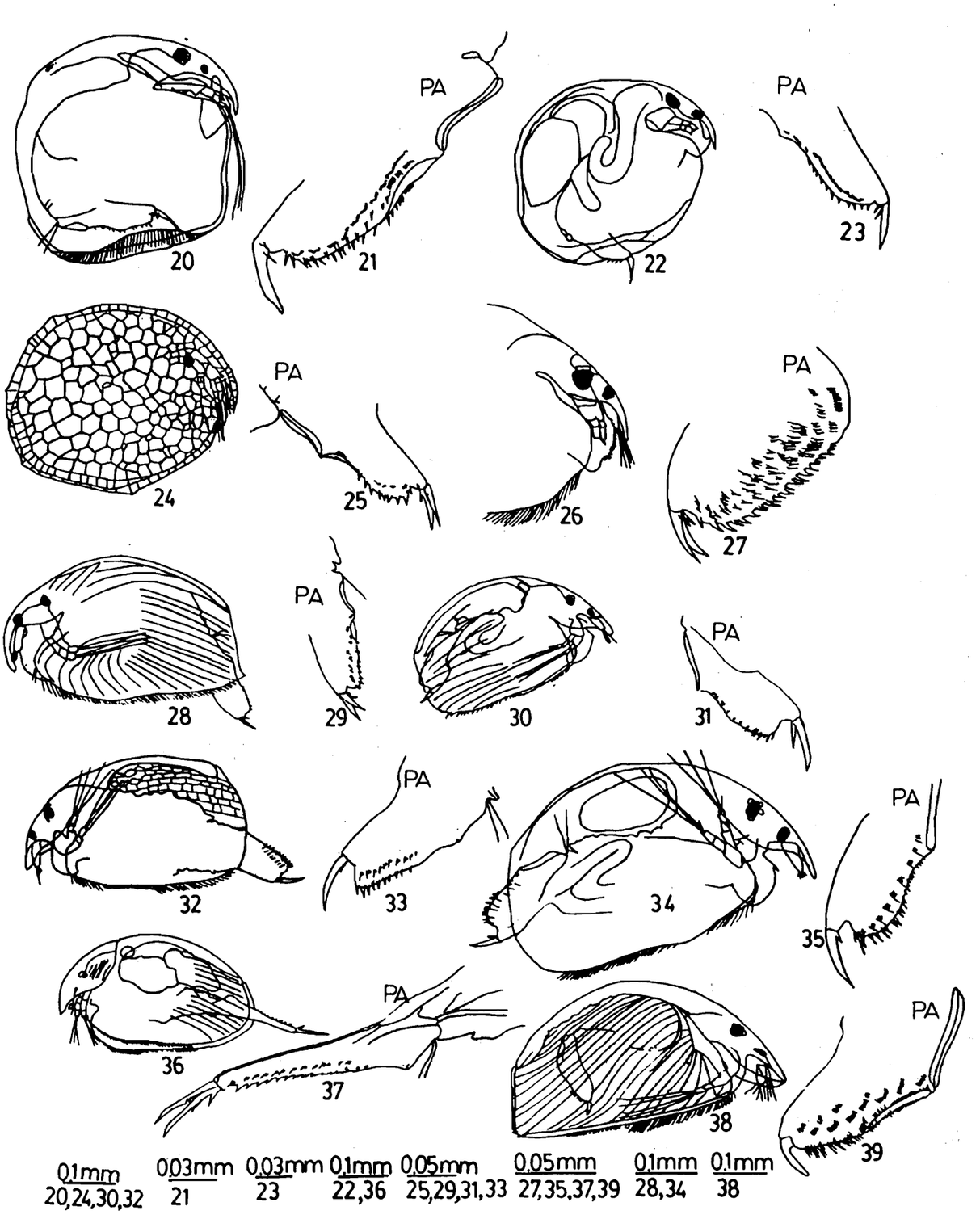
Female : Body size 0.89 mm. Valves with longitudinal lines. Rostrum blunt, antennules not reaching apex of rostrum. Ocellus smaller than eye, situated closer to the eye than to the apex of rostrum. Labrum rounded with fine setae. Postabdomen with about 18 groups of small denticles, each group consists of 3 or 4 denticles with the distal-most denticle being the longest of each group. Claw with a short basal spine.

Distribution : India - Gujarat, Rajasthan, Andaman and Nicobar Islands and Tamilnadu. Elsewhere South East Asia, Ethiopian, Neotropical and USSR.

Remarks : Rare. Occurs in reddish-brown ponds of West Bengal.



Figs. 1-19. Cladocera of West Bengal, females : 1-3. *Latonopsis australis*; 4-7. *Pseudosida bidentata*; 8-9. *Ceriodaphnia reticulata*; 10-11.*Daphnia similis*; 12-13. *Bosminopsis deitersi*; 14-15. *Macrothrix spinosa*; 16-17. *Guernella raphalis*; 18-19. *Grimaldina brazzai*.



Figs. 20-39. Cladocera of West Bengal, females : 20-21. *Chydorus ventricosus*; 22-23. *Chydorus eurynotus;* 24-25. *Chydorus faviformis*; 26-27. *Dunhevedia serrata*; 28-29. *Alonella excisa*; 30-31. *Alona monacantha*; 32-33. *Alona costata*; 34-35. *Alona verrucosa*; 36-37. *Camptocercus australis*; 38-39. *Graptoleberis testudinaria.*

SUMMARY AND DISCUSSION

Among the 400 species of Cladocera recorded in the world, India abodes only 90 species (Michael and Sharma, 1988). Sharma (1978) recorded 24 species from the South 24 parganas district and in the vicinity of Calcutta city of West Bengal, excluding 4 and 5 species by Gurney (1906, 1907) and Sewell (1935) respectively. In the present study as many as 57 species have been described including the previous records from West Bengal (excluding a few northern districts) among which 23 species are found to be new records to this region.

As per previous reports on Cladocera, in Western part of India, Rajasthan has 39 species (Venkataraman, 1992) and in South India, Tamilnadu has 39 species (Venkataraman, 1983). Andaman and Nicobar Islands have as many as 37 species of Cladocera (Venkatarman, 1991, 1993). A recent study on the North Eastern region yielded 49 species of Cladocera from Tripura (Venkataraman, 1993; Wetland survey report, Z.S.I., Calcutta) as well as 32 species from Assam and other neighbouring areas (Biswas, 1980). Thus, from the above studies, it is clear that West Bengal has more number of species of Caldocera than the other states mentioned.

Diversity of the limnetic Cladocera in West Bengal is very less then compared to other temperate regions. *Diaphanosoma excisum, Moina micrura and Ceriodaphnia cornuta* usually dominate the limnetic regions of tropical wetlands and this is found to be true in West Bengal too. Occasionally, *Daphnia lumholtzi, Daphnia similis, Moina weismanni and Bosmina longirostris* occur as limnetic cladocera. This scarcity of limnetic forms may be due to the predation pressure by insects and fishes as suspected by Fernando (1980) and Venkataraman (1983). However, the previous records on the occurrence of Cladocera also show that the number is always less in any tropical limnetic regions when compared to temperate regions. As mentioned earlier in the present study, most of the larger and smaller water bodies in West Bengal are used either as irrigation reservoir or as fish culture tanks. Fish culture practices are always a deterimental factor in the live food zooplankton species availability in any habitat.

The present study was made between the latitudes 22° - 23.5°N, almost closer to the temperate region and one may expect the availability of more number of temperate representation. Though, the high raised Himalayan mountains form as a barrier for the distribution of Cladocera from temperate region, due to the number of rivers flowing through this region, it is expected that more number of species of Cladocera from the north may be added to Indian records. This is found true due to the occurrence of several temperate Cladocera species in the flood plain regions of West Bengal, such as *Diaphanosoma brachyurum, Daphnia similis, Grimaldina brazzai, Chydorus pubescens, Chydorus faviformis, Leydigia acanthocercoides, Graptoleberis testudinaria, Alona intermedia, Alona costata, Alona rectangula and Camptocercus australis*. These species are extremely rare, occurring in very small number and only in one, two or three types of habitats. They have neither been recorded from West Bengal before nor from tropical and Oriental regions.The above mentioned species might have been introduced into West Bengal freshwater habitats recently from out side by means of passive spread by birds (Proctor et al., 1967), through food grains import (Mukhamediev, 1951) or due to the transport of fish fry (as many as 9 new variety of fishes are introduced in West Bengal and are nor replacing the native fish species; personal observation) for fish culture.

The study on the diversity of Cladocera in different types of habitats of West Bengal shows the following order. Among all the water bodies studied, Santragachi jhill and Ballavpur sanctuary have yielded as many as 17 species of Cladocera. Kashipur Hugla jhill, Dhatin jhill, Malanchaberia jhill, Dadkhali jhill and Gole Park of Rampurhat are some of the wetlands where the cladoceran diversity is more.

In the present study it was observed that the diversity of Cladocera increased by the presence or absence of aquatic macrophytes. This finding is supported by the suggestions of Synerholm (1974), Whiteside and Harmsworth (1967) and Quade (1969) also stated that the distribution of Cladocera is controlled by habitats and aquatic macrophytes rather than the lake types. Except Freyer (1968) no one has stressed the importance of the relationship between aquatic macrophytes and feeding habit, morphology and distribution of Cladocera. This is probably true in the case of Cladocera distribution in West Bengal, where the wetlands are eutrophic and have a wider variety of aquatic macrophytes.

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CRUSTACEA : COPEPODA : CALANOIDA & CYCLOPOIDA

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INTRODUCTION

In recent years, attention has been drawn to the importance of species of copepods as they constitute a major group of organisms in zooplankton representing 70-85% of the total population of the plankton organisms. Their important role in the food chain played in the fresh as well as marine waters is well known. Inspite of some attenton, our knowledge on copepoda specially calanoida and cyclopoida from West Bengal region remaince inadequate. In order to add to our knowledge on copepoda, the author, has given a brief account of 21 species of calanoida and 4 species of cyclopoida from West Bengal habitats.

The limits of West Bengal region included for the present study is the coastal belt of about 64 km comprising 800,000 ha; brackish and estuarine region of 200,000 ha and freshwater area of 240,000 ha within the boundaries of Assam and Bangla Desh in the east; Sikkim and Bhutan in the north; Nepal, Bihar and Orissa in the west and Bay of Bengal in the south. During the last few decades, several important contributions have been made on calanoid and cyclopoid copepods from the state of West Bengal specially by Sewell (1932, 1934); Gopalkrishnan (1971) and Roy (1978).

In the endeavor, to make this work as useful as possible to both the field worker for identfication and the expert who often is obliged to handle data at specific and generic level and even higher taxonomic categories. It is possible that a few species have been omitted although all available literature have been scrutinized. Neverthless, it may be that some references and citations have been omitted. It is indeed true that fauna of any group is a flexible work tool, capable of periodical updating through additons and revisions. However, the copepod fauna of West Bengal is rich and of diverse nature.

MATERIAL AND METHOD

The present study is based on the material collected by the author from fresh as well as estaurine water bodies of West Bengal and also the material present in the National collections of the Zoological Survey of India, Calcutta. During most of the author's collection trips, all available water bodies were carefully examined and random samples thus collected containing one or more species of copepods, during the period from 1975 to 1988.

Since, most of the planktonic organisms living in the open water are small, scattered and cryptic in habits, the major problem is concentration. For this purpose, a plankton net made of fine cotton, silk or nylon is most useful. Such net commonly terminates in a small (250 ml) vial. After the net is drawn through water at the depth of nearly one or two feet, it should be lifted up and the water is allowed to drain out until the catch has been concentrated in a small volume in the vial along with the water. A plankton haul containing full vial of samples was poured into jars, allowed to settle

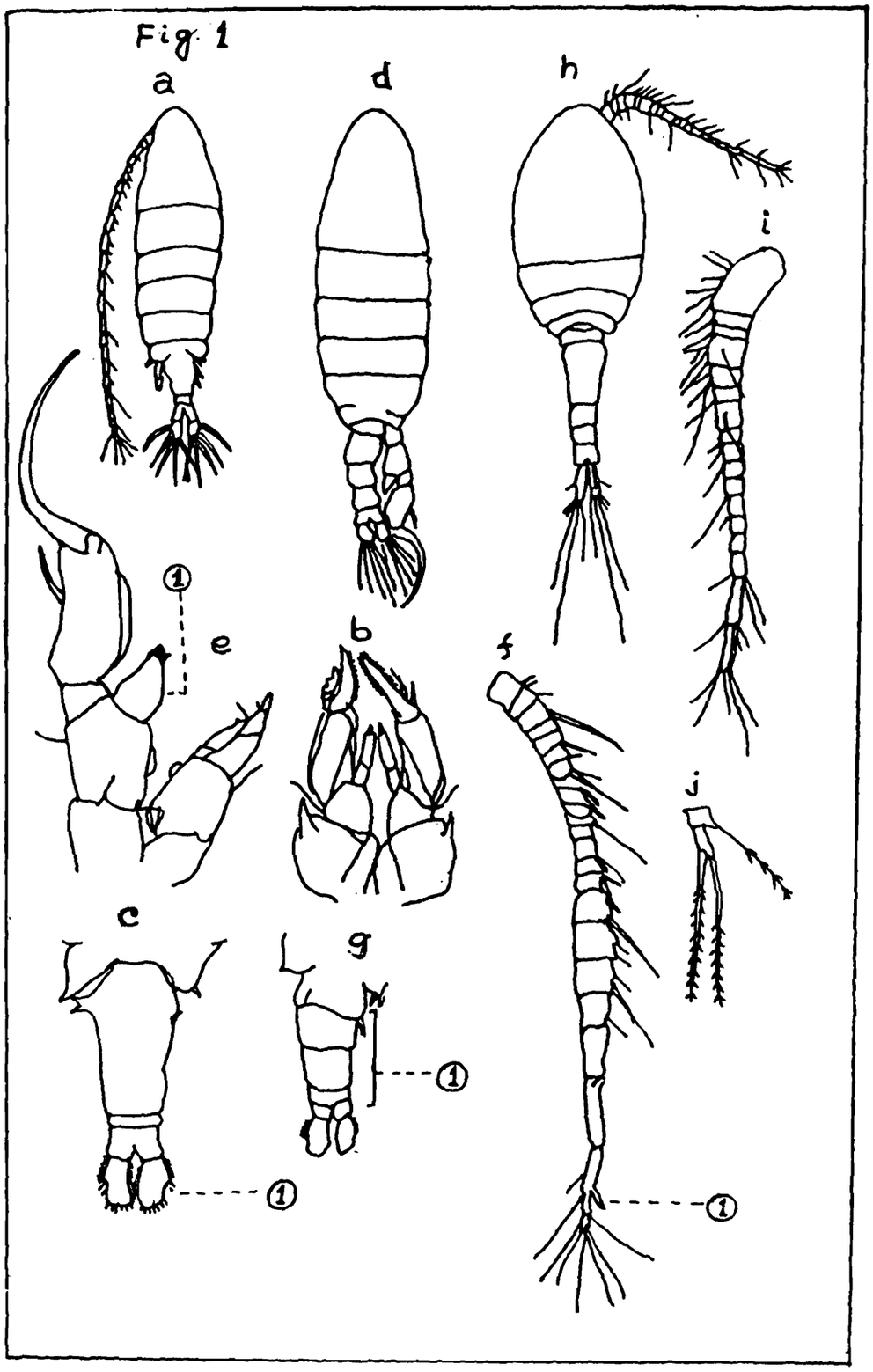


Fig. 1. Diagram of the Calanoid & Cyclopoid Copepod a-c adult female of calanoid; d-g adult male of calanoid & h-j adult female of cyclopoid. a = dorsal view; b = fifth pair of legs; c = fifth metasomal segment and urosome; c_1 = caudal ramus; d = dorsal view; e = fifth pair of legs; e_1 = endopod; f = right antennule; f_1 = antepenultimate segment; g = fifth metasomal segment and urosome; g_1 = urosome; h = dorsal view; i = anterior antennule; j = fifth pair of legs.

down to the surface as dead organisms within 10 to 15 minutes after pouring 5 to 10 drops of formaldehyde solution. The concentrated mass of the plankton samples can be collected after decanting off the water. Care should be taken to prevent any damage to the appendages and the organisms as a whole. For preservation, the excess of water mixed with formalcehyde solution should be poured off and the samples in small vials should be refilled with sufficient amount of fresh rectified spirit. To avod dryness, 3 to 4 drops of glycerine should also be added to the vial containing specimen. By the use of formaldyhyde solution as preservative, it was found that the appendages become stiff consequently the samples become gradually deteriorate. As the samples were taken, a record was made with date, location, type of vegetation in the water and a brief description of the surrounding place of the collecton sites. A label with containing the date, location and the name of the collector was also placed in the sample bottles. After sorting out the material in the collection, representative of the species (Copepods) in each sample were usually mounted by glycerine for rapid studies and ts advantage was that its showed fine structural details.

MORPHOLOGY AND TERMINOLOGY

Antennule — Two pairs of elongated sensory appendages on the heads of copepods, of which the first pair are usually called antennule.

Antepenultimate segment — A small projection of any shape or structure pertaining to the third segment of the distal part of the right antennule in male.

Basipod — The distal segment of the protopod of a biramous appendage of a crustacean.

Caudal ramus — Any branch like structure or barb of feathers appertaining to the tail region of the crustacean.

Cephalothorax — The body region formed by fusion of head and thorax in crustacea.

Endopod — The inner branch of the biramous limb of a crustacean.

Exopod — The outer branch of the biramous limb of a crustacean.

Genital region — Appertaining to the reproductive organ.

Metasome — The posterior region of the body of the crustacean, a term used especially when the phylogenetic segmentation pattern can not be identified.

Prosome — The anterior region of the body of the crustacean, a term used especially when the phylogenetic segmentation pattern can not be identified.

Rostrum — A pointed projection of the carapace between the eyes of a crustacean.

Spinnule — Covered with small spines.

Urosome — Abdominal region of the crustacean.

SYSTEMATIC ACCOUNT

List of Taxa recorded

Class CRUSTACEA

Sub Class COPEPODA

1. Order CALANOIDA

1. Family ACARTIIDAE

1. Genus ***Acartia*** Dana, 1846
   1. *Acartia chilkaensis* Sewell
   2. *Acartia plumosa* T. Scott
2. Genus ***Acartiella*** Sewell, 1914
   3. *Acartiella major* Sewell
   4. *Acartiella minor* Sewell
   5. *Acartiella tortaniformes* Sewell

2. Family DIAPTOMIDAE

3. Genus ***Arctodiaptomus*** Kiefer, 1935
   6. *Arctodiaptomus shillongensis* Reddiah
4. Genus ***Heliodiaptomus*** Kiefer, 1932
   7. *Heliodiaptomus cinctus* (Gurney)
   8. *Heliodaptomus contortus* (Gurney)
   9. *Heliodiaptomus viduus* (Gurney)
5. Genus ***Neodiaptomus*** Kiefer, 1932
   10. *Neodiaptomus madrasensis* sp. nov.
   11. *Neodiaptomus schmackeri* (Poppe & Richard)
   12. *Neodiaptomus sewelli* Roy
6. Genus ***Phyllodiaptomus*** Kiefer, 1936
   13. *Phyllodiaptomus blanci* (de Guerne & Richard)
7. Genus ***Tropodiaptomus*** Kiefer, 1932
   14. *Tropodiaptomus australis* Kiefer

3. Family PSEUDODIAPTOMIDAE

8. Genus ***Pseudodiaptomus*** Herrick, 1884
   15. *Pseudodiaptomus annandalei* Sewell
   16. *Pseudodiaptomus aurivilli* Cleve
   17. *Pseudodiaptomus binghami* Sewell
   18. *Pseudodiaptomus lobipes* Sewell
   19. *Pseudodiaptomus tollingeri* Sewell

4. Family PONTELLIDAE

9. Genus ***Labidocera*** Lubbock
   20. *Labidocera acuta* (Dana)
   21. *Labidocera Pavo* (Dana)

2. Order CYCLOPOIDA

5. Family CYCLOPIDAE

10. Genus ***Mesocyclops*** Sars, 1914

22. *Mesocyclops leuckarti* (Claus)

11. Genus ***Microcyclops*** Claus, 1893

23. *Microcyclops varicans* (Sars)

12. Genus ***Paracyclops*** Claus, 1893

24. *Paracyclops fimbriatus* (Fischer)

13. Genus ***Tropocyclops*** Kiefer, 1927

25. *Tropocyclops prascinus* (Fischer)

Class CRUSTACEA

Sub Class COPEPODA

Key to the Orders

1. **Body cylindrical and free living in habit** ..... Calanoida
2. **Body depressed, parasitic or free living in habit** ..... Cyclopoida

1. Order CALANOIDA

Key to the Families

1. **Head with distinct lateral hooks and two pairs of dorsal circular lenses present but cervical depression across centre of dorsal surface of head absent** 2

   No such hooks and lenses present on head region but a well defined cervical depression across centre of dorsal surface of head present ..... Diaptomidae

2. **Fifth leg biramose in female, uniramose in male, right leg with a weak chela** .....Pontellidae

   Fifth leg uniramose in both sexes, symmetrical in female and asymmetrical in male 3

3. **Endopods of male and female fifth leg present** ..... Acartiidae

   Endopods of male and female fifth leg absent .....Pseudodiaptomidae

1. Family ACARTIIDAE

Key to the Genera

Fifth leg uniramose in female : Urosome not elongated and ends in as long as broad caudal rami .....***Acartia*** Sewell

Fifth leg biramose in female : Urosome elongated and ends in two long caudal rami .....

.....***Acartiella*** Sewell

1. Genus *Acartia* Dana, 1846

1846. *Acartia Dana Am.J.sci.Ser.* 2: 1 (2) : 225-230.

Type Species : *Acartia negligens* Dana, 1849

Diagnosis : Slender body. Rostrum present. Metasome spindleshaped and strongly narrowed at both ends. Genital segment in female comparatively large which nearly as long as two abdominal segments combined. Exopods of all natatory legs 3-segmented and endopods 2-segmented. Fifth legs uniramose in both sexes. Urosome not elongated.

Remarks : The genus was established by Dana in 1846 to include some species chiefly from Pacific ocean. It is unquestionably clear that the genus *Dias* of Prof. Lilljeborg in 1853 is exactly identical with Dana's genus.

Key to the Species

A small notch on the middle of outer margin of the second exopod segment of fifth leg in female present.....*A. chilkaensis* Sewell

No such notch present on the middle of outer margin of the second exopod segment of fifth leg in female.....*A. plumosa* T. Scott

1. ***Acartia chilkaensis*** Sewell

1919. *Acartia chilkaensis* Sewell. *Rec.Indian Mus.*, **16**: 9, 1978. Roy, Phd Thesis : 219.

Material : 3 Females from Salt Lakes, 21.10.'88 (S. Sen & T. Roy Coll.).

Diagnosis : *Adult female* - Body cylindrcal with four imperfect divisions of prosome. Head and thoracic segment seperate. Rostrum having a small projection. Urosome three segmented. Genital segment almost twice longer than succeeding segment. Caudal rami symmetrical. First antennule reaches to genital segment when it folded back to body. It consists of 25 segments. Fifth leg almost symmetrical. It consists of three segments. Terminal portion of second exopod segment produced in a covered spinous process free from any sort of hairs. A small notch originates from outer margin which about middle of its length. A set of hairs present on inner margin of swollen base of third exopod segment.

Adult male : Unknown

Distribution : India : West Bengal : Hooghly river at Naihati, Nawabgunj, Ganga Joara, Lock Gate at Dhapa near Calcutta; Orissa : Chilka Lake. *Elsewhere* : Nil.

2. ***Acartia plumosa*** T. Scott

1894. *Acartia plumosa* T. Scott. *Trans.Linn.Soc.London.Zool.*, **6** : 66, 1974. Pillai, Phd. Thesis : 248.

Material : 2 Females & 2 Males from Salt Lakes, Calcutta, 21.10.'88 (S. Sen & T. Roy Coll.).

Diagnosis : *Adult female* - Body small and robust. Urosome three segmented. Genital segment nearly twice length of second urosome segment. Caudal rami symmetrical and about 21/2 times longer than wide. Spines or spinnules absent on urosomal segment. Right and left exopod segments possess long sub terminal plumose seta and an apical long and non-plumose seta with basal part of later dilated and gibbose in shape.

Adult male - Prosome similar to that of femele. Urosome five segmented. Second urosomal segment longer than third segment and possesses a series of minute spinnules along its posterior margin. Genital segment smallest in size. Caudal rami little asymmetrical and also right ramus little wider than left. Right fifth leg three segmented. Third right exopod segment nearly twice the length of second exopod segment,elongated and bent inwards and provided with a distal spine and an inner

margial spine. First right exopod segment with concave inner margin and second and third right exopods armed with a large plumose spine at its inner mid-margin and terminally with a short spine.

Distribution : India : West Bengal : Salt Lakes. *Elsewhere* : Congo : Bananah creek, Congo river and from Loanda Harbour.

2. Genus *Acartiella* Sewell, 1914

1914. *Acartiella* Sewell, *Spolia Zeylan.*, **9**: 191-263.

Type species : Acartia tortaniformes Sewell, 1912.

Diagnosis : Slender body. Rostrum absent. Prosome elongated. Fifth leg biramose with well developed internal ramus. First basal segment of right fifth leg in male usually with an inner process. Urosome elongated and ends in two long caudal rami.

Remarks : The genus *Acartiella* was created by Sewell in 1914 to accomodate two species *Acartiella tortaniformes* Sewell, 1912 and *Acartiella kempi* Sewell, 1914. According to him (1932 : 393) "In the main, the members of this genus are inhabitants of breckish water but may occur also in the sea, expecially around the mouth of rivers"

Key to the Species

1. A small naked seta present on anterior margin of second exopod segment of fifth leg in female ..... *A. tortaniformes* Sewell

   No such seta present on anterior margin of second exopod segment of fifth leg in female..... 2

2. Serrations absent on inner margin of claw (second exopod segment)..... *A. minor* Sewell

   Serrations present distally on 1/3rd of inner margin of claw (second exopod segment).....

   ..... *A. major* Sewell

3. *Acartiella major* Sewell

1919. *Acartiella major* Sewell. *Rec.Indian Mus.*, **16**: 13, 1978. Roy, Phd Thesis : 230.

Material : 3 Females & 1 Male from Gazikhal canal, Sunderbans, 2.9.'75 (T. Roy Coll.).

Diagnosis : *Adult female* - Body with five imperfect divisions of prosome and three unequal divisions of urosome. Wings of last pedigerous segment rounded and unarmed and both appear to be symmetrical. head provided with rounded anterior surface and little compressed on either side of cephalic region. Rostrum usually absent. 25-segmented first antennule when folded back to body reaches to end of third urosomal segment. Fifth leg somewhat symmetrical. Right fifth leg three segmented and endopod present. Third exopod segment swollen proximally and terminates in a blunt end. Dorsal portion of third segment serrated on both sides and a small spine originates from middle of outer margin only. Endopod small and serrated in half of outer margin.

Adult male - Body form similar to that of female. Wings of last pedigerous segment similar and bearing a small spine dorso-laterlly on either side of wing. Urosome four segmented. Type of caudal rami and their setae are similar to that of female. Left antennule resembles to that of female antennule. Right antennule modified to form a grasping organ. It consists of twentyfour segments. Fifth leg asymmetrical. Right leg longer than left. Right fifth leg consists of four segments. A well developed process called endopod originates from first exopod segment.

Distribution : India : West Bengal : Sunderbans, Salt Lakes; Orissa : Chilka Lake. *Elsewhere* : Nil.

4. ***Acartiella minor*** Sewell

1919. *Acartiella minor* Sewell. *Rec.Indian Mus.*, **16**: 15, 1978. Roy. Phd. Thesis : 228.

Material : 3 Females from Salt Lakes, Calcutta, 21.10.'88 (S. Sen & T. Roy Coll.).

Diagnosis : *Adult female* - Body rather long with five imperfect divisions of prosome. Wings of last pedigerous segment appear to be symmetrical. Postero-lateral corner of right wing has a small spine pointing downwards. Left wing devoid of any spine. Rostrum usually absent. Abdomen consists of four segments. Genital segment the largest. Caudal rami asymmetrical. Right being larger. First antennule when folded back reaches to middle of genital segment of urosome. It consists of twentyfive segments. Fifth leg somewhat symmetrical. Right fifth leg consists of one basipod, two exopod and one endopod segments. Second exopod segment arises from disto-lateral corner of first exopod segment. Proximal part of it wide while distal portion pointed. Left leg similar to that of right leg in all respects.

Adult male Unknown.

Distribution : India : West Bengal : Salt Lakes; Orissa : Chilka Lake. *Elesewhere* : Nil.

5. ***Acartiella tortaniformes*** Sewell

1912. *Acartia tortaniformes* Sewell. *Rec.Indian Mus.*, **7** : 346.

1978. *Acartia tortaniformes* Roy. Phd *Thesis* : 224.

Material : 7 Females & 5 Males from Chingrighata canal, 1914. (Marine Survey Coll.); from Uttarbhag, Lower Bengal, 1933 (Marine Survey Coll.); from Peerkhali canal, Sunderbans, 15.3.'85 (T. Roy Coll.); from Bidya river, Sunderbans, 15.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Body with five imperfect divisions of prosome. Wings of last pedigerous segment appear to be symmetrical. Rostrum absent. Postero-lateral corner of outer lobe of right wing has a hyaline spine. Urosomal segment consists of three segments. Genital segment larger than succeeding segment. Caudal rami symmetrical bearing six setae. First antennule consists of twentyfive segments. Fifth leg somewhat symmetrical. Right fifth leg consists of three segments (exopod) and one endopod segment. Distal portion of third segment serrated on both sides and a small spine originates from middle of outer margin only. Endopod small and serrated in half of outer margin.

Adult male Body form similar to that of female. Wings of last pedigerous segment smaller and bearing a small spine dorso-laterally on either side of wing. Urosome four segmented. Type of caudal rami and their setae similar to that of female. Left antennule resembles to that of female antennule. Right antennule modified to form a grasping organ. It consists of twentyfour segments. Fifth leg asymmetrical. Right leg longer than left. Right fifth leg consists of four segments. A well developed process called endopod originated from first segment. Third segment forms claw and bearing two small spines on inner margin. A small portion of distal end of claw serrated on both sides. Left fifth leg consists of three segments. Third segment arising from distal portion of second segment which is deep invagination at centre and fringed with a long spine on its inner margin and considerably swollen on middle of outer margin with a short spine on it. It is tipped with two stout and one weak spine.

Distribution : India : West Bengal : Sunderbans. *Elsewhere* : Bangla Desh : Chittagong; Burma : off hainguy Island.

2. Family DIAPTOMIDAE

Key to the Genera

1. Circular or semi-circular saw of terminal process of left fifth leg in male has marked radical or feeble striations 2

   No such circular or semi-circular saw of terminal process of left fifth leg in male 3

2. Endopod of fifth leg almost as long as first exopod segment and is tipped with two unequal setae in female ..... *Tropodiaptomus* Kiefer (*T. australis* Kiefer).

   Endopod of fifth leg shorter than first exopod segment and is tipped with fine hairs between two spinnules in female 5

3. Third exopod segment (claw) of right fifth leg narrow, cylindrical and curved inside with fine serrations on inner margin from distal region in male ..... *Phyllodiaptomus* Kiefer

   Third exopod segment (claw) of right fifth leg twice wider of its first half than its second half and two halves are marked by an oblique ridge and part of inner margin from distal region striated in male 4

4. Right endopod of fifth leg short, narrow and cylindrical in male .....

   ..... *Arctodiaptomus* Kiefer (*A. shillongensis* Reddiah)

   Right endopod of fifth leg short and little swollen at base of middle in male 5

5. Sinnuate claw of fifth leg has fine hairs on both sides in female ..... *Heliodiaptomus* Kiefer

   Sinnuate claw of fifth leg has highly conical and chitinised denticles on both sides sometimes naked on outer margin in female ..... *Neodiaptomus* Kiefer

3. Genus *Arctodiaptomus* Kiefer, 1935

1935. *Arctodiaptomus* Kiefer. *Zool.Anz. Leipzig.*, **109**: 113.

Type species : *Arctodiaptomus wierzeiskii* (Richard).

Diagnosis : Third exopod segment of right fifth leg forms claw which curved typically in male. Endopod of right fifth leg in male, large flask shaped tip with fine hairs between two spinnules. Exopod of left fifth leg in male, an irregular structure bearing a small blunt end terminally and a small pointed spine projecting subterminally. Endopod of left fifth leg smaller and thinner than its counterpart of right fifth leg.

Remarks : The genus *Arctodiaptomus* was established by Kiefer in 1935 and inhabits exclusively in freshwater bodies. This genus representing seven species from India of which six species restricted to mountaineous areas of North and remaining species, A. shillongensis from Meghalaya and also from plains of West Bengal.

6. *Arctodiaptomus shillongensis* Reddiah

1965. *Arctodiaptomus shillongensis* Reddiah. *Crustaceana*, 8(1) : 25 1978. Roy. Phd Thesis : 197.

Material : 5 Females & 6 Males from Bhagirathi river, Palasighat, Palasi, District Nadia, 6.3.'85 (T. Roy Coll.) and from Janaki Nagar, Palasi, District Nadia, 6.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* Body moderately cylindrical with imperfect six divisions of prosome. Abdomen consists of three segments. Genital segment, largest and almost equal in length of succeeding two segments. Identical caudal ramus present. Fifth leg somewhat symmetrical. It consists of right and left fifth leg. Right fifth leg consists of two basipod, two exopod and one endopod segments. Second segment (claw) slightly wider than that of left has a fine set of hairs on major part of inner margin. Endopod which almost half of length of first exopod segment, bears two spinnules at their tips.

Adult male - Male slightly differ in structure of right antennule, shape of fifth leg and size and segmentation of urosomal segment. Urosome consists of five segments of different sizes. Caudal rami symmetrical. Right antennule consists of twentythree segments. Fifth leg asymmetrical. Right fifth leg consists of two basipod, three exopod and one endopod segments. Right endopod much larger than counterpart of left leg. Third exopod segment which forms claw originates from distal portion of second exopod segment. Left fifth leg consists of two basipod, three exopod and one endopod segments. Endopod smaller and thinner than its counterpart of right fifth leg.

Distribution : India : West Bengal : Nadia District; Meghalaya : Shillong. *Elsewhere* : Nil.

4. Genus ***Heliodiaptomus*** Kiefer, 1932

1932. *Heliodiaptomus Kiefer. Zool.Anz.Leipzig.*, **100**: 265.

Type species : *Heliodiaptomus viduus* (Gurney) 1916.

Diagnosis : Anterior antennule slender and elongated and smaller than total length of body. Third exopod segment of ritht fifth leg in male forms claw which recurved and peculiarly twisted with serrations. Endopod of right rudimentary leg in male large and nearly cylindrical while in female, both right and left leg without terminal setae.

Remarks : The genus *Heliodiaptomus* was established by Kiefer in 1932 to accomodate six species of diaptomid. This genus is one of most common of Indian diaptomid genera, inhabits in fresh water bodies of temporary and permanent nature. This genus still to-date representing five species from India and three species from West Bengal.

Key to the Species

1. Second exopod segment (claw) of fifth leg in female denticulated on its both margins.....2

   Second exopod segment (claw) of fifth leg in female not denticulated but serrated on its both margins.....3

2. Third exopod segment (claw) of right fifth leg in male normal in shape..... *H. viduus* (Gurney)

   Third exopod segment (claw)of right fifth leg in male recurved and peculiarly twisted with serrations .....*H. contortus* (Gurney)

3. Both spines of right and left basipod segment of fifth leg in female are of same size,.....

   ..... *H. cinctus* (Gurney)

7. ***Heliodiaptomus cinctus*** (Gurney)

1907. *Diaptomus cinctus* Gurney. *Rec.Indian Mus.*, **1**: 29.

1981. *Heliodiaptomus cinctus* Reddy & Radhakrishna. *Hydrobiologia*, **83**: 165.

Material : 13 Females & 8 Males from Bhagirathi R., Palasighat, Palasi, District Nadia, 6.3.'85 (T. Roy Coll.); from Bishnupur vill., Bankura, 23.2.'86 (T. Roy Coll.); Santiniketan, Bolepur, 6.3.'86 (T. Roy Coll.); Rampurhat, Birbhum, 8.3.'86 (T. Roy Coll); Palasi Vill., Farakka, 15.3.'86 (T. Roy Coll.); Raiganj, West Dinajpur, 29.6.'88 (T. Roy Coll.).

Diagnosis : *Adult female* - Body moderately long with anterior proximity being rounded off at tip. Margin of last thoracic segment armed with a pair of small spines. Urosomal segment three segmented. Genital segment, largest and provided with a stout spine on either side. Caudal rami symmetrical with six caudal setae. Fifth leg somewhat symmetrical in form.

Adult male - Body moderately slender in form with anterior proximity rounded off at tip. Wings of last thoracic segment rounded with a pair of small spines. Urosome consists of five segments. Caudal rami symmetrical bearing six setae. Right antennule prehensile, modified for grasping organ. Fifth leg symmetrical. Left leg shorter than right reaching almost half of right fifth leg.

Distribution : India : West Bengal : Hooghly river; Bihar : Chakradharpur; Orissa : Chilka Lake; Andhra Pradesh : Secunderabad, Guntur, Giddalur; Kerala : Calicut, Cochin, Tellicherry. *Elsewhere* : Burma; Sri Lanka.

8. ***Heliodiaptomus contortus*** (Gurney)

1907. *Diaptomus contortus* Gurney. *Rec.Indian Mus.*, 1: 28.

1981. *Heliodiaptomus contortus* Reddy & Radhakrishna. *Hydrobiologia*, 83: 163.

Material : 20 Females & 8 Males from Museum tank, Calcutta, 1930 (Museum Coll.); Nawabganj, Hooghly, 1930 (R.B.S.Sewell Coll.). Bhagirathi R., Palasighat, Nadia, 6.3.'85 (T. Roy Coll.); Santipur, Nadia, 8.3.'85 (T. Roy Coll.); Gosaba, Sunderbans, 14.3.'85 (T. Roy Coll.); Chinakuri Vill., Asansole, 4.3.'86 (T. Roy Coll.); Museum tank, Calcutta, 6.1.'88 (T. Roy Coll.).

Diagnosis : *Adult female* - Body moderately slender in form with anterior proximity rounded off at tip. Urosomal segment consists of three segments. Genital segment largest which nearly twice longer than succeeding segment. Caudal rami symmetrical with six equal caudal setae. First antennule consists of twentyfive segments. Fifth leg well developed and symmetrical and with one pair of basipod, three pairs of exopod and one pair of endopod segments. Third exopod segment forms claw which knobbed at its base and has a knotch externally from which two unequal setae arise. Inner margin of claw set with fine hairs.

Adult male - Shape of body same as in female. Cephalothorax more than two times longer than abdomen. Abdomen consists of five unequal segments and caudal rami. Caudal rami symmetrical. Right antennule modified with grasping organ. It consists of twentyfive segments. Terminal process of antepenultimate segment straight and slightly recurved distally. Fifth leg asymmetrical. Left leg shorter than right, reaching almost half of right fifth leg. Right fifth leg consists of two basipod, three exopod and one endopod segments. Third exopod segment which forms long stout and recurved claw originates from terminal portion of second exopod segment. Half of inner margin of twisted claw striated. Left fifth leg consists of two basipod, three exopod and one endopod segments. Third exopod segment forms a chela like structure, and also a strong and long spine at its base.

Distribution : India : West Bengal : Museum tank, Calcutta, Hooghly R., Chingrighata, Asansole; Bihar : Chakradharpur; Orssa : Chilka Lake; Andhra Pradesh : Guntur, Kolletikota; Goa. *Elsewhere* : Nil.

9. *Heliodiaptomus viduus* (Gurney)

1916. *Diaptomus viduus* Gurney. *Proc.Zool.Soc.Long.*, **1**: 338.

1981. *Heliodiaptomus viduus* Reddy & Radhakrishna. *Hydrobiologia*, **83**: 162.

Material : 15 Females & 11 Males from tank in Calcutta, 1912 (Museum Coll.); Museum tank, Calcutta, 1923, 1930, 1932 (Museum Coll.); Janakinagar, Palasi, Nadia, 6.3.'85 (T. Roy Coll.); santipur, Nadia, 8.3.'85 (T. Roy Coll.); Bhangankhalighat, Canning, 11.3.'85 (T. Roy Coll.); Canning, 12.3.'85 (T. Roy Coll.); Bhairabsthan near Circuit House, Bankura, 25.2.'86 (T. Roy Coll.); Dobrana Vill., asansole, 3.3'86 (T. Roy Coll.); Berhampur, Murshidabad, 13.3.'86 (T. Roy coll.); Bidhannagar Vill; Jalpaiguri, (T. Roy Coll.); Siliguri, 27.6.'88 (T. Roy Coll).

Diagnosis : *Adult female* - Body moderately long and slender with anterior proximity being rounded off at tip. Cephalothorax nearly 31/2 times longer than urosome including caudal rami. Urosome consists of three segments. Genital segment largest. Caudal rami symmetrical. First antennule consists of twentyfive segments. Fifth leg symmetrical. Right fifth leg consists of two basipod, three exopod and one endopod segments. Third exopod segment forms claw and bearing a set of fine hairs on inner half of margin. Outer magin of claw naked. Endopod arises from disto-lateral corner of first exopod segment. Right endopod slightly larger than that of left leg. Left fifth leg similar to right in many respects but differs only in size of second exopod and endopod segments.

Adult male - Shape of body similar to that of female. Urosome consists of five segments and caudal rami. Caudal rami symmetrical, oearing six setae. Left antennule same as in female. Right antennule modified as grasping organ. It consists of twentyfive segments. Terminal process of antepenultimate segment little curved distally. Fifth leg asymmetrical. Right fifth leg consists of two basipod three exopod and one endopod segments. Second exopod segment terminally bears long and curved claw. More than half of inner margin of claw starting from distal end, striated. Left fifth leg consists of two basipod, three exopod and one endopod segments. Endopod similar to that of right leg but little thinner and margins little wavy.

Distribution : India : West Bengal : Museum tank, Calcutta, Salt Lakes, Asansole, Bankura; Orissa : Balasore Berhampur, Puri, Sambalpur, Chandwar, Whenkanal, Cuttack, Jenapore, Linghipur, Narshingpur, Attamalik; Andhra Pradesh; Tamil Nadu : Madurai; Delhi; Andaman Islands : Hope Town. *Elsewhere* : Sri Lanka.

5. Genus *Neodiaptomus* Kiefer, 1932

1932.*Neodiaptomus* Kiefer. *Zool.Jb.Syst.*, **63**: 451.

Type species : *Neodiaptomus schmackeri* Poppe & Richard, 1892.

Diagnosis : Third exopod segment of right fifth leg in male forms a pickle shapped smoothly curved claw with base little angular and endopod cell developed, large conical flask-shaped in structure, while in left fifth leg, third exopod carries a short or long rounded terminal process and a longer tapering straight inner process. Terminal segment of female fifth leg forms a prominent, large conical or leaf like process.

Remarks : Genus *Neodiaptomus* was established in 1932 by Kiefer to accomodate the species of *schmackeri* (= *D. schmackeri* Poppe & Richard, 1892) from China. Since then, ten species of this genus were described so far out of which six species were from India and three of them from West Bengal.

Key to the Species

1. Hyline process of antepenultimate segment of right antennule in male, finger like with a blunt end.....2

   Hyaline process of antepenultimate segment of right antennule in male, slightly recurved distally..... *N. madrasensis* sp. nov.

2. Endopod of fifth leg in female, reaching almost distal end of first exopod segment..... ..... *N. sewelli* Roy

   Endopod of fifth leg in female, not reaching distal end of first exopod segment..... .....*N. schmackeri* (Poppe & Richard)

10. ***Neodiaptomus madrasensis*** sp. nov.

1978. *Neodiaptomus madrasensis* Roy. Phd *Thesis* : 173.

Material : 10 Females & 6 Males from Bhangankhalighat near Canning, 11.3.'85 (T. Roy Coll.); Sehara vill., Burdwan, 20.2.'86 (T. Roy); Ambagan vill., Burdwan, 20.2.'86 (T. Roy Coll.); Khanda Kosh vill., Burdwan, 21.2.'86 (T. Roy Coll.); Chinakuri vill., Asansole, 4.3.'86 (T. Roy Coll.); Palasi vill., Farakka, 15.3.'86 (T. Roy Coll).

Diagnosis : *Adult female* - Body with five unequal divisions of prosome. Cephalosome largest segment. Urosome three segmented of which genital segment, largest and second segment, smallest. Caudal ramus possesses six setae. Fifth leg quite distinctive but asymmetrical in size. Right fifth leg consists of two basipod, three exopod and one endopod segments. Second exopod segment (claw) set with nine thick denticles on its inner margin. This number, however, inconsistent in other specimens reaching upto ten. Outer margin of claw free from ornamentation. Endopod arises from distolateral corner of second basipod segment and uneven on its inner margin. Left fifth leg similar to that of right except in ornamentation of claw. This segmentation of left leg has eight conical thick denticles, arranged in one row on its inner margin and seven on its outer margin. Endopod of left fifth leg slightly smaller than that of right endopod.

Adult male - Male slightly smaller than female. Cephalosome nearly equal to that of combined length of its succeeding three segments. Urosome consists of five segments. Right antennule consists of twentyfour segments. Terminal process of antepenultimate segment straight and thumb like in appearance. Right fifth leg consists of two basipod, three exopod and one endopod segments. Second exopod segment terminally bears a long, stout and curved claw. Second half of inner margin of claw, striated. A long and cylindrical endopod situated at inner posterior corner of second basipod segment. Endopod of left fifth leg significantly broader and smaller than its counterpart of right fifth leg.

Distribution : India : West Bengal : Burdwan; Tamil Nadu. *Elsewhere* : Nil.

11. ***Neodiaptomus schmackeri*** (Poppe & Richard)

1892. *Diaptomus schmackeri* Poppe & Richard. *Bull.Soc.Zool.*,Fr. 17: 149.

1973. *Neodiaptomus schmackeri* Rajendran. *J.Madurai Univ.* (Suppl. 1) : 126.

Material : 10 Females & 6 Males from Dobrana vill., Asansole, 3.3.'86 (T. Roy Coll.); Siuri, Birbhum, 7.3.'86 (T. Roy Coll.); Bakreswar, Birbhum, 9.3.'86 (T. Roy Coll.); Berhmpur, Murshidabad, 13.3.'86 (T. Roy Coll.); Piasbari vill., Maldah, 20.3.'86 (T. Roy Coll.); Raiganj, West Dinajpur, 29.6.'88 (T. Roy Coll.).

Diagnosis : *Adult female* - Body robust with anterior proximity rounded off at its tip. Urosome three segmented. Genital segment largest and second segment smalls of all. Caudal rami symmetrical. Each ramus bears six equal caudal seta. First antennule consists of twentyfive segments. Fifth leg somewhat asymmetrical. Right fifth leg consists of two basipod, three exopod and one endopod segments. Second exopod segment forms claw which is knobbed at its base and has a knotch externally from which two unequal setae arise. Size of claw little wider than left. Inner margin of claw set with highly chitinized denticles. Outer margin free from any ornamentation. Small endopod segment originates from dorso-lateral region of second basipod segment and armed with fine hairs between two spinnules at its tip.

Adult male : Body cylindrical in shape and little thinner than female. Cephalsome less than two times of urosome. Urosome five segmented. Caudal rami symmetrical. Each ramus bears six setae. Right antennule consists of twentythree segment. Terminal process of antepenultimate segment little longer than ultimate segment and slightly recurved distally. Fifth leg largely asymmetrical. It consists of right and left fifth leg. Left fifth leg very short, tip of which reaching almost half of second exopod segment of right fifth leg. Right fifth leg consists of two basipod, three exopod and one endopod segmens. Second exopod segment terminally bears a long, stout and curved claw which termed as third exopod segment. Half of inner margin of claw from distal end, strited. Endopod narrow, cylindrical and ringed with a row of fine hairs between two spinnules at its tip. Left figth leg very short. It consists of two basipod, three exopod and one endopod segments. Second exopod segment nearly half of first exopod segment and fringed with a row of minute bristles on inner margin. Endopod originates from disto-latral region of inner margin of second basipod segment and ornamented with fine hars between two spinnules at its tip. Proximal half of inner margin of endopod segment little swollen.

Distribution : India : West Bengal : Burdwan; Tamil Nadu. *Elsewhere* : China.

12. ***Neodiaptomus sewelli*** Roy

1984. *Neodiaptomus sewelli* Roy. *Bull.Zool.Surv.India*, **5**(2 &3) : 133.

Material : 15 Females & 6 Males from Khanda Kosh vill., Burdwan, 20.2.'86 (T. Roy Coll.); Madhyasatali vill., Jalpaiguri, 20.6.'88 (T. Roy Coll.).

Diagnosis : *Adult female* - Cephalosome about four times longer than urosome. Urosome three segmented. Fifth leg symmetrical. It consists of two pairs of basipod, three pairs of exopod and one pair of endopod segments. Second exopod segment of rifht fifth leg forms claw and knobbed at its base and also a knotch present on its outer side from which two unequal setae arise. Inner margin of claw set with 8-9 highly chitinized, conical denticles, outer margin of which, naked. Endopod cylindrical and little larger than its counterpart of left fifth leg, its tip reaching almost distal end of first exopod segment. It is barrel shaped with a fringe of fine hairs between two spinnules at its tip. Left leg similar to that of right but differs only in size and ornamentation of claw and size of endopod. Second exopod segment (claw) set with eight highly chitinized, conical denticles on inner margin and three on its outer.

Adult male - Body smaller than female with five imperfect divisions of prosome. Cephalosome more than two times longer than urosome. Urosome five segmented. Caudal rami symmetrical. Each ramus bears six setae. Right antennule consists of twentyone segments. Terminal process of antepenultimate segment finger like with a blunt end. Fifth leg asymmetrical. It consists of right and left halves. Right fifth leg consists of two basipod three exopod and one endopod segments. Third exopod long, stout and recurved claw bearing fine hairs on 2/3rd of inner margin from distal portion

and unornamented on outer margin of it. Endopod large and broad base, originates from distolateral corner of inner margin of second basipod segment and fringed with fine hairs between tow spinnles on its tip. Left fifth leg consists of two basipod three exopod and one endopod segments. Third exopod segment represented by a small thick and recurved spine and a seta both of which arise terminally on second exopod segment. Endopod small and margin more wavy. Tip of endopod fringed with a set of fine hairs.

Distribution : India : West Bengal : Burdwan. *Elsewhere* : Nil.

6. Genus *Phyllodiaptomus* Kiefer, 1936

1936. *Phyllodiaptomus* Kiefer. *Zool.Anz.Leipzig.*, **123**: 321.

Diagnosis : Third exopod of right fifth leg in female narrow, cylindrical and curved inside with fine serrations on inner margin from distal region and also size and shape of second exopod segment of fifth leg in female.

Type species : *Diaptomus blanci* de Guerne & Richard, 1896

Remarks : The genus *Phyllodiaptomus* was established by Kiefer in 1936. So far, three species were described, out of which two of them are found in India and the genus appears to be endemic to the oriental region.

13. *Phyllodiaptomus blanci* (de Guerne & Richard)

1896. *Diaptomus blanci* de Guerne & Richard. *Bull.Soc.Zool.Fr.* **21**: 53.

1950. *Phyllodiaptomus blanci* Brehm. *Rec.Indian Mus.*, **48** : 1.

Material : 15 Females & 7 Males from Hura vill., Purulia, 27.2.'86 (T. Roy Coll.); Jhalda, Purulia, 28.2.'86, (T. Roy Coll.); Sindhri vill., Purulia, 1.3.'86 (T. Roy Coll.); Berhampur, Murshidabad, 13.3.'86 (T. Roy Coll.); Piasbari vill., Maldah, 20.3.'86 (T. Roy Coll.).

Diagnosis : *Adult female* - Wings of last thoracic segment asymmetrical. Urosome consists of three segments. Genital segment largest and second segment smallest of all. Caudal rami symmetrical. First antennule consists of twentyfive segments. Fifth leg well developed and symmetrical. It consists of two pairs of exopod, two pairs of basipod and one pair of endopod segements. Second exopod segment of right fifth leg forms claw and knobbed at its base and has a knotch outside from which two unequal setae arise. Inner margin of claw set with fine hairs.

Left fifth leg identical in shape and structure in many respects but differs only in size of second exopod segment (claw).

Adult male - Urosome consists of five segments. Second segment largest and fifth segment smallest of all. Caudal rami symmetrical. Right antennule consists of twentytwo segments. Terminal process of antepenultimate segment toothed like in appearance. Fifth leg largely asymmetrical. Left fifth leg short and its tip reaching almost to tip of endopod segment of right fifth leg. Right leg consists of two basipod, three exopod and one endopod segments. Third exopod segment which forms a curved claw, thin and fringed with fine serrations on 2/3rd from distal region of segment (claw). It gradually tapers to distal end and little knobbed at its base. Endopod large and thick and as long as half of second exopod segment. Left fifth leg consists olf two basipod, three exopod and one endopod segments.

Distribution : India : West Bengal : Nawabgunj near Pulta Water Works, in the vicinity of Howrah bridge, Hooghly R., at Naihati, Purulia; Bihar : Chakradharpur; Bay of Bengal. *Elesewhere* : Central Asia; Turkestan; Mesopotamia.

7. Genus *Tropodiaptomus* Kiefer, 1932

1932. *Tropodiaptomus* Kiefer. *Bull.Soc.Sti.Cluj.* (Romania). **6**: 522-528.

Type species : *Diaptomus orientalis* Brady-Sars, 1886/1889.

Diagnosis : Terminal portion of endopod of fifth leg in female provided with two unequal setae. Third exopod segment of right fifth leg in male strong and tapers distally to a pointed end. First exopod segment of left fifth leg in male forming lobe like structure, fringed with striations on inner margin or tapers distally, terminating in a row of fine hairs.

Remarks : The genus *Tropodiaptomus* was established by Kiefer in 1932 to accomodate the species of *orientalis* (*D. orientalis* Brady-Sars, 1886/1889) from Ceylon. After going through scattered literature of recent and past, reveals that this genus is represented by forty six species throughout World of which nine species are known from India and one from West Bengal respectively.

14. *Tropodiaptomus australis* Kiefer

1886/1889. *Diaptomus orientalis* Brady-Sars. : 59.

1966. *Tropodiaptomus australis* Bayly. *Aust.J.mar.Freshwat.Res.*, **17**: 123.

Material : 3 Females & 2 Males from Hooghly R., near Calcutta, 6.1.'88 (T. Roy Coll.).

Diagnosis : *Adult female* - Last metasomal segment has two symmetrical lateral wings. Urosome three segmented. Caudal rami symmetrical. First antennule consists of twenty five segments. Fifth leg well developed and symmetrical. Right fifth leg consists of one basipod, three exopod and one endopod segments. Third exopod segment originates from terminal portion of second exopod segment and forms a claw. Endopod one segmented and cylindrical, arises from disto-lateral corner of first exopod segment and also tipped with two unequal setae. Left fifth leg almost identical in shape and structure of right fifth leg except for difference in size of second exopod segment.

Adult male - Wings of last metasomal segment symmetrical. Urosome five segmented. Caudal rami longer than fifth urosomal segment and symmetrical. First right antennule consists of twentytwo segments Terminal process of antepenultimate segment thumb like in appearance. Fifth leg symmetrical. Right fifth leg consists of two basipod, three exopod and one endopod segments. Third exopod segment forms a claw which bends inside. One-segmented endopod very short. It arises from disto-lateral region of inner margin of second basipod segment. The left fifth leg also consists of two basipod two exopod and one endopod segments. The first exopod semi-circular lobe which bends a little inside.

Free edge of inner margin of lobe shaped like a saw with striations and other distal extremity small with rounded lobe on posterior aspect.

Distribution : India : West Bengal : Calcutta. *Elsewhere* : Sri Lanka; Indonesia : Java; Sumatra; Australia; South Africa.

3. Family PSEUDODIAPTOMIDAE

8. Genus *Pseudodiaptomus* Herrick, 1884

1884. *Pseudodiaptomus* Herrick. *12th Ann.Rep.Geol. & natl.Hist.Surv.Minnesota*, : 1-191.

Type species : *Pseudodiaptomus pelagicus* Herrick, 1884.

Diagnosis : Body more or less cylindrical. Head fused or seperated from first thoracic segment. Urosome four segmented in female and five segmented in male. Anterior antennule slender and sometimes exceeding total length of body. Fifth leg uniramose in female. Right fifth leg uniramos and left leg biramose in male.

Remarks : The genus *Pseudodiptomus* was established by Herrick in 1884 to include species of *Pseudodiaptomus pelagicus* from Mississippi. So far, seventytwo species are known through out world out of which twentythree species and one sub species from India and five species from West Bengal respectfully. Pseudodiaptomids are primarily demarsal inhabit found from fresh water to coastal marine waters.

Key to the Species

1. Middle of inner margin of third exopod segment (claw) of right fifth leg in male produces a spherical flattened plate ..... *P. tollingeri* Sewell

   No such spherical flattened plate present on middle of inner margin of third exopod segment (claw) of right fifth leg in male 2

2. Genital segment bears two strong spines on each side on its dorsal region 3
   Genital segment bears a few small spines on each side and a row of spines on its dorsal region 4

3. Terminal right exopod segment of fifth leg in female with one spine not much longer than others ..... *P. annandalei* Sewell

   Terminal right exopod segment of fifth leg in female with one spine much longer than others... ..... *P. aurivilli* Clave

4. Second basipod segment of left fifth leg in male bears a chitinous plate like process on its inner margin which terminates in a sharp point ..... *P. binghami* Sewell

   Second basipod segment of left fifth leg in male projected in a chitinous plate like process from inner margin which terminates in a flat circular end ..... *P. lobipes* Sewell

15. *Pseudodiaptomus annandalei* Sewell

1919. *Pseudodiaptomus annandalei* Sewell, *Rec.Indian Mus.*, **16**: 5. Res., 38 : 389.

Material : 7 Females & 3 Males from Chingrighata canal near Calcutta, 1914, (Marine Survey Coll.); Salt Lakes, Calcutta, 21.10.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Urosome consists of four segments. Genital segment twice longer than preceeding segment and produced on either side in a large recurved spine. Caudal rami symmetrical. First antennule when folded back reaching posterior end of genital segment of urosome. It consists of twentyone segments. Fifth leg somewhat symmetrical. Right fifth leg consists of two basipod, and three exopod segments. Second exopod segment is knobbed at its base and has a knotch externally from which arise a small marginal spine and three end spines of which outer is by far longest and stoutest and serrated on both margins. Left fifth leg similar to right fifth leg.

Adult male - Urosome consists of five segments having with symmetrical rami. Right antennule consists of twentyone segments. Fifth leg asymmetrical. Right fifth leg consists of one basipod and three exopod segments. Third exopod segment terminates in a claw and devoid of seta both inner and outer margin of it. Left fifth leg consists of one basipod, and three exopod segments. Third exopod segment little broad and bears a serrated spine on its outer margin and terminates in a sharp chitinous spine.

Distribution : India : West Bengal : Salt Lakes, Chingrighata, Calcutta; Orissa; Chilka Lake; Andhra Pradesh : Kolleru; Tamil Nadu coast; Kerala : Qauilon, Travancore. *Elsewhere* : Kuram river, Perak; Java.

16. *Pseudodiaptomus aurivilli* Cleve

1901. *Pseudodiaptomus aurivilli* Cleve. *K. svenska Vetensk.Akad.Handl.*, 35(5) : 48.

1984. Chad Walter. *Proc.Biol.Soc.Wash.* 97(2) : 372.

Material : 12 Females & 5 Males from Diamond Harbour in south 24 Parganas, 19.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Rostrum bifid with long filaments. Genital segment longer than wide and on either side of it a backwardly directed curved spinous seta present. Caudal rami long and asymmetrical. First antennule consists of twentyone segments. First right exopod segment elongated and with a distal outer spine; terminal segment with an outer marginal spine and three distal spines, all finely serrated. Inner margin of terminal segment provided with a long setae.

Adult male - Prosome same as that of female. Right anterior antennule geniculate. First right exopod segment short and extended in form of a stout conical spine at distal anterior corner falling short of second right exopod segment. Third right exopod segment falciform in shape and with a triangular knob towards inner base.

Distribution : India : West Bengal : Diamond Harbour, Salt Lakes; Andhra Pradesh : Lawson's Bay; Tamil Nadu : Gulf of Mannar; Cochin Back Waters Bombay coast; Arabian Sea; Andaman Islands. Elsewhere : Malay Archipelago; Aru Archipelago; Coast of Burma; Karun river, Perak; East coast of south Africa.

Remarks : *Type specimens* - Cotype : 5 exs. from Diamond Harbour, West Bengal No. C4350/1, Zoological Survey of India, Calcutta.

17. *Pseudodiaptomus binghami* Sewell

1912. *Pseudodiaptomus binghami* Sewell. *Rec.Indian Mus.*, 7 : 313.

1982. Reddy & Radhakrishna. *Hydrobiologia*, 57: 256.

Material : 7 Females & 3 Males from Gazikhali canal, Sunderbans, south 24 Parganas, 15.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Urosomal segment consists of four segments. Genital segment considerably largest bearing a few small spines on both outer and inner margin of it and a row of spines present on dorsal part of posterior margin. Caudal rami symmetrical. First antennule consists of twenty one segments. Fifth leg symmetrical. Right fifth leg consists of one basipod and three exopod segments. Third exopod segment terminated in a long curved spine serrated on both margins. Base of this segment is knobbed and has a knotch externally from which a small serrated spine arises on both margins. Left fifth leg nearly similar to that of right fifth leg.

Adult male - Urosomal segment consists of five segments having with symmetrical caudal rami. Left antennule unmodified as in female. Right antennule modified to form a grasping organ. Terminal segment being marged with next following segment. Fifth leg asymmetrical. Left fifth leg shorter than right reaching distal extremely of second exopod segment of right fifth leg. Right fifth leg consists of two basipod and three exopod segments. Third exopod segment curved and distal part of it, claw like bearing serrations on its inner margin. Left fifth leg consists of two basipod and three exopod segments. Second and third exopod segments being merged together and form a leaf like

plate. Outer margin of plate armed with a small serrated spine. Inner margin of plate smooth and uneven in nature.

Distribution : India : West Bengal : Chingrighata canal, Tolly's Nullah, Gangajoara, Lock gates at Dhapa near Calcutta, Salt Lakes, Hooghly R., Budge Budge, Naoabad, Uttarbhag, Sunderbans. *Elsewhere* : Burma : Rangoon river.

18. *Pseudodiaptomus lobipes* Gurney

1907. *Pseudodiaptomus lobipes* Gurney. *Rec. Indian Mus.*, 1(1) : 27,

1978. Roy. *Thesis* : 111.

Material : 7 Female & 2 Males from Gazikhali tributaries, Sunderbans, 15.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Urosome consists of four segments. Genital segment, largest segment and bear four short spines on inner and outer margin. Caudal rami symmetrical. First antennule consists of twentyone segments. Fifth leg symmetrical. Right fifth leg consists of one basipod and three exopod segments. Third exopod segment forms claw which is a long, curved spine and tapering at its tip. Both sides of distal end of spine settared. base of this segment, is knobbed and has a knotch externaly from which a small serrated spine arises. Left fifth leg similar to right fifth leg.

Adult male : Urosomal segment consists of five segments. Caudal rami symmetrical and bearing six setae. Right antennule modified to form a grasping organ. Ultimate segment being merged with next following segment. Fifth leg asymmetrical. Left fifth leg shorter than right and leaf like plate. (second and third exopod segment merged together) reaching distal extremity of second segment of right fifth leg. Right fifth leg consists of two basipod and three exopod segments. Third exopod segment curved distally bearing serrations on inner margin of 1/4th of segment which forms claw. Left fifth leg consists of two basipod and three exopod segments.

Distribution : India : West Bengal : Hooghly R., at Naihati, Nawabgunj, near the Pulta Water Works, in the vicinity of the Howrah bridge, ponds at Alipore Zoo Gardens in Calcutta; Chilka Lake, Mahanadi river. *Elsewhere* : Nil.

19. *Pseudodaiptomus tollingeri* Sewell

1919. *Pseudodiaptomus tollingeri* Sewell. *Rec. Indian Mus.*, 16: 100.

1978. Roy. PhD. *Thesis* : 100.

Material : 10 Females & 6 Males from ponds near Canning, 12.3.'85 (T. Roy Coll.); Peerkhali canal, Sunderbans, 15.3.'85 (T. Roy Coll.); Gazikhali canal, Sunderbans, 15.3.'85 (T. Roy Coll.); canal near Tamluk, Dist. Midnapore, 24.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* : Head and first thoracic segment fused. Urosomal segment consists of four segments. Anterior part of genital segment bulges on left side. First three segments bearing a row of spines along distal part of posterior margin. Caudl rami symmetrical and bearing six setae. First antennule when foled back, it reaches to posterior end of genital segment. It consists of twenty segments. Fifth leg somewhat symmetrical. Each leg consists of one basipod and three jointed exopods only. Third exopod segment externally in a bluntly rounded process and bears three spines of which outer long and curved and in length nearly equal to whole limb. It is finely serrated along inner side of border. Left fifth leg similar to right in many respects except first exopod segment which more rounded and shorter than right leg.

Adult male : Urosome five segmented. Caudal rami symmetrical and bearing six setae. Right antennula modified to form a grasping organ. It consists of twentyone segments. Fifth leg asymmetrical, left leg being shorter, reaching upto distal extremity of first exopod segment of right leg. Right fifth leg consists of one basipod and three exopod segments. About middle of third exopod segment of inner margin dilated and dilation being fringed distally with spines and it terminated in a long curved simple process, serrated on inner margin. Left fifth leg consists of one basipod and two exopod segments. Second exopod segment bears externally a large doubly serrated spine. Terminal part of jointed spine bent sharply on itself and terminates in three unequal process.

Distribution : India : West Bengal : Salt Lakes, Chingrighata canal, Uttarbhag, Port Canning, Sunderbans; Lake Kolleru of Andhra Pradesh, River Krishna; a lagoon near Pondicherry; Cochin Back Waters. *Elsewhere* : Nil.

4. Family PONTELLIDAE

9. Genus *Labidocera* Lubbock, 1853

1853. *Labidocera* Lubbock. *Ann. Mag. nat. Hist.*, **12**(2) : 115-124; 159-165.

Type species : *Labidocera darwinii* Lubbock, 1853

Diagnosis : Head separated from first thoracic segmet. One pair of cuticular lenses present on dorsal part of head region. Urosome two to three segmented in female and four to five segmented in male. Genital segment and caudal rami symmetrical in male but in some cases, asymmetrical in female. Fifth leg biramose in female but uniramose with a chela in right fifth leg in male. Left fifth leg often with a rudimentary endopod.

Key to the Species

Lateral cephalic hooks present : Finger like process at distal end of terminal segment of female fifth leg, slender and short spine like process at base of finger very rudimentary .....*L. acuta* (Dana)

Lateral cephalic hooks absent : Finger like process at distal end of terminal segment of female fifth leg, slender and short apine like process at base of finger not rudimentary.....*L. pavo* (Dana)

20. *Labidocera acuta* Dana

1849. *Labidocera acuta* Dana. *Proc. Am. Acad. Arts. Sci.*, **2** : 30

1967. Silas & Pillai. *J. mar. biol. Ass. India*, **9** (2) : 346.

Material : 8 Females & 5 Males from Peerkhali canal, Sunderbans, 15.3.'85 (T. Roy Coll.); Kachia khal, sunderbans, 15.3.'85 (T. Roy Coll.); canal near Tamluk, Dist. Midnapore, 24.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* - Cephalosome anteriorly broadly rounded with a conspicuous rostral hook. Dorsal cuticular lenses wider apart and separated by about twice its diameter. Urosomal segment 1/4th of total length. Genital segment less than half of urosome. Caudal rami asymmetrical. Right ramus being slightly larger and also nearly 1 1/2 times longer than wide. Fifth leg markedly asymmetrical. Left leg being relatively stouter and longer.

Adult male : Shape and structure of cephalosome similar to that of female except dorsal cuticular lenses large and situated close together. Urosome five segmented. Genital segmet distinctly broader than long. Posterior corner of right genital segment bears a short spine, inner to which present a conical process which less than half length of genital segment. Caudal rami asymmetrical. Right ramus much longer and about more than twice as long as wide. Finger like

process at distal end of terminal segment relatively slender, short spine like process at base of finger very rudimentary.

Distribution : India : West Bengal : Sunderbans, bay of Bengal; Andhra Pradesh; Tamil Nadu coast; : Gulf of Mannar; Kerala costs; Andaman Sea. *Elsewhere* : Ceylon Pearl Banks; Indo-Pacific; Malay Archipelago; Maldive Archipelago; Arabian Sea; Laccadive Sea; Persian Gulf; Madagascar; Durban Bay; South African Coast.

21. ***Labidocera pavo*** Dana

1849. *Labidocera pavo* Dana. *Proc. Am. Acad. arts. Sci.*, **2** : 30.

1974. Pillai. Phd *Thesis* : 172.

Material : 6 Females & 3 Males from lower parts of Vidyadhari R., Sunderbans, 15.3.'85 (T. Roy Coll.); Kachia Khal, Sunderbans, 15.3.'85 (T. Roy Coll.).

Diagnosis : *Adult female* : Lateral cephalic hook absent. Dorsal eye lenses moderately developed and placed apart. Rostrum bifurcate with acuminate tips. Urosome two segmented. Genital segment produced into a conical lobe with rounded tip on its right side. Posterior margin of segment proceeded ventrally into a lobe, resembling a bottle which extends to middle of caudal rami. Caudal rami symmetrical. Fifth leg asymmetrical.

Adult male : Cephalic region rounded anteriorly. Dorsal eye lenses arranged close together. Urosome five segmented. Caudal rami slightly asymmetrical. Right ramus little wider than left. Right first antennule geniculate. Right fifth leg chelate in shape. Hand of chela with a well developed thumb. Claw elongates and curved and also with a blunt conical projection along inner margin at 1/3rd distance from base. Terminal segment with one outer marginal spine and three terminal subequal spines, all turned inwards of female fifth leg.Inner margin of segment irregularly lobular and with a patch of fine hairs. Subterminal segment with a distolateral spines.

Distribution : India : west Bengal : Sunderbans; Bay of Bengal; Orissa : Chilka Lake; Tamil Nadu coast; Andaman Sea; Indian coastal waters. *Elsewhere* : Ceylon Pearl Banks; Red Sea; West of Sunda Island; Malay Archipelago; Coast of Burma; Suez canal; Central part of northern Indian Ocean.

Order CYCLOPOIDA

5. Family CYCLOPIDAE

Key to the Genera

1. Fifth leg one segmented and its basal segment fused with fifth metasomal segment ..... *Microcyclops* Claus [*M. varicans* (Sars)]

   Fifth leg two segmented and its basal segment not found with fifth metasomal segment 2

2. Genital segment elongated but very little dilated anteriorly ..... *Mesocyclops* sars [*M. leuckarti* (Claus)]

   Genital segment not elongated but very much dilated anteriorly. 3

3. First antennule eight segmented ..... *Paracyclops* Claus [*P. fimbriatus* (Fischer)]

   First antennule twelve segmented ..... *Tropocyclops* Kiefer [*T. prascinus* (Fischer)]

10. Genus *Mesocyclopes* Sars, 1914

1914. *Mesocyclopes* Sars. *Crust. Norway*, 6 : 57.

Type species : *Mesocyclopes leuckarti* (Claus)

Diagnosis : Genital segment elongated and very little dilated in front in female. Caudal rami very short with a well developed setae. Anterior antennule slender, elongated and seventeen segmented. Last pair of legs very small and biarticulate in nature.

22. *Mesocyclopes leuckarti* (Claus)

1939. *Mesocyclops leuckarti* Kiefer. *Mem. Indian Mus.*, **13** : 162.

1923. *Cyclops leuckarti* Brehm. *Intern. Rev. Hydrobiol. Leipzig*, **11** : 329.

Material : 15 Females & 10 Males from Gazikhali tributaries, Sunderbans, 15.3.'85 (T. Roy Coll.); Burdwan, 20.2.'86 (T. Roy Coll.); Bishnupur, Bankura, 23.2.'86 (T. Roy Coll.); Chinakuri vill., Asansole, 4.3.'86 (T. Roy Coll.); Santiniketan, Bolepur, 6.3.'86 (T. Roy Coll.); Bakreswar, Birbhum, 9.3.'86 (T. Roy Coll.); Piasbari vill., Maldah, 20.3.'86 (T. Roy Coll.); Museum tank, Calcutta, 6.1.'88 (T. Roy Coll.); Raidhaka R., Baxirhat, Coochbihar, 18.6.'88 (T. Roy Coll.); Siliguri, 27..6.'88 (T. Roy Coll.).

Diagnosis : *Adult female* : Body with five divisions of prosome and four divisions of urosome. Genital segment long, narrow and largest and nearly equal in length of succeeding three segments of urosome. Caudal rami symmetrical. Each Ramus Bears six caudal setae. When seventen segmented anterior antennule folded back to body reaching nearly proximal margin of fifth segment of body. All rami of four legs are three joints comparatively slender and apical spines of outer ramus coarsely denticulated. Terminal segment of inner ramus in second and fourth pairs nearly equal or shorter in length of two segments combined. Space of inner edge of second and fourth pairs originates a little distance from apex. Apical spines of inner ramus of fourth pair of legs equal and producing acute projections. Distal outer spine of terminal segments originating from tip. Last pair of legs well developed with distal joint comparatively narrow and carrying two slender unequal setae., a short outer one originating from tip and a little larger inner one a little behind from tip.

Adult male : Unknown.

Distribution : India : West Bengal : Sunderbans, Coochbihar, Burdwan; Orissa : Chilka Lake; Tamil Nadu; Mysore; Maharastra; Jammu & Kashmir. *Elsewhere* : Africa; South America.

11. Genus *Microcyclops* Claus, 1893

1893. *Microcyclops* Claus. *Anz. Akad. Wiss. Wien.*, **30** (9) : 82.

Type species : *Ceylops varicans* Sars, 1918

Diagnosis : Metasome elliptical. Fifth segment produced laterally. Head fused with first segment of cephalsome. Urosome slender. Genital segment scarcely dilated anteriorly. Caudal rami longer than wide. First antennule twelve segmented. Fifth leg one segmented and its basal segment totally fused with fifth metasomal segment.

23. *Microcyclops varicans* (Sars)

1918. *Cyclops varicans* Sars. *Crustacea of Norway*, **6** : 54.

1972. *Microcyclops varicans* Wilson. *Bull. U.S. natn. Mus.* Washington **158** : 326.

Material : 2 Females & 1 Male from Calcutta (N. Annandale Coll.).

Diagnosis : *Adult female* : Cephalic segment large and rounded anteriorly. Metasome oval and little more than half as wide as long. Anterior antennule twelve segmented and smaller in length of cephalic region. Urosome five segmented. Genital segment little wider anteriorly and narrowed posteriorly. Caudal rami symmetrical and nearly equal in length of last two segments of urosome combined. Both rami of natatory legs, biarticulate. Fifth pair of legs with proximal joint totally confluent with segment and its seta originates from lateral corner, distal joint small, narrow conical in form and in middle of inner edge of it present very minute spinules.

Adult male : Body more slender than that of female. Elongated oval shaped metasome present. Cephalic segment evenly rounded anteriorly and little longer than rest of metasome. Urosomal segment less than half of metasomal segment. Genital segment little swollen. Caudal rami longer than last two segments combined and nearly five time as long as wide. First antennule twice hinged at fifth and tenth segments. Basal segmet of fifth leg always fused with body. A sixth pair of legs present at posterior corners of genital segment.

Distribution : India : West Bengal : Calcutta. *Elsewhere* : Norway; Sweden; Germany; Turkestan; Poland; Africa; New Zealand; British Isles; Russia; Scottish Lakes; Switzerland; Illinois R.; Natucket Island.

12. Genus *Paracyclops* Claus, 1893

1893. *Paracyclops* Claus. *Anz. Amad. Wiss. Wien.*, **30** : 83.

Type species : *Cyclops crassicornis* Muller

Diagnosis : Body stout. Metasome flattened with lateral plates. Urosome stout and subcylindrical. Genital segment wider than long. Caudal rami symmetrical and more longer than wide. First antennule eight segmented. Fifth leg a 3 lobbed lamela with one apical and one outer seta and a long inner denticulated spine present.

24. *Paracyclops fimbriatus* (Fischer)

1853. *Cyclops fimbriatus* Fischer. *Bull. Soc. Imp. Nat. Moscow*, **26** (1) : 94.

1972. *Paracyclops fimbriatus* Wilson. *Bull. U.S. natn. Mus.* Washington, **158** : 342.

Material : 3 Females & 2 Males from Museum tank, Calcutta, 5.12.'81 (T. Roy Coll.); Museum tank, Calcutta (N. Annandale Coll.).

Diagnosis : *Adult female* : Body robust with four anterior divisions of prosome. Metasome elliptical. Cephalic segment larger than rest of metasome. Anterior antennule eight segmented and nearly half in length of prosome and densely setose. Urosome five segmented. Genital segment somewhat dilated antriorly. Caudal rami longer and nearly equal in length of last three segments of urosome combined. Fifh pair of legs well defined and spine of inner edge of it short.

Adult male : Body smaller than female. Anterior antennule eight segmetned and geniculate. Urosome five segmented and nearly little more than half of metasome. Shape and structure of caudal rami same as in female. Five pair of legs present and also rudimentary. Sixth pair originates from posterior corner of genital segment.

Distribution : India : West Bengal : Calcutta. *Elsewhere* : Russia; Sweeden; Germany; Poland; Norway; British Isles; France; Bohemia; Turkestan; Hungary; U.S.A.; Minnesota; Ohio; Nantucket Island.

Remarks : The only species of the genus is a bottom dweller form and keeps close to the ground amid the debris.

13. Genus ***Tropocyclops*** Kiefer, 1927

1927. *Tropocyclops* Kiefer. *Zool. Anz.*, **73** : 303.

Types species : *Cyclops prascinus* Fischer, 1860

Diagnosis : Body slender. metasome obovate and epimeral plates well defined and prominent. Fifth segment produced a hairy lobe on either side and overlapping base of genital segment. First antennule twelve segmented. Fifth legs very small and one segmented and trilobbed at their tips. Urosome slender. Genital segment swollen anteriorly and narrowed posteriorly. Caudal rami elongate.

25. ***Tropocyclops prascinus*** (Fischer)

1860. *Cyclops prascinus* Fischer.*Abh.math-phys.Classe.kon.Akad. Wiss.Munich*, **8** : 652.

1939. *Tropocyclops prascinus* Kiefer.*Mem.Indian Mus.*, **13** : 131.

Material : 1 Female & 1 Male grom Calcutta (N. Abnandale Coll.).

Diagnosis : *Adult female* - Metasome elliptcal and two times longer than wide. Cephalic segment little more than half of metasome. First antennule when folded back reaching nearly end of third metasomal segment. Fifth leg trilobate and inner spine little shorter than outer and sparcely dentate. Urosomal segment less than half in length of metasome. Genital segment little dilated anterorly. Caudal rami short and slightly divergent.

Adult male - Body smaller in size of female. Cephalic segment relatively shorter and rounded anteriorly. First antennule twice gemoci;ate.. Fifth leg trilobed, inner spine longer and shorter female. Urosomal segment five segmented and more than half in length than metasomal segment. Genital segment as wide as fifth segment of urosome anteriorly and narrowed posteriorly. Caudal rami symmetrical.

Distribution : India : West Bengal : Calcutta. *Elsewhere* - Sri Lanka; Germany; France; Briths Isles; Switzerland; Great Lakes; Minnesota; Massachusetts; Wisconsin; Nebraska; Indiana; Mississppi; valley Florida.

DISCUSSION

The copepod fauna of West Bengal is of diverse nature and was studied and reported by Sewell (1929, 1934); Gopalkrishnan (1971) and Roy (1978). In the samples collected from surveys in West Bengal thus pelagic copepods specially calanoid and cyclopoids are well represented. Sometimes conventional characters used in taxonomy to distinguish species of *Acartia* Dana; *Acartiella* Sewell; *Arctodiaptomus* Kiefer; *Heliodiaptomus* Kiefer; *Neodiaptomus* Kiefer; *Phyllodiaptomus* Kiefer; *Tropodiaptomus* Kiefer; *Pseudodiaptonus* Herrick; *Labidocera* Lubbock; *Mesocyclops* Sars; *Microcyclops* Claus; *Paracyclops* Claus and *Tropocyclops* Kiefer are found to evince variations when quite a good number of material are examined, the significance and status of which need evaluation. Thus, there is a need for proper redescription of species of above genera taking into consideration variability in characters viz., nature of fifth legs, last metasomal segment, geniculate antennae and genital segment hitherto considered dependable in species diagnosis. It is indeed true

that the fauna of any group is a flexible work tool capable of periodical updating through additions and revisions.

Copepods have rediated into different habitats such as pelagic in fresh, estuarine and marine waters. Along with this ecological diversity, the copepods have evolved a multitude of body shapes and structures. Figure 1 is a panorama of the body shapes and appendages of the calanoid and cyclopoid copepod. Citations to original sources for the drawings are given in the legend of Figure 1.

The generalized body forms of the calanoids and cyclopoids are familiar to all copepodologists. In the calanoids, there is an obvious difference in the width between bullet-shaped prosome and a flexible urosome and the major body articulation lies behind the segment of the fifth legs. The free living cyclopoids are smaller in size and much shorter anteripr antennule than in the calanoids. The urosome is proportionately longer because the major articulation is set between the segment of the fourth sweeming leg and the segment of the reduced fifth legs.

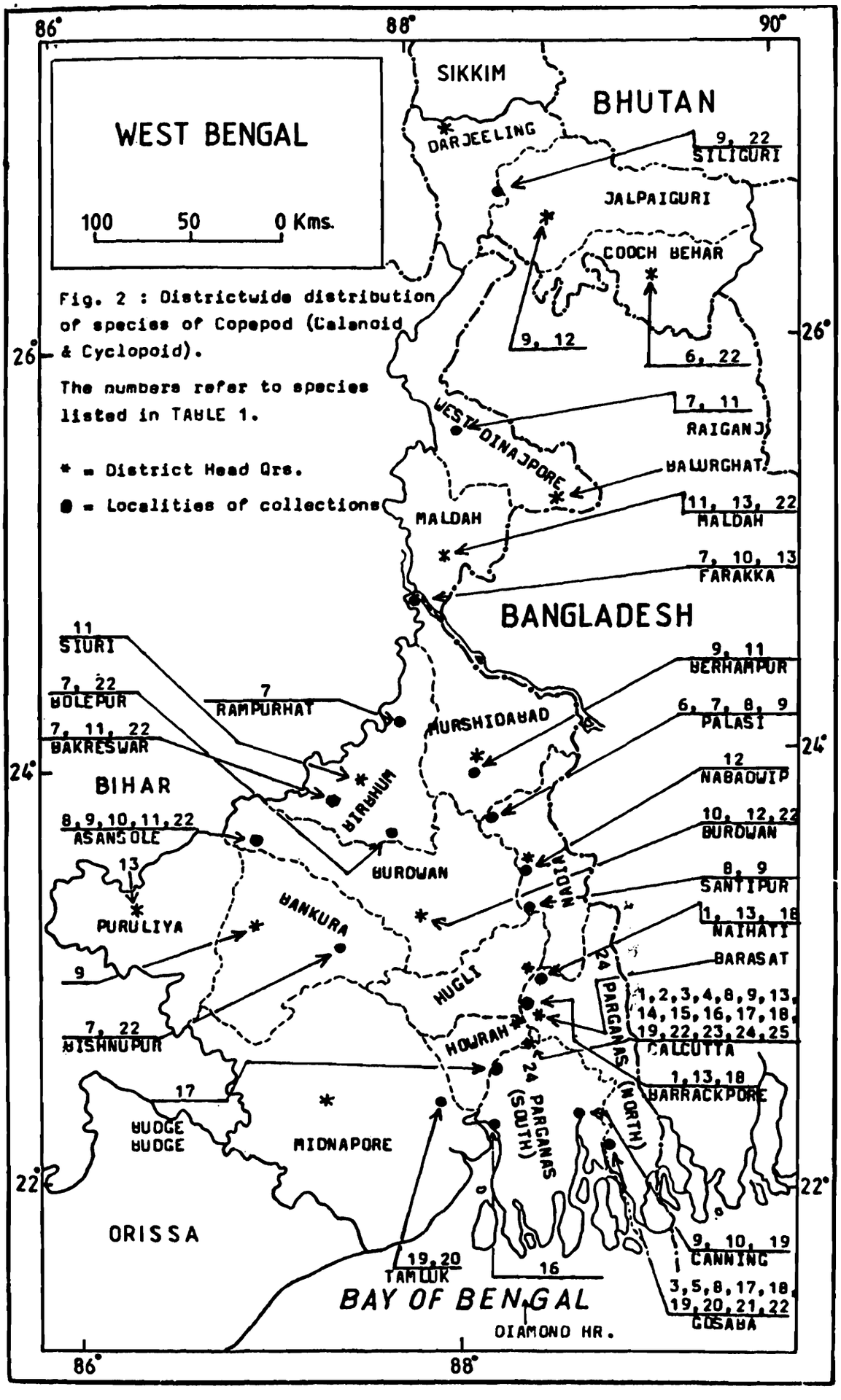
Twentyfive species have been reported from the West Bengal region (Table 1). Most of them collected from the freshwater and brackish/estuarine water to coastal habitats. (Fish ponds, ditches, lakes, mud embayments, river mouths and mangrooves). Several calanoid and cyclopoid species * (6,10,11,12,24 & 25) occur in predominatly freshwater habitats; five calanoid species * (1,2,3,4 & 17) are in brackish/estuarine water habitats and * (9,13,15 & 20) are recorded from brackish to marinewater habitats. Previous attempts to divide the group - copepoda (Sewell, 1932, 1934); Gopalkrishnan, 1971 and Roy, 1978) into district assemblages have not been entirely successful.

* = The numbers refer to species listed in Table 1. (Next page)

Table 1 : Characteristics for copepod (calanoid & cyclopoid) species assemblages.

F = Reported from fresh water habitats; E = Reported from brackish / estuarine water habitats; M = reported from marine waster habitats; Z = Specimens deposited at Z.S.I., L = Reported only once in literature; S = Found only female species in the collections; A = Associated with other species.

Sl. No.	*Name of species*	*F*	*E*	*M*	*Z*	*L*	*S*	*A*
1.	*Acartia chilkaensis* Sewell	–	+	–	+	–	+	+
2.	*Acartia plumosa* T. Scott	–	+	–	+	–	–	+
3.	*Acartiella major* Sewell	–	+	–	+	+	–	+
4.	*Acartiella minor* Sewell	–	+	–	+	–	+	+
5.	*Acartiella tortaniformes* Sweell	–	+	+	+	–	–	+
6.	*Arctodiaptomus shillongensis* Reddiah	+	–	–	+	–	–	+
7.	*Heliodiaptomus cintus* (Gurney)	+	+	–	+	–	–	+
8.	*Heliodiaptoms contortus* (Gurney)	+	+	–	+	–	–	+
9.	*Heliodiaptomus viduus* (Gurney)	+	+	+	+	+	–	+
10.	*Neodiaptomus madrasensis* sp. nov	+	–	–	+	–	–	+
11.	*Neodiaptomus schmackeri* (P & R)	+	–	–	+	–	–	–
12.	*Neodiaptomus sewelli* Roy	+	–	–	+	–	–	+
13.	*Phyllodiaptomus blanci* (d G & R)	+	+	+	+	+	–	–
14.	*Tropodiaptomus australis* Kiefer	+	–	+	+	–	–	–
15.	*Pseudodiaptomus annandalei* Sewell	+	+	+	+	–	–	–
16.	*Pseudodiaptomus aurivilli* Cleve	–	+	+	+	–	–	–
17.	*Pseudodiaptomus binghami* Sewell	–	+	–	+	–	–	+
18.	*Pseudodiaptomus lobipes* Gurney	+	+	–	+	–	–	+
19.	*Pseudodiaptomus tollingeri* Sewell	–	+	+	+	–	–	+
20.	*Labidocera acuta* (Dana)	+	+	+	+	–	–	+
21.	*Labidocera pavo* (Dana)	–	+	+	+	–	–	–
22.	*Mesocyclops leuckarti* (Claus)	+	+	–	+	–	+	+
23.	*Microcyclops varicans* (Sars)	+	+	–	–	+	–	–
24.	Paracyclops fimbriatus (Fischer)	+	–	–	+	+	–	–
25.	Tropocyclops prascinus (Fischer)	+	–	–	+	+	–	–


WEST BENGAL
100 50 0 Kms.
Fig. 2 : Districtwide distribution of species of Copepod (Calanoid & Cyclopoid).
The numbers refer to species listed in TABLE 1.
* = District Head Qrs.
● = Localities of collections
86°
88°
90°
26°
24°
22°
SIKKIM
BHUTAN
DARJEELING
9, 22 SILIGURI
JALPAIGURI
COOCH BEHAR
9, 12
6, 22
7, 11 RAIGANJ
WEST DINAJPORE
BALURGHAT
11, 13, 22 MALDAH
MALDAH
7, 10, 13 FARAKKA
BANGLADESH
11 SIURI
7, 22 BOLEPUR
7 RAMPURHAT
7, 11, 22 BAKRESWAR
BIRBHUM
MURSHIDABAD
9, 11 BERHAMPUR
6, 7, 8, 9 PALASI
12 NABADWIP
BIHAR
8, 9, 10, 11, 22 ASANSOLE
BURDWAN
10, 12, 22 BURDWAN
8, 9 SANTIPUR
13 PURULIYA
BANKURA
NADIA
1, 13, 18 NAIHATI
BARASAT
9
HUGLI
24 PARGANAS
1, 2, 3, 4, 8, 9, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25
7, 22 BISHNUPUR
HOWRAH
CALCUTTA
1, 13, 18 BARRACKPORE
17
BUDGE BUDGE
MIDNAPORE
24 PARGANAS (SOUTH)
24 PARGANAS (NORTH)
ORISSA
9, 10, 19 CANNING
19, 20 TAMLUK
16
3, 5, 8, 17, 18, 19, 20, 21, 22 COSABA
BAY OF BENGAL
DIAMOND HR.

SUMMARY

The present work deals with the studies on copepod from the state of West Bengal by the author during the period from 1975-1976 and 1985-1988. In all, 25 species of calanoid and cyclopoid copepod belonging to 13 genera and 5 families under 2 orders of the different habitats in the state of West Bengal, have been described in brief. To breakwise the entire species of the copepod fauna of West Bengal, the following details of the groupwise strength of the species, genus, family and order are as follows :

21 species belonging to 9 genera and 4 families under the order calanoida and 4 species belonging to 4 genera and 1 family under the order cyclopoida. This paper deals with introduction, material and methods, a brief account of general morphological characters with specall emphasis on the characters of taxonomic importance, morphology and terminology, discussion, summary and diagnostic sketch. For facility in identification, taxonomic keys to various orders, families, genera and species have also been incorporated.

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CRUSTACEA : ISOPODA

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INTRODUCTION

The members of the group isopods (families Cymothoidae, Cirolanidae and Sphaeromatidae) occur in varied ecologial conditons in marine estuarine and brackishwater environment. The present study is based on named and unnamed material available in the Zoological Survey of India as well as additional material collected by the "State Survey Parties" from the coastal lower part of West Bengal. The West Bengal coast extends from Digha (Medinipur District) in the west to Sundarban on the eastern border.

Prior to the establishment of Zoological Survey of India in 1916, very little work was carried out on the group of marine isopod. Stebbing (1907) initiated the study of Indian isopods. Works of Barnard (1936), Tiwari (1952 & 53) and Ghatak and Misra (1984) may be mentioned in this context. However, information about this group in West Bengal is rather meagre being limited to notes by said workers.

The present work is an attempt to study the systematics of this group. Material of this study was collected during 1985 to 1988 from the Districts of 24 Parganas, Medinipur, Hugli, Nadia and Bardhaman. All together 9 species belonging to 3 families and 6 genera have been worked out.

The paper deals with the diagnostic characters, distribution, measurement, colour, host and key for identification of those 9 species hitherto reported from West Bengal. It also furnishes a general account of morphology and terminology as well as the common habitats of this group. Synonymies have been reduced to avoid over repetation but include the original and most recent references and authors responsible for major changes in nomenclature.

MORPHOLOGY AND TERMINOLOGY

Isopods are typically dorsoventrally flattened crustaceans without carapace. The body is divided in to cephalon (head) which normally incorporates peraeon (thorax) of seven somites and a pleon of six somites, some or all of the pleon somites may be fused with the terminal telson forming pleotelson. The cephalon bears a pair of antennules and a pair of large antennae, each having a basal peduncle and distal flagellum followed by ventral mandibles, maxillules and maxilla. All the mouth parts are covered by maxillipeds and the appendages of the first true peraeon somite which is fused with the head. The mouth parts vary from family to family in response to the feeding habit.

Each of the seven somites peraeon bears a pair of uniramous peraeopods (walking legs) which are usually more or less alike (hence isopoda). Each peraeopod consists of five articles *viz.* ischium, merus, carpus, propodus and dactylus. Coxal plates are extended from coxa. Oostegites are present in the ovigerous female at the inner base of the anterior peraeopods. The pleon appendages consist of five pair of pleopods and uropods. The male isopods are identified by the presence of "appendix masculina" situated in the second pleopod. The uropods are biramous but may be uniramous in both sexes but they may be terminal or subterminal with articles cylindrical, lateral and flattened or ventral and hinged laterally depending upon the families to which the animal belongs.

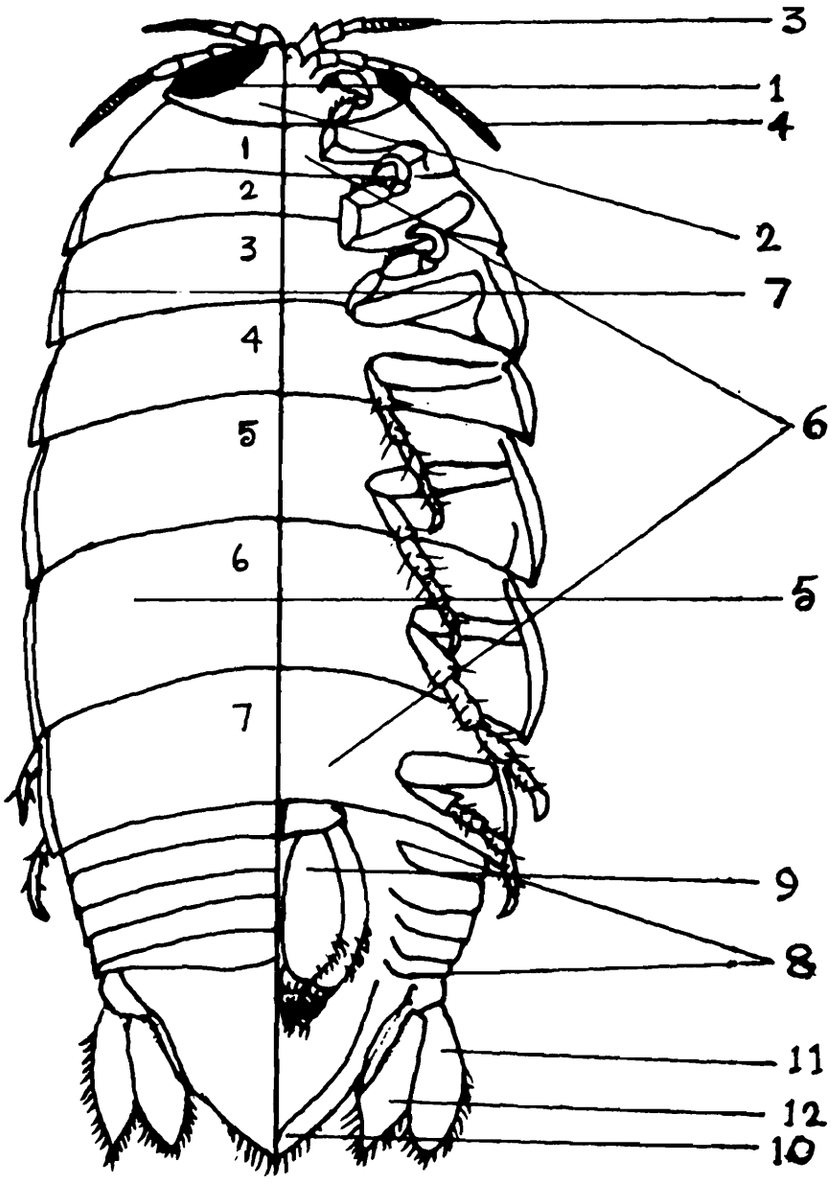


Fig. 1. Diagram of a flabelliferan isopod, (After E. Naylor) Left half - dorsal surface; Right half - ventral surface 1, Eye; 2, Cephalon (Head); 3, Antenna-i; 4, antenna-ii; 5, Peraeon; 6, Paraepods; 7, Coxal plate; 8, Pleon; 9, Pleopod; 10, Pleotelson; 11, Uropodal exopod; 12, Uropodal endopod.

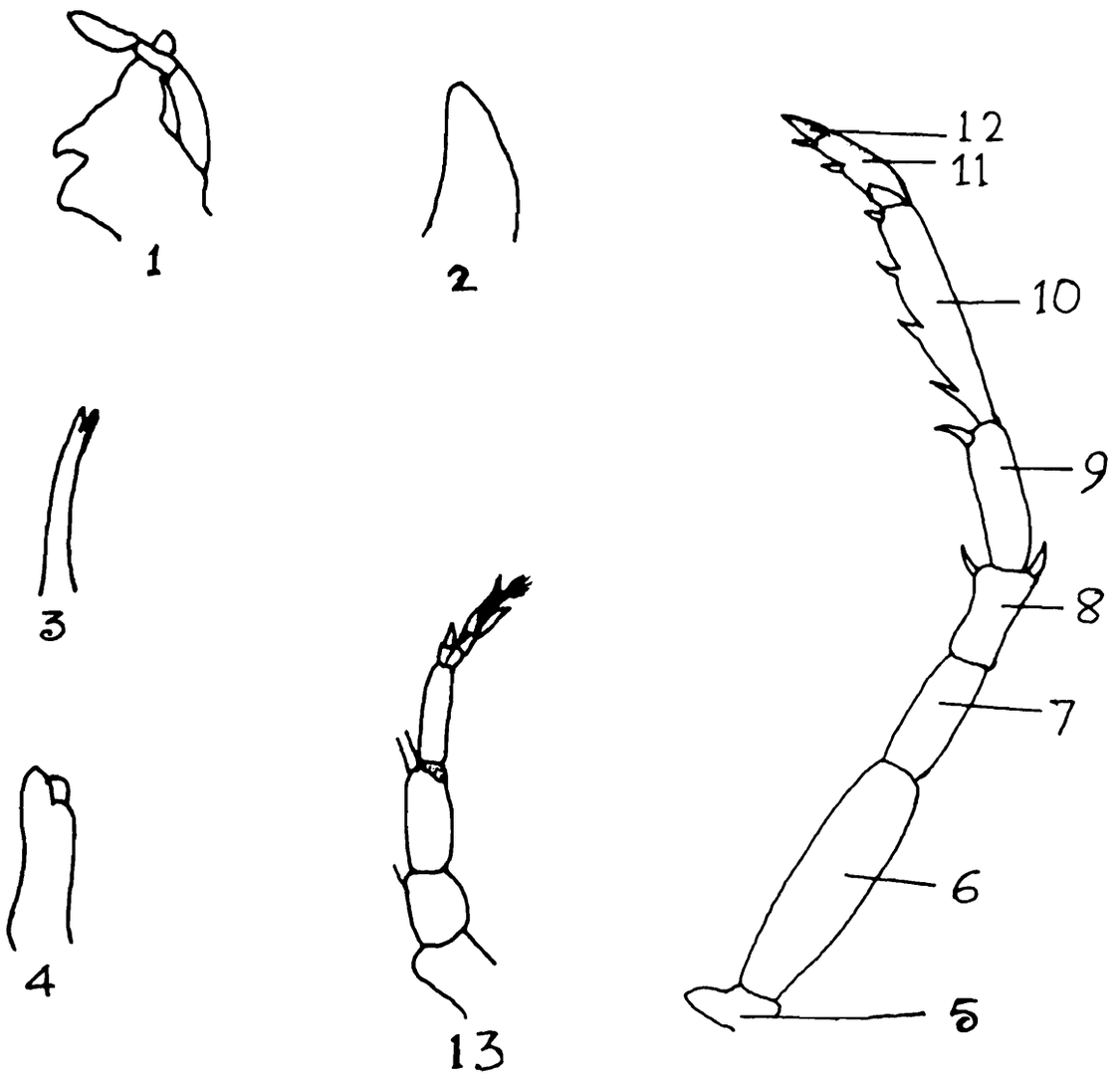


Fig 2. Mouth parts and Paraeopods of flabelliferan Isopod. (After George A. Schulty) 1, Mandible; 2, Mandible without Palp; 3, Maxilla-I; 4, Maxilla II; 5, Coxa; 6, Basis; 7, Ischium; 8, Merus; 9, Carpus; 10, Propodus; 11, Dactylus; 12, Unguis; 13, Antenna.

ECONOMIC IMPORTANCE

Marine isopods of various groups are occasionally reported as pests of marine fishes, prawns, crabs etc. They eat and destroy the fishes. Cymothoid isopods live as the ecto and endo-parasite of fishes. It is interesting to note that some cymothoids are reported as causing serious damage to live fish (Kjennerud, 1956). The wood boring species are most economically important of all the isopods because of their destruction of wooden marine structures placed in the sea and estuarine waters.

THE COMMON HABITATS OF MARINE ISOPODS

The common habitats include :

(i) Gill chamber and on the surface of the body of other crustaceans.
(ii) Plankton (a few are formed).
(iii) Gill cavity and throat of many large fishes.
(iv) Body cavity of coelenterates sponges and other hollow marine animals.
(v) Nets of fisherman and nest of shrimps (for free living parasitic isopods).
(vi) Roots of mangrove and other trees.
(vii) Maritime drift along a beach or shore line.
(viii) Wet sand.
(ix) Under the stone on a beach especially in a tide pool.
(x) Wooden marine structures.
(xi) Marine grass and other marsh grass habitats.
(xii) Within algal mass.
(xiii) In and under holdfests of large algae.
(xiv) In and under the bark of the trees that have fallen in to the marine waters.
(xv) On and in drift wood.
(xiv) Under and dead marine animals found along the intertidal shore.
(xvii) Burrows of other animals and mud flats.

SYSTEMATIC ACCOUNT

Class CRUSTACEA

Order ISOPODA

Suborder FLABELLIFERA

(* New Record)

1. Family SPHAEROMATIDAE

i. * Genus ***Sphaeroma*** (Bosc)

* (1) *Sphaeroma triste* Heller

21—3—187/ZSI/Cal/93

ii. Genus ***Exosphaeroma*** (Stebbing)

(2) *Exosphaeroma parva* Chilton

2. Family CYMOTHOIDAE

iii. Genus ***Nerocila*** Leach

(3) *Nerocila phaeopleura* Bleeker

(4) *Nerocila serra* Sch. & Mein.

(5) *Nerocila madrasensis* Ramakrishna & Venkata Ramaniah

(6) *Nerocila sundaica* Bleeker

iv. Genus ***Cymothoa*** Fabricius

(7) *Cymothoa indica* Sch. & Mein.

v. Genus ***Anilocra*** Leach

(8) *Anilocra laticauda* Milne Edwards

3. Family CIROLANIDAE

vi. Genus ***Cirolana*** Leach

(9) *Cirolana parva* Hansen

Key to Families

1. Pleon composed of one free segment..... SPHAEROMATIDAE

   Pleon composed of three of less visible segments.....2

2. All peraeopods are prehensile ..... CYMOTHOIDAE

   All peraeopods are not prehensile..... CIROLANIDAE

I. Family SPHAEROMATIDAE

Body oval in shape, quickly roll in to a ball. All pleon somites are fused, usually three sutures. Pleon composed of only one free segment. Pleotelson formed with the fusion of six pleon somite. Pleopods of two to three are usually fleshy or membranous and are more or less translucent. Coxal plates of peraeon 2-7 are fused with somite. Uropod is lateral and endopod is ridgly fused with peduncle, exopod is movable.

The family is represented in West Bengal by two genera.

Key to Genera

Uropod with exopod and endopod subequal in length .....***Sphaeroma*** (Bosc)

Uropod with exopod and endopod not subequal in length .....***Exosphaeroma*** Stebbing

Genus 1. *Sphaeroma* (Bosc)

1. *Sphaeroma triste* Heller

1868. *Sphaeroma triste* Heller; *Novara Reise. Zool.*, **2** : 142.

1868. *Sphaeroma triste* : Pillai, *Proc. Zool. Soc. Lond.*, **2** : 379.

Material examined : 10 exs.; Bakkhali; 21.xii.1978; Coll. K. N. Reddy.

Host : Unknown.

Colour : In alcohol - straw colour with black scattered, spotted pigment. In live specimens - yellowish pigmented.

Measurement : Length of the specimens ranges from 3-4 mm.

Diagnosis : Surface of head and the first peraeon segment granulated and one prominent tubercle present in middle of the head. A setiferous rounded tubercle present on the anterior and posterior divisions of the pleon. Uropod serrated. Peraeon segments 2-7, bear costa on the both anterior and posterior lateral margins. Exopod and endopod subequal in length.

Distribution : West Bengal : South 24 Parganas; Camorta Is., Nicobars; Rameswaram.

Remarks : The species is recorded for the first time from this area.

Genus 2. *Exosphaeroma* Stebbing

2. *Exosphaeroma parva* Chilton

1916. *Exosphaeroma parva* Chilton; *Mem. Indian Mus.*, **5** : 890-891.

Material examined : 20 exs.; Bakkhali; 21.xii.1978; Coll. K. N. Reddy.

Host : Unknown

Colour : In alcohol - slate colour. Live specimens - dark slate colour.

Measurement : Length of the specimens ranges from 3-7 mm.

Diagnosis : Body dorsoventrally flattened, the last body segment broadly rounded. Dorsal surface smooth. Mouth parts, limbs and pleopods present but not distinctive. Uropod branches not exactly subequal in length.

Distribution: West Bengal : South 24 Parganas; Orissa.

Remarks : This species is recorded for the first time from this area.

2. Family CYMOTHOIDAE

Antennae short and reduced, without clear distinction between peduncle and flagellum. Palp of the maxillipeds always two jointed and the last joint long and narrow.

Most important group for their parasitic habits. Members of the family attain 60 mm length and they consider among the largest group of isopods. Only three genera so far reported from West Bengal.

Key to Genera

1. Posterolateral angles of peraeonal somite are prominently produced ..... ***Nerocila***

   Posterolateral angles of peraeonal somite not produced at all 2

2. Body not ovate. Pleon abruptly narrower than peraeon ..... ***Cymothoa***

   Body ovate, pleon not abruptly narrower than peraeon ..... ***Anilocra***

Key to Species of *Nerocila*

1. Head quadrate. First antenna composed of 9 articles. ..... *N. phaeopleura*

   Head subquadrate. First antenna composed of 8 articles. 2

2. Fifth peraeon segment broad. Edges of endopod serrated ..... *N. serra*

   Fifth peraeon segment not broad. Edges of endopod not serrated 3

3. Head triangular. First antenna composed of 7 articles. Edges of endopod not so prominently serrated ..... *N. sundaica*

   Head subquadrate. First antenna composed of 8 articles. Uropod long and slender. Endopod not serrated ..... *N. madrasensis*

Genus 3. *Nerocila* Leach

3. *Nerocila phaeopleura* Bleeker

1857. *Nerocila phaeopleura* Bleeker, *Verh nat. Ver. Needrl. Ind.*, **2** : 25.

1936. *Nerocila phaeopleura* : Barnard, *Rec. Indian Mus.*, **38** : 164-165.

Material examined : 2 exs.; Canning; 22.ii.1986.

Host : *Histiophorous gladias* (Shaw & Nodder).

Colour : Live specimens - darkbrown. In alcohol-brown or pale brown.

Measurement : Length of the specimen ranges from 14 - 16 mm.

Diagnosis : Head quadrate, eyes distinct. First and second antennae composed of nine and ten joints. Fifth, sixth and seventh peraeon segments widest. The pleonic appendages with setae. Telson longer than broad. The inner margin of the endopod of uropod not serrated.

Distribution : West Bengal : South 24 Parganas; Bay of Bengal.

Remarks : The specimen is recorded for the first time from West Bengal.

4. *Nerocila serra* Sch. & Mein.

1881. *Nerocila serra* Schiodte & Meinert, *Naturh. Tidsskr*, (3) **13** : 18.

1936. *Nerocila serra* : Barnard, *Rec. Indian Mus.*, **38** : 163-164.

Material examined : 20 exs.; Digha; 7.iv.1987.

Host : Unknown.

Colour : Live specimens - dark brown. In alcohol - straw colour.

Measurement : Length varies from 15-21 mm.

Diagnosis : Head almost quadrate. Cephalon broader than long. Eyes distinct but small. First and second antennae composed of eight and nine articles. Coxal plates well developed and falcate. First five pleon segments subequal in length. Endopod and uropod reaching beyond the part of the outer margin and the inner part of the uropod coarsely serrated.

Distribution : West Bengal : Medinipur; Orissa; Andhra Pradesh : Vizagapatnam; Queensland; Great Palm Ireland; Brisbane; Cairus, East Indies, Delegoa Bay; Malay Archipelago; South Africa.

Remarks : The trilobate nature of the posterior margin of cephalon, the compactness of the posterior angles of fourth to seventh segments differentiate *N. serra* from *N. madrasensis* a closed species. The specimen is recorded for the first time from this area.

5. ***Nerocila madrasensis*** Ramakrishna & Venkata Ramaniah

1978. *Nerocila madrasensis* Ramakrishna & Venkata Ramaniah, ***Bull. Zool. Surv. India,*** **1** : 177-180.

1984. *Nerocila madrasensis :* Ghatak & Misra, ***Bull. zool. Surv. India,*** **5** : 21-25.

Material examined : 7 exs.; Sagar Island; 23.xii.1987.

Host : As ectoparasite on *Strongylura strongylura* Van Hasselt.

Colour : Live specimens - dorsum yellow with black longitudinal stripe. In alcohol - yellowish with black stripe.

Measurement : Length of the specimens varies from 14 - 18 mm.

Diagnosis : Head large, subquadrate and much wider than length. Body oval in shape, surface gray with black reticulate net work. Eyes large and situated in the posterolateral angles of head. First and second pair of antennae composed of 8-10 articles. Sixth peraeon segment broadest of all peraeon. The uropod lanceolate. The seventh leg prehensile with long dactyli. Uropod long and slender.

Distribution : West Bengal : South 24 Parganas; Madras coast.

Remarks : The subquadrate shape of the cephalon and the shape, size of the opimera of the thoracic segments differentiate *N. madrasensis* from *N. munda.* This is the most common species in this locality.

6. ***Nerocila sundaica*** Bleeker

1857. *Nerocila sundaica* Bleeker, *Verh. Nat. Ver Needert. Ind. Vol. No.* : 26.

1936. *Nerocila sundaica :* Barnard, ***Rec. Indian Mus.,*** **38** : 163.

Material examined : 5 exs.; Digha; 25.v.1985.

Host : From the buccal cavity of the estuarine fishes.

Colour : Live specimen - yellowish with a blackish median longitudinal stripe. In alcohol - dorsum yellowish.

Measurement : Length ranges from 16 - 22 mm.

Diagnosis : Head triangular. The eyes small but distinct. First and second antennae composed of seven and nine joints. Coxal plates well developed and falcate. Endopod of uropod reaching beyond the apex of telson and margin of its ramus very finely serrate.

Distribution : West Bengal: South 24 Parganas; Orissa; East Indies.

Remarks : The species is reported for the first time from West Bengal. The fine serrations of the inner margin of the endopod of europod make the difference between *N. sundaica and N. serra.*

Genus 4. *Cymothoa* Fabricius

7. *Cymothoa indica* Sch. & Mein.

1884. *Cymothoa indica* Sch. & Mein., *Naturh. Tiddskr.* **16** : 230.

1924. *Cymothoa indica:* Chilton, *Mem. Indian Mus.*, **5** : 887.

Material examined : 10 exs.; Digha; 7.iv.1987.

Host : In the buccal cavity of *Glossobius giuris* Hamilton.

Colour : In alcohol - brown or pale brown. Live specimens - dark brown.

Measurement : 12 - 19 mm.

Diagnosis : Head subovate. Eyes obscure. First and second antennae subequal in length and composed of eight and nine articles. Fourth and fifth peraeon segments widest. Uropod reaching almost to the level of hinder margin of telson. Pleon abruptly narrower than peraeon.

Distribution : West Bengal : Medinipur; Orissa; Madras; Barkul point; Bernier Island; Queensland; Port Denison; Bowmen.

Remarks : *Cymothoa indica* closely resembles *Cymothoa limbeta, C. borbonica* with shape and size. But *C. indica* differs from these specimens that the anterior margin of the cephalon is not truncate.

Genus 5. *Anilocra* Leach

8. *Anilocra laticauda* H. Milne Edwards

1840. *Anilocra laticauda* H Milne Edwards, *Hist. Nat. Crust.*, **3** : 259.

1905. *Anilocra laticauda:* Richardson, *Bull. U. S. Nat. Mus.*, **54** : 22-228.

Material examined : 1 ex.; Digha; 7.iv.1987.

Host : Unknown.

Colour : Live specimens - glossy brown. In alcohol - straw colour.

Measurement : Length 23 mm.

Diagnosis : Body stout, compact and longitudinally ovate. Head wider and triangular in shape. The first peraeon segment widest than all. Eyes large and situated in the posterolatral angles of the head. The first pair of antenna composed of 8 articles. All the peraeopods prehensile with curved dactyli. The pleon is not abruptly narrower than peraeon.

Distribution: West Bengal : Medinipur. Maryland; Mexico; Cuba; Brazil; Venezuela; Porto Rico.

Remarks : This species is recorded for the first time from this area.

3. Family CIROLANIDAE

Genus 6. *Cirolana* Leach

Diagnosis : Dorsal surface of the body smooth. Front of cephalon not produced in an anteriorly dialated process. Fifth pleon segment covered by lateral parts of proceeding segments. Outer side of the exopod is furnished with hair.

9. *Cirolana parva* Hansen

1890. *Cirolana parva* Hansen, *Vidensk. Selsk. Skr; 6 Raekke, naturvidens, ogmathen Afd.*, **5** : 340-341.

1924. *Cirolana parva:* Chilton, *Mem. Indian Mus.*, **5** : 883.

Material examined : 14 exs.; north of Gadiwara; 31.iii.1989; 36 exs.; Majerchar; 7.i.1989; 20 exs.; Jinjakjali; 31.i.1989; 14 exs.; Krishnadevpur; 11.iv.1989; 8 exs.; Phuleswar; 6.iv.1989; 38 exs.; Shivganga; 31.iii.1989; 11 exs.; Kalnaghat; 13.iv.1989.

Colour : Live specimsns yellowish with black pigment on the dorsal surface. In alcohol - yellowish white.

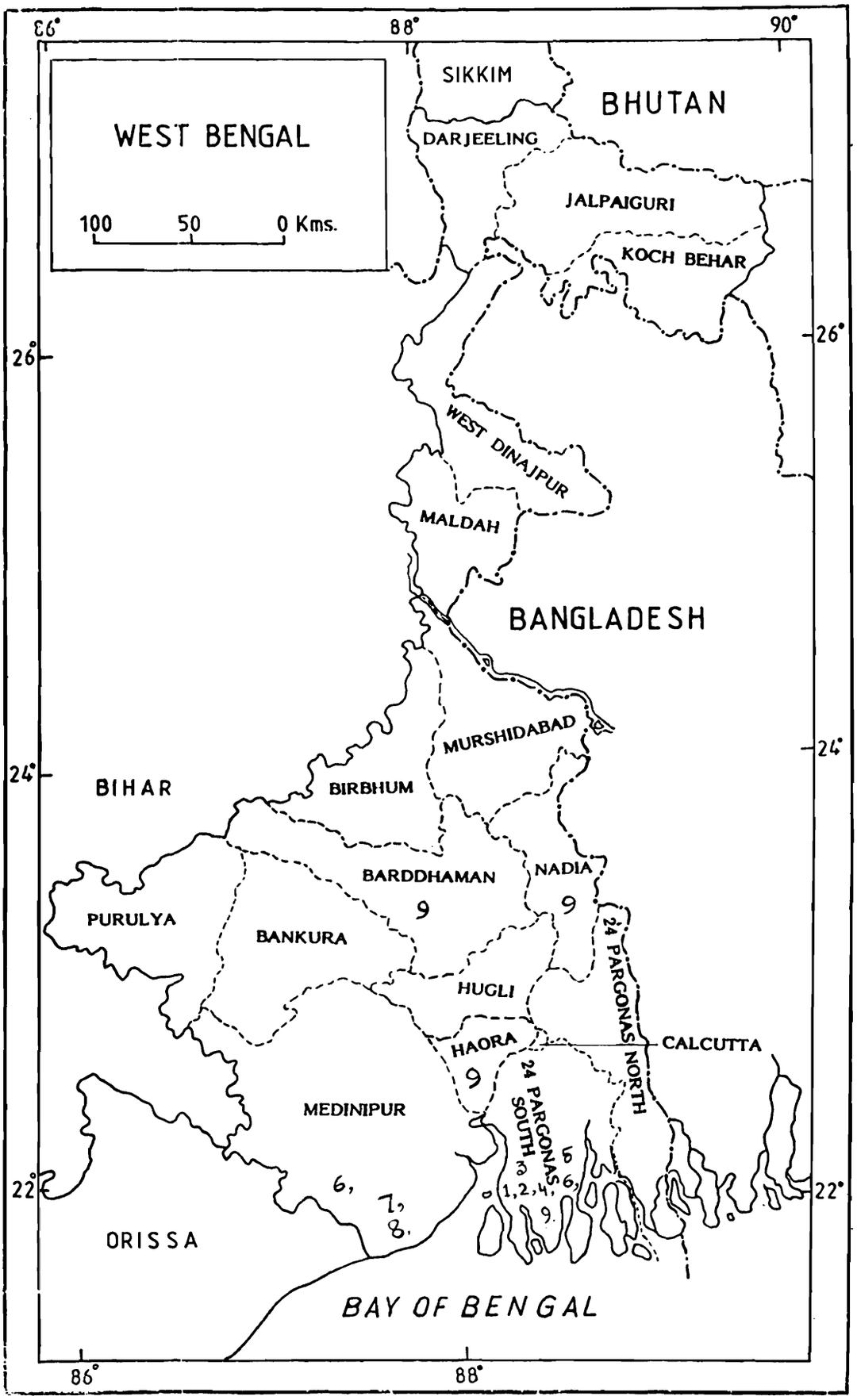
Host : Unknown.

Measurement : Length of the specimens ranges from 5-8 mm.

Diagnosis : the dorsal surface of the body smooth and pigmented. The terminal segment is not rounded. The outer ramus of the uropod slightly shorter and much narrower. All peraeopods are ambulatory not prehensile.

Distribution: West Bengal : South 24 Parganas; Nadia, Hugli, Bardhaman, Orissa; Sri Lanka; Gulf of Mexico; West Indies; Red Sea and East Indies.

Remarks : This species is recorded for the first time from this area. The species differs from *Cirolana californica* by the terminal segments.



Seriel Nos. 1-9 denotes the seriel number of species.

SUMMARY

The present account deals with 9 species from West Bengal. Of these one species, namely *Nerocila madrasensis* Ramakrishna and Venkata Ramaniah was reported earlier from this area. It may be mentioned that the remaining species are recorded for the first time from this area. The diagnostic characters and keys for identification of genera and species of this group have been provided. A general account of morphology, terminology, habitats and the name of the host have been included.

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CRUSTACEA : DECAPODA : GRAPSIDAE

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INTRODUCTION

Till now, 49 species of the family Grapsidae have been reported from India and out of these, only 24 species from West Bengal. All of them are estuarine in habit.

Alock (1900) made studies on the collections of Grapsid crabs made by the Indian Marine Survey Ship 'Investigator', Chopra and Das (1937) published on account of crabs of Tavoy and Mergui Archipalago, Pillai (1951) on the crabs of Travancore, Chhapgar (1957) on the crabs of Maharastra (Bombay) state, Sankarankutty (1961) on the crabs of Andaman & Nicobar Is., Chakraborty, choudhury & Deb (1986) on the crabs of sundarbans.

Apart from these works, Tesch (1917-18) published reports on the Indo-pacific species, Tweedie (1936) on the species of mangrove swamps around Singapore Is., and a few other Malayan localities and Sakai (1939 & 1976) on the crabs of Japan.

Three species have been recorded for the first time from West Bengal and of which one species has already been redescribed and sent for the publication (in the departmental journal).

The paper contains key to the family, genera and species along with detai's of material examined, diagnostic Characters and distribution in India and elsewhere. The collection dates however were not available in many cases ad these could not be given.

MORPHOLOGY AND TERMINOLOGY

External characters : The carapace of crabs is somewhat cubic; body divisible into cephalothorax and abdomen attached below the carapace as a flap.

Cephalothorax : Covered dorsally by carapace, anterior and lateral margins of carapace spiny; rostrum absent; following structures present in this region :

Mouth : Square and opening on the ventral side of the anterior end bounded by external maxillipeds.

Eye : One pair of stalked compound eyes placed at the anterior margin of the carapace within definite sockets; stalks two-jointed and movable.

Appendages : Cephalic and thoracic.

A. *Cephalic appendages* : It includes :

1) *Antennule or 1st. antenna* : Transversely folded, joined and placed within sockets.

2) *2nd. antenna;* Usually small and erect jointed process and may be included or excluded from the orbital hiatus.

3) *Mandible* : Placed below maxllipeds.

4) *1st. & 2nd. maxillae* : Of these two, the 2nd. is more prominent.

B. *Thoracic appendages* :

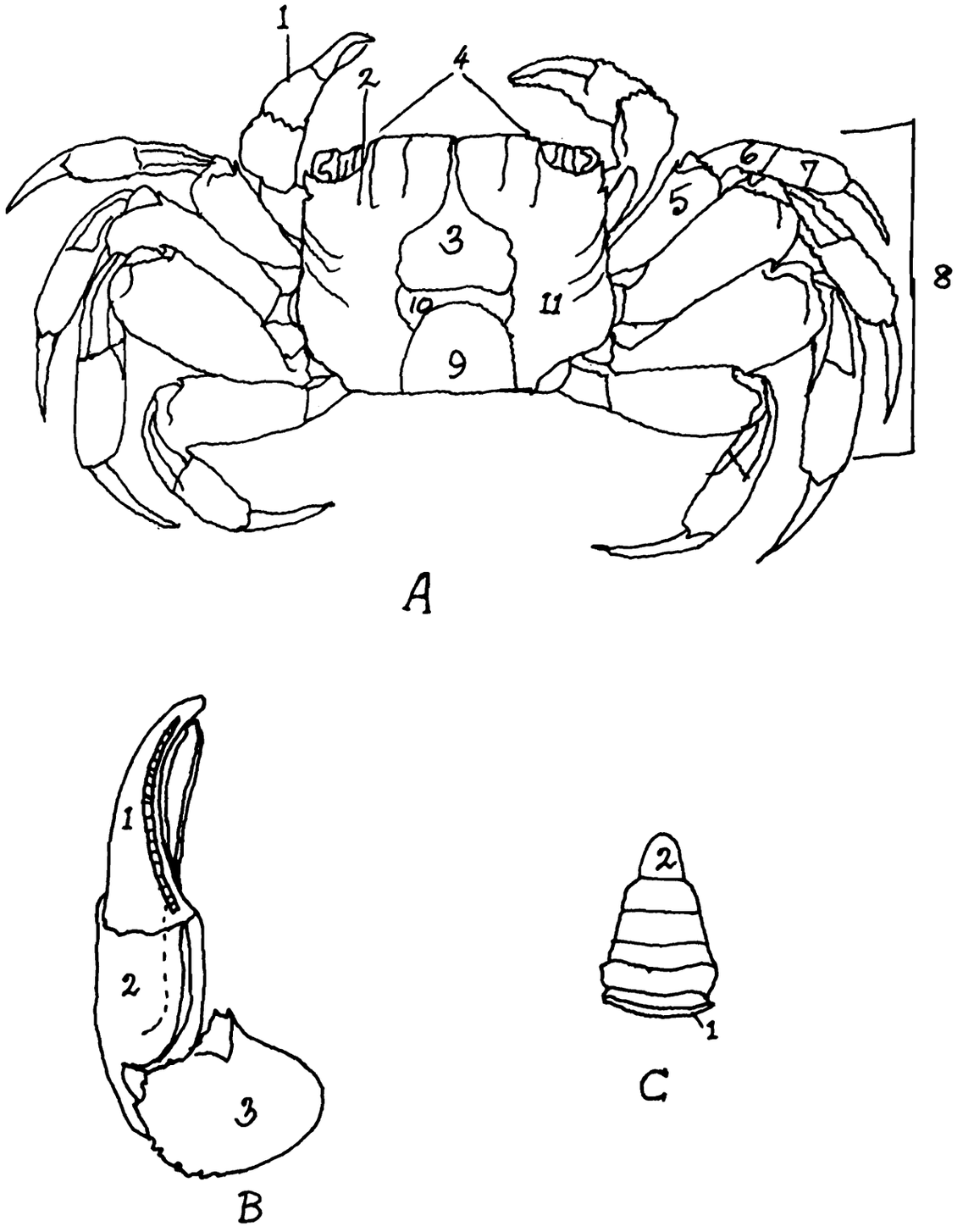


Fig. A. Diagram of dorsal side of a Grapsid carb. 1; cheleped, 2; hepatic region, 3; mesogastic region, 4; front, 5; merus, 6; carpus, 7; propodus, 8; walking legs, 9; intestinal region, 10; cardiac region, 11; branchial region, Fig. B. Diagram of cheleped. 1; dactylus, 2; palm, 3; wrist. Fig. C. Diagram of abdomen. 1; first segment, 2; last segment.

1) *Three pairs of maxillipeds* : Cover the gills.

2) *One pair of chelipeds and four pairs of walking legs.* Of these five, the first is well developed and provided with powerful chela and used for food capture and defence; legs clawed but not chelated and are used for walking sideways.

Abdomen : Seven segmented, flaplike and much narrower in comparison to the carapace on the median groove formed by sternites. Two pairs of copulatory stylets or pleopods are seen in the male and four pairs of pleopods form an egg carrying basket in the female. Anus is present at the terminal end of last abdominal segment.

SYSTEMATIC ACCOUNT

Class CRUSTACEA

Order DECAPODA

Family GRAPSIDAE

The family Grapsidae is characterised by the lateral borders of carapace either parallel or very slightly arched. Squarish crab with broad front.

This family contains 24 species belonging to 9 genera from West Bengal. A list of the species is given below and the asterisk (*) mark denotes new records from this state.

1. Genus *Sesarma* Say

1. *Sesarma quadrata* (Fabricius)
2. *Sesarma bidens* (De Haan)
3. *Sesarma smithi* H. M. Edwards
*4. *Sesarma intermedia* (De Haan)
5. *Sesarma edwardsi* de Man
6. *Sesarma taeniolatum* White
7. *Sesarma tetragona* (Fabricius)
8. *Sesarma longipes* Krauss
*9. *Sesarma kraussi* de Man

2. Genus *Metaplax* H. M. Edwards

10. *Metaplax crenulata* (Gerstaecker)
11. *Metaplax indica* H. M. Edwards
12. *Metaplax intermedia* de Man
13. *Metaplax distincta* H. M. Edwards
14. *Metaplax dentipes* (Heller)

3. Genus *Pyxidognathus* A. M. Edwards

15. *Pyxidognathus fluviatilis* Alocock
16. *Pyxidognathus deianira* de Man

4. Genus ***Ptychognathus*** Stimpson

17. *Ptychognathus dentatus* (de Man)
18. *Ptychognathus onyx* Alcock

5. Genus ***Varuna*** A. M. Edwards

19. *Varuna litterata* (Fabricius)

6. Genus ***Clistocoeloma*** A. M. Edwards

20. *Clistocoeloma merguiense* de Man

7. Genus ***Metopograpsus*** H. M. Edwards

21. *Metopograpsus messor* (Forskal)
22. *Metopograpsus maculatus* H. M. Edwards

8. Genus ***Metasesarma*** H. M. Edwards

23. *Metasesarma rousseauxii* H. M. Edwards

9. Genus ***Pachygrapsus*** Randall

24. *Pachygrapsus propinquus* de Man

Key to the Genera of the Family GRAPSIDAE

1. Presence of an oblique hairy ridge on the external maxillipeds 2
   Absence of oblique hairy ridge onthe extenal maxillipeds 5
2. Carapace nearly square 3
   Carapace quadrilateral 4
3. Carapace hairy, post frontal tubercles distinct ..... ***Sesarma***
   Carapace bare, post frontal tubercles indistinct ..... ***Metasesarma***
4. Carapace dorsally covered with small patches or clusters of hairs ..... ***Clistocoeloma***
   Carapace without such patches of hairs ..... ***Metaplax***
5. Antero-lateral borders of carapace with teeth, front less than half of the extreme breadth of carapace 6
   Antero-lateral borders of carapace without teeth, front more than half of the extreme breadth of carapace 8
6. Carapace thin, flat, depressed 7
   Carapace deep and strongly convex in both directions ..... ***Pyxidognathus***
7. Surface of male palm with a patch of hairs at the finger cleft ..... ***Ptychognathus***
   Surface of male palm without such a patch of hairs at the finger cleft ..... ***Varuna***
8. Antennae completely excluded from the orbital haitus ..... ***Metopograpsus***
   Antennae not excluded from the orbital haitus ..... ***Pachygrapsus***

1. Genus *Sesarma* Say

1817. Say, *Jour. Acad. Nat. Sci. Philad.* 1 : 76

Key to Species of the Geus **Sesarma**

1. Lateral sides of carapace straight 2
   Lateral sides of carapace not straight 7
2. Upper surface of male palm with two oblique comblike ridges 3
   Upper surface of male palm without oblique comblike ridges 4
3. Lateral borders of carapace without teeth ..... *S. quadrata*
   Laterl borders of carapace with one tooth ..... *S. bidens*
4. Upper edge of male dactylus with tubercles 5
   Upper edge of male dactylus without tubercles 6
5. Male dactylus with 40-60 fine uniform tubercles ..... *S. taeniolatum*
   Male dactylus with 9-10 uneven tubercles ..... *S. tetragona*
6. One stong spine present at the inner angle of wrist ..... *S. edwardsi*
   No spine at the inner angle of wrist ..... *S. intermedia*
7. Upper borders of male dactylus without spines 8
   Upper borders of male dactylus with two short stumpy spines ..... *S. smithi*
8. Four post frontal tubercles prominent ..... *S. longipes*
   Four post frontal tubercles not so prominent ..... *S. Kraussi*

1. *Sesarma quadrata* (Fabricius)

1798. *Cancer quadratus* Fabricius, *Ent. Syst. Suppl.* : 341

1957. *Sesarma quadrata* Chhapgar, *J. Bombay Nat. Hist. Soc.* **54** : 520.

Material examined : 3 exs., Barackpur, 2.8.1909 (North 24 parganas); 2 exs., Matlah river, December 1916, S. W. Kemp, 4 exs, Utterbhag, 18.3.1934, S. L. Hora (South 24 parganas).

Diagnostic Characters : Carapace length being about four-fifths of its breadth. Dorsal surface flat and covered with hair. Front more than half, the greatest breadth of carapace. Lateral borders without tooth. Chelepeds differ in sexes and the male palm with two comblike ridges on its upper border.

Distribution : West Bengal : Orissa; Andhra Pradesh; Andaman & Nicobar Is; Pakistan; Srilanka; Burma.

2. *Sesarma bidens* (De Haan)

1835. *Grapsus (Pachysoma) bidens* De Haan, *Faun. Japan Crust.* : 60

1986. *Sesarma bidens* Chakraborty, Choudhury & Deb, *J. Bengal Nat. Hist. Soc.* 5 : 62

Material examined : 34 exs., from Achipur, 4.3.1933, Nurpur, 18.3.1985, S. K. Ghosh, Diamond Harbour, 28.10.1965, S. Ahmed, Kakdwip, Bakkhali, March 1985, B. P. Halder, Uttarbagh, 22.11.1934, Matlah Is., 15.9.1983, N. C. Gayen, Gosaba, 14.3.1985, S. K. Ghosh, Bidya river, 10.9.1983, N. C. Gayen, Bhangaduni Is., 18.9.1983, Baghmara, September 1983, Sajnakhali, 12.2.1925, B. Prasad, Jhingakhali, 11.9.1983, S. Biswas (South 24 parganas); Digha, 5.9.1983, A. Dey (Midnapur).

Diagnostic Characters : Carapace slightly less transverse and its lateral sides with one sharp tooth. Other characters similar to *Sesarma quadrata.*

Distribution : West Bengal : Orissa; Andhra Pradesh; Andaman & nicobar Is.; Srilanka; Thailand; Hongkong and Japan.

3. ***Sesarma smithi*** H. M. Edwards

1853. *Sesarma smithi* H. M. Edwards, *Arch. Mus. Paris.* 7 : 149

1939. *Sesarma smithi* Sakai, Studies on the crabs of Japan, Tokyo : 686

Material examined : 1 ex., from Baghmara khal, 17.9.1983, S. Chatterjee (South 24 parganas).

Diagnostic Characters : Lateral sides of carapace convexly arched in their anterior half and concave in their distal half. Lateral borders cut into two teeth, upper border of movable finger with two stout, blunt spines.

Distribution : West Bengal, : in India; Singapur; Indonesia; Thailand; Philippines; Australia; South Africa and Brazil.

* 4. ***Sesarma intermedia*** (De Haan)

1835. *Grapsus (Pachysoma) intermedius* De Haan, *Faun. Japan Crust.* : 61

1939. *Sesarma intermedia* Sakai, Studies on the crabs of Japan Tokyo, : 684.

Material examined : 3 exs., from Nurpur, 18.3.1985, S. K. Ghosh (South 24 parganas).

Diagnostic Characters : Carapace more qudrate and less transverse, post frontal lobes not so prominent and the sides cut into two teeth of which second one smallest. Outer surface of palm granulate with an obliquely longitudinal line in the middle and beneath this line a group of large granules present.

Remarks : This species is recorded for first time from West Bengal and is distinguished from *Sesarma edwardsi* by the absence of spines at the inner angle of wrist.

Distribution : West Bengal : Andaman & Nicobar Is.; Burma; Korea; Hongkong and Japan.

5. ***Sesarma edwardsi*** de Man

1887. *Sesarma edwardsi* de Man, *Zool. Jahrb. Syst. II,* : 649

1936. *Sesarma edwardsi* Tweedie, *Bull. Raff. Mus.* (12) : 51

Material examined : 60 exs., from Pulta, Basirhat, 5.9.1984, B. P. Halder, (North 24 parganas); Achipur, 4.3.1933, Falta, 27.3.1985, B. P. Halder, Chingrighata, 19.10.1914, Port. Canning, J. Wood-Mason (South 24 parganas); Calcutta Maidan, 29.8.1934, G. C. Chatterjee (Calcutta); Tamluk, 24.3.1985, S. K. Ghosh, Kolaghat, 22.3.1985, S. K. Ghosh (Midnapur).

Diagnostic Characters : Similar to *Sesarma intermedia,* but the post-frontal lobes more prominent. Lateral sides with one sharp tooth. Outer surface of palm closely coverd with small tubercles. Upper surface of dactylus and lower surface of fixed finger also covered with small and sharp granules.

Remarks : This species is easily recognised by the presence of a sharp spine at the inner angle of wrist.

Distribution : West Bengal : Kerala; Maharastra; Andaman; Bangladesh; Burma and Srilanka.

6. *Sesarma taeniolatum* White

1847. *Sesarma taeniolatum* White, *List. Crust. Brit. Mus.* : 38

1986. *Sesarma taeniolatum* Chakraborty, Choudhury & Deb, Lit. Cit. **5** : 62.

Material examined : 55 exs., from Matlah river, December 1916, S. W. Kemp, Bidya river, 10.9.1983, S. M. Ali, Gosaba, 6.3.1981, H. C. Ghosh, Baghmara, 16.9.1983, S. R. Dey Sarker, Jhingakhali, Chamta block, Bhangaduni Is., September 1983, S. Biswas, Sajnakhali, 22.8.1958, H. C. Roy (South 24 parganas).

Diagnostic characters : Carapace nearly square, dorsally flat and covered with clusters of hairs. Lateral sides with a tooth. Upper border of male dactylus with a milled crest of 40-60 fine lamellae.

Distribution : West Bengal : Andhra pradesh; Maharastra; Pakistan; China; Thailand; Singapur and Philippines.

7. *Sesarma tetragona* (Fabricius)

1798. *Cancer tetragonus* Fabricius, *Suppl. Entm. Sust.* : 341

1917. *Sesarma tetragona* Tesch, *Zool. Meded. Leiden, III* : 206

Material examined : 1 ex., Lower Bengal, S. L. Hora, 1 ex., Canning, 2 exs., Sunderban, May 1985, B. P. Halder, 1 ex., Sandheads M. of river Hooghly (South 24 parganas).

Diagnostic Characters : This species closely resembles *Sesarma taeniolatum,* but differs in the following particulars : the carapace slightly broader and the crest of the upper border of the male dactylus with 9-10 coarse teeth.

Distribution : West Bengal : Orissa; Tamilnadu; Andaman and Srilanka.

8. *Sesarma longipes* Krauss

1843. *Sesarma longipes* Krauss, *Sudafr. Crust.* : 44

1986. *Sesarma longipes* Chakraborty, Chaudhury & Deb, *J. Bengal Nat.Hist.Soc.* **5** : 63.

Material examined : 1 ex., from Bhangonkhali ghat, 11.3.1985, S.K. Ghosh (South 24 parganas).

Diagnostic Characters : Carapace length equal to its width at the antero-lateral angles, but posteriorly just at the point of 2nd. pair of legs, it is much more than its length. Third pair of legs more than 2.1/2 times the length of carapace. Lateral borders cut into a tooth, third pair of legs more longer than others.

Distribution : West Bengal : Andaman and Nicobar Is.; Natal and Seychelles.

* 9. ***Sesarma kraussi*** de Man

1887. *Sesarma kraussi* de Man, *Zool. Jahrb. Syst.* **2** : 652

1936. *Sesarma kraussi* Tweedie, *Bull. Raff. Mus.* (12) : 51

Material examined : 1 ex., from Nurpur, 7.12.1983, A. Misra (South 24 parganas).

Diagnostic Characters : Similar to *Sesarma longipes* except the followings : Third pair of legs more than 3 1/2 time the length of carapace. Lateral borders of carapace cut into two teeth and both the surfaces of palm smooth, a row of sharp granules along the outer surface of fixed finger.

Remarks : This species is recorded for first time from West Bengal. It is medium in size and its greatest breadth of carapace about 18 mm, or so.

Distribution : West Bengal : Nicobar Is.; Burma and Singapur.

2. Genus ***Metaplax*** H. M. Edwards

1852. H. M. Edwards, *Ann. Sci. Nat. Zool.* (3) **XVIII** : 161

Key to the species of the genus **Metaplax**

1. Anterior border of carpus and propodus of legs smooth 2

   Anterior border of carpus and propodus of legs spiny ..... *M. crenulata*

2. 3rd. to 5th. male abdominal segments fused together ..... *M. indica*

   All the male abdominal segments separate 3

3. Male dactylus without prominent lobe on its dentary edge and the chelepeds equal 4

   Male dactylus with prominent lobe on its dentary edge and the chelepeds unequal. Anterior border of merus of legs with a single spine ..... *M. intermedia*

4. Anterior border of merus of 1st. and last pair of legs with a single spine and the middle two pairs with several spines ..... *M. distincta*

   Anterior border of merus of legs free from spines ..... *M. dentipes*

10. ***Metaplax crenulata*** (Gerstaecker)

1856. *Rhaconotus crenulatus* Gerstaecker, *Arch. Natur, Jahrg.*, XXII : 142

1986. *Metaplax crenulata* Chakraborty, Choudhury & Deb, Lit. cit. 5 : 63

Material examined : 19 exs., from Frazergunj, B. Prasad, Canning, 4.3.86, B. P. Halder, Matlah river, S. W. Kemp, Beghmara, Bhangaduni Is., Chamta block, Jhingakhali, September 1983, S. Biswas, Sajnakhali, 23.3.1958, H. C. Roy (South 24 parganas).

Diagnostic Characters : Carapace about three-fourths as long as broad. Front about one-fourth the greatest breadth of carapace. Lateral borders of carapace cut intofive teeth and its anterior part distinctly arched. Both the borders of merui of legs spiny.

Remarks : This species can easily be recognised by its male chelepeds and anterior border of legs which are more longer and spiny.

Distribution : West Bengal : India; Burma and Malaysia.

11. *Metaplax indica* H. M. Edwards

1852. *Metaplax indicus* Edward, *Ann. Sci. Nat. Zool.* (3) XVIII : 161

1986. *Metaplax indica* Chakraborty Choudhury & Deb, Lit. Cit. **5** : 63.

Material examined : 7 exs., from Achipur, Ferryghat (South 24 parganas).

Diagnostic Characters : Carapace about two-thirds as long as broad. Front about one-third, the greatest breadth of carapace. Lateral border cut into 4 teeth. Male chelepeds equal and smooth, legs quite unarmed. Third to fifth male abdominal segments fused together.

Remarks : This species easily be distinguished from others by its fused abdominal segments.

Distribution : West Bengal : Orissa; Andhra Pradesh; Maharastra and Pakistan.

12. *Metaplax intermedia* de Man

1888. *Metaplax intermedius* de Man, *J. Linn. Soc. Zool.* XXII : 166

1986. *Metaplax intermedia* Chakraborty, Chowdhury & Deb, Lit. Cit. **5** : 63

Material examined : 199 exs., from Nurpur, 7.12.1983 Sagar Is., 15.8.1977, A. Misra, Kakdwip, 9.3.1985, Gangetic delta, Mus. coll., Sandheads M. of river Hooghly, B. Prasad, Canning, 10.3.1985, S. K. Ghosh, Basanti, 16.3.1985, S. K. Ghosh, Gosaba, 14.3.1985, S. K. Ghosh, Chota Mollakhali, 12.9.1984, Sajnakhali, 22.2.1958, H. C. Roy (South 24 parganas); Medinipur Town, 8.3.1984, (Medinipur).

Diagnostic Characters : This species differs from *Metaplax indica* in the followings : male chelepeds unequal, anterior border of merui of legs with single spine and the male abdominal segments separated.

Distribution : West Bengal : Orissa; Andhra Pradesh and Burma.

14. *Metaplax dentipes* (Heller)

1865. *Helice dentipes* Heller, *Crustaceender Novara Rese* : 62

1937. *Metaplax dentipes* Chopra & Das, *Rec. Ind. Mus.* **39** : 433

Material examined : 162 exs., from Achipur, 4.3.1933, Nurpur, 18.3.1985, S. K. Ghosh, Diamond Harbour, 19.3.1985, S. K. Ghosh, Kakdwip, 8.3.1985, B. P. Halder, uttarbhag, 8.2.1933, S. L. Hora, Canning, 10.3.1985, S. K. Ghosh, Bhangonkhali Ghat, Gosaba, Basanti, 16.3.1985, S. K. Ghosh (South 24 parganas); Tamluk, Haldia, March 1984, A. Misra, Geokhali, 22.3.1985, B. P. Halder (Medinipur).

Diagnostic Characters : Carapace length more than three-fourths of its breadth. Lower Orbitl edge with 4 or 5 blunt, broad teeth which decrease in size within outwards. Anterior border of merus of legs free from spine.

Distribution : West Bengal : Eastern coast of India; Burma; Thailand and Srilanka.

3. Genus *Pyxidognathus* A. M. Edwards.

1878. Edwards, *Bull. Soc. Philom,* Paris (7) **III** : 109

Key to the Species of the Genus **Pyxidognathus**

Presence of a single spine theposteror border of the merus of legs ..... *P. fluviatilis*

Presence of more than one spine on the posterior border of the merus oflegs ..... *P. deianira*

15. *Pyxidognathus fluviatilis* Alcock

1900. *Pyxidognathus fluviatilis* Alcock, *J. Asia. Soc. Bengal, India.* **69** (2) : 408

1918. *Pyxidognathus fluviatilis* Tesch. *Zool. Meded., Leiden,* **IV** : 176

Material examined : 18 exs., from Pulta, March-December 1937 (North 24 parganas); Sunderban, 22.7.1918 (South 24 parganas)

Diagnostic characters : Carapace deep, strongly convex inlongitudinal and transverse direction. Antero lateral borders of carapace arched and cut into 3 prominent teeth. Carpus propodus of legs not so broad. Posterior border of merus of legs with a single spine.

Distribution : West Bengal : north 24 parganas, South 24 parganas & Bengladesh.

16. *Pyxidognathus deianira* de Man

1888. *Pyxidognathus deianira* de Man, *J. Linn. Soc., Zool.,* **XXII** : 148

1918. *Pyxidognathus deianira* Tesch, *Zool. Meded. Leiden,* **IV** : 173

Material examined : 8 exs., from Shibpur, 27.1.1917 (Howrah).

Diagnostic Characters : Similar to *Pyxidognathus fluviatilis* except the posterior border ofmerus of legs which are having more than one spine.

Distribution : West Bengal, Andaman Is. and Burma.

4. Genus *Ptychognathus* Stimpson

1858. Stimpson, *Proc. Ac. Nat. Sci. Philad* : 104

Key to the Species of the Genus **Ptychognathus**

A patch of hairs on the inner surface of the male finger cleft ..... *P. dentatus*

A patch of hairs on the outer surface of the male finger cleft ..... *P. onyx*

17. *Ptychognathus dentatus* (de Man)

1892. *Ptychognathus dentatus* de Man, *Weber's Zool. Ergebn. Niederl Ost Ind.* **II** : 318

1961. *Ptychognathus dentatus* Sankarankutty, *J. Mar. Biol. Assoc. India,* **3** : 111

Material examined : Several 1 exs., from Pulta, 16.9.1936 (North 24 parganas); Falta, 27.3.1985, B. P. Halder, Nurpur, 18.3.1985, S. K. Ghosh, Diamond Harbour, 19.3.1985, S. K. Ghosh, Bakkhali, April 1978, G. C. Rao, Utterbhag, S. W. Kemp (South 24 parganas); Geokhali, 23.3.1985, B. P. Halder (Midnapur).

Diagnostic characters : Carapace flat, depressed and the regions quite distinct. Front prominent and its length two-fifths the greatest breadth of carapace. Antero-lateral borders cut into three sharp teeth. Inner angle of wrist dentiform.

Remarks : The species closely related to the species of varuna except by being small in size; regions of carapace not so well defined and dactyli of legs not so broad.

Distribution : West Bengal : Andaman Is.; Nicobar Is.; Bangladesh and Burma.

18. *Ptychognathus onyx* Alcock

1900. *Ptychognathus onyx* Alcock, *J. Asia. Soc. Benga, India,* **69** (2) : 404

1918. *Ptychognathus onyx* Tesch, *Siboga Expedition,* **XXXIXC** : 86

Material examined : 4 exs., from Pulta, 1936-37 (North 24 parganas); Falta, 27.3.1985, B. P. Halder, Nurpur, 18.3.1985, S. K. Ghosh (South 24 parganas).

Diagnostic characters : Similar to *Ptychognathus dentatus*, except the followings : inner angle of wrist produced to form a long spine and the outer surface of male finger cleft with a tuft of hairs extending along the fixed finger.

Distribution : West Bengal : North 24 parganas, South 25 paranas; Orissa; Andhra Pradesh and Burma.

5. Genus *Varuna* A. M. Edwards

1830. Edwards, *Dict. Hist. Nat.,* **XVI** : 511

19. *Varuna litterata* (Fabricius)

1798. *Cancer litteratus* Fabricius, *Ent. Syst. Suppl.,* : 342

1986. *Varuna litterata* Chakraborty, Choudhury & Deb, lit. cit. **5** : 61

Material examined : Several exs., from Dhapa, N. Annandale, Pulta, 1936-37 (North 24 parganas); Nurpur, Falta, Roychak, December 1983, A. Misra, Diamond Harbour, 19.3. 1985, S. K. Ghosh, Gangasagar, 23.12.1978, K. N. Reddy, Sandheads, 1917, S. W. Kemp, Uttarbhag, 28.2.1935, Canning, Bhangonkhali Ghat, 11.3.1985, S. K. Ghosh, Sajnakhali, 23.3.1958, H. C. Roy (South 24 parganas); Tamluk, 8.3.1984, A. Misra, Geokhali, 22.3.1985, B. P. Halder, Haldia, 5.4.1977, S. K. Talukder (Medinipur).

Diagnostic characters : Carapace dorsally depressed, edges thin and sharp. Front more than one third, the greatest breadth of carapace. Anterolateral borders arched and cut into three teeth. Last three joints of legs compressed and plumed for swimming.

Remarks : The species not only found in brackish water but also in freshwater and economically important as food.

Distribution : West Bengal : Bihar; Orissa; Andhra Pradesh; Tamilnadu; Kerala; Maharastra; Bangladessh; Singapore; Hong Kong; Japan; Burma; Australia; Newzeeland and East Africa.

6. Genus *Clistocoeloma* A. M. Edwards

1873. Edwards, *Nouv. Archiv. du Mus.* **IX** : 310

20. *Clistocoeloma merguiense* de Man

1888. *Clistocoeloma merguiense* de Man, *Jour. Linn. Soc.* London, **22** : 195

1976. *Clistocoeloma merguiense* Sakai, Crabs of Japan & the adjacent Seas, Kodansha, Tokyo : 674

Material examined : 6 exs., from Matlah river, December 1916, S. W. Kemp, Sagar Is., 31.7.1974, A. Misra (Souh 24 parganas).

Diagnostic Characters : Carapace broader than long. The whole body and appendages except the tips of dactyli of legs covered with a patch of hairs. Lateral borders cut into 3 lobes including outer orbital angle. Legs unequal and the third pair more longer. Last segment of male abdomen much longer than broad at the base, twice as long as the preceding segment.

Distribution : West Bengal : Nicobar Is.; Burma; Malaysia and Singapore.

7. Genus *Metopograpsus* H. M. Edwards

1853. Edwards, *Ann. Sci. Nat. Zool.*, (3) **XX** : 164

Key to the Species of the Genus **Metopograpsus**

Carapace about four-fifhs as long as broad, free frontal edge beaded ..... ***M. messor***

Carapace about seven-eight as long as broad, free frontal edge entire ..... ***M. maculatus***

21. *Metopograpsus messor* (Forskal)

1818. *Cancer messor* Forskal, *Descrip. Anim. in. itin. orient* : 88

1986. *Metopograpsus messor* Chakraborty, Choudhury & Deb, lit. cit. **5** : 61

Material examined : 84 exs., from Basirhat, 5.9.1984, B. P. Halder (North 24 parganas), Achipur, 4.3.1933, Roychak, 7.12.1983, A Misra, Diamond Harbour, 28.10.1965, S. Ahmed, Sagar Is., 31.7.1974, A. Misra, Canning, March 1985, S. K. Ghosh, Bhangonkhali Ghat, 11.3.1985, S. K. Ghosh Gosaba, 14.3.1985, S. K. Ghosh (South 24 parganas); Geokhali, 22.3.1985, B. P. Halder (Midnapur).

Diagnostic characters : Front about three-fifths the greatest breadth of carapace. Lateral sides of carapace entire. Inner angle of lower border of orbit denticulate. Last male abdominal segmet triangular.

Distribution : West Bengal : Orissa; Andhra pradesh; Tamilnadu; Karnataka; Kerala; Maharastra; Andaman & Nicobar Is.; Pakistan; Bangladesh; Burma; Srilanka; Saudi Arab and Australia.

22. *Metopograpsus maculatus* H. M. Edwards

1853. *Metopograpsus maculatus* Edwards, *Ann. Sci. Nat. Zool.* (3) **XX** : 165

1986. *Metopograpsus maculatus* Chakraborty, Choudhury & Deb, *J. Bengal Nat. Hist. Soc.* **5** : 61

Material examined : 1 ex., from Bhangaduni Is., Kedo Block, 18.9.1984, A. Misra, (South 24 parganas).

Diagnostic characters : Carapace more elongated, even the length being seven-eightss of its breadth. Front about three-fourths of its greatest breadth of carapace. Inner angle of lower border of orbit not denticulate. Last male abdominal segment as three lobed appearance.

Distribution : West Bengal : South 24 parganas; Maharastra; Orissa; Andhra Pradesh; Andaman Is.; Srilanka; Burma; Malaysia and East Indies.

8. Genus *Metasesarma* H. M. Edwards

1853. Edwards, *Ann. Sci. Nat. Zool.* (3) **XX** : 188

23. *Metasesarma rousseauxii* H. M. Edwards

1853. *Metasesarma rousseauxii* Edwards, *Ann. Sci. Nat. Zool.* (3) **XX** : 188

1947. *Metasesarma rousseauxii* Tweedie, *Bull. Raff. Mus.* (18) : 34

Material examined : 1ex., from Sandheads M. of river Hooghly (South 24 parganas).

Diagnostic characters : Carapace broader than long, deep, smooth and bare. Front more than half the greatest breadth of carapace. Lateral sides without tooth, legs slender, and unarmed. Third pair off legs longest and it less than twice the length of carapace.

Remarks : The genus *Metasesarma* are land and freshwater crabs of the Indo-pacific region.

Distribution : West Bengal : Andhra Pradesh; Tamilnadu; Andaman & Nicobar Is.; Mnnikoy; Burma; Srilanka; Philippines; Madagascar and Australia.

9. Genus *Pachygrapsus* Randall

1839. Randall, *Proc. Ac. Nat. Sci. Philad* : 126

24. *Pachygrapsus propinquus* de Man

1908. *Pachygrapsus propinquus* de Man, *Rec. Ind. Mus.*, Calcutta **2** (3) : 216

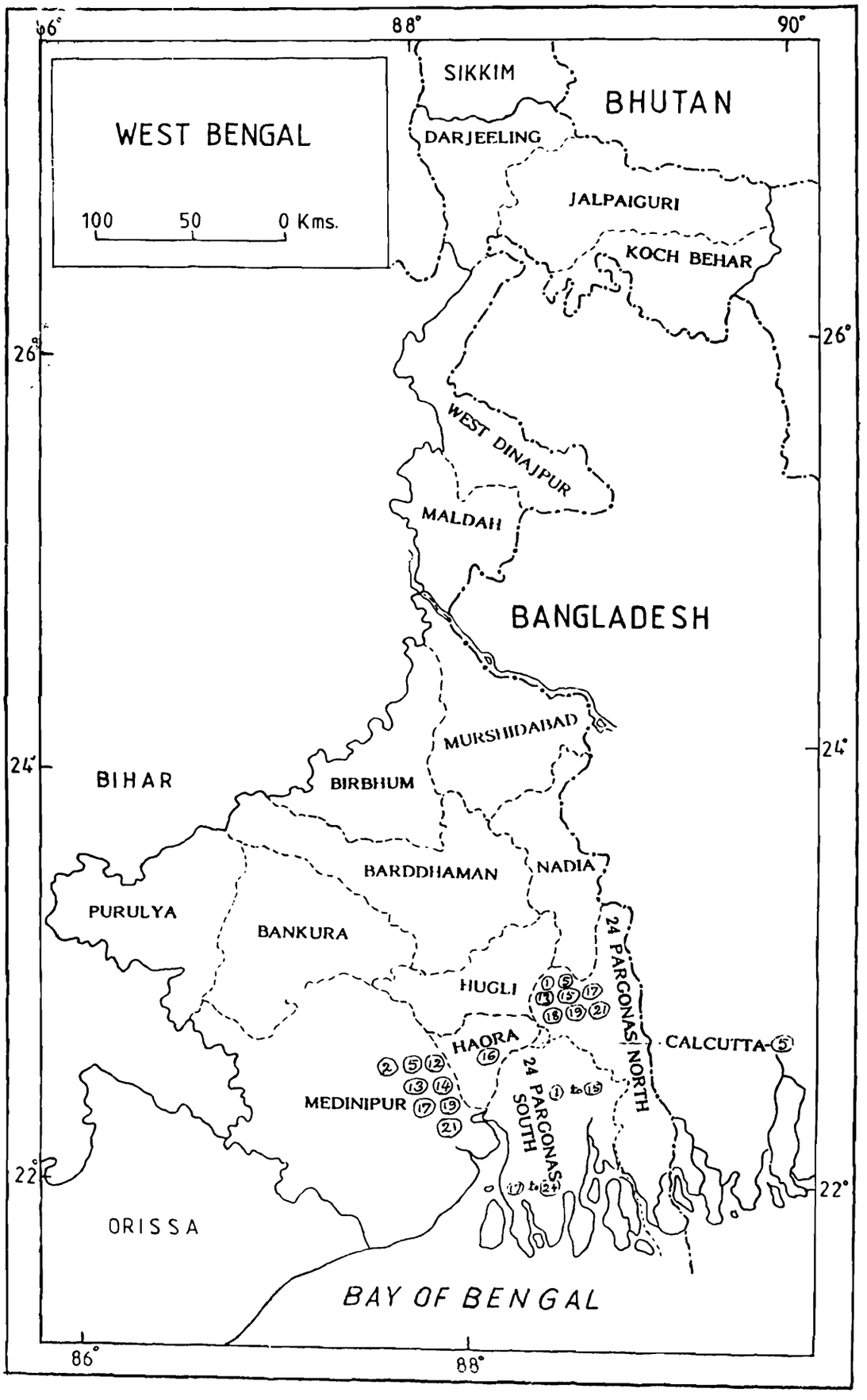
1918. *Pachygrapsus propinquus* Tesch, *Siboga Exped,* **2** : 216 XXXIXC : 76

Material examined : 3 exs., from Canning, January 1906, N. Annandale, Kakdwp, 9.3.1985, B. P. Halder (South 24 parganas).

Diagnostic characters : Distance between the external orbital angles, 1 1/3 times the length of carapace. Front more than half the greatest breadth of carapace. Antero-lateral borders entire. A single transverse ridge present in between orbits and lateral parts of cervical groove.

Remarks : Upper surface of carapace of freshly preserved crab slate coloured and legs red-brown with small dark spots.

Distribution : West Bengal : Orissa and U.S.A.



Serial Nos. 1-24 denotes the serial number of species

SUMMARY

Several examples of crabs collected from the districts of West Bengal have been determined. These belongs to three sub-families viz., Grapsinae, Varuninae, and Sesarminae. Of the three sub-families the Grapsinae represented by three species of the genera *Metopograpsus* and *Pachygrapsus,* Varuninae represented by five species of the genera *Varuna, Ptychognathus, Pyxidognathus* and Sesarminae represented by sixteen species belonging to the genera *Sesarma, Metasesarma, Metaplax,* and *Clistocoeloma.* Out of these species, two have been recorded for the first time from West Bengal.

ACKNOWLEDGEMENT

I am grateful to the Director, Joint-Director (Dr. A. K. Ghosh) and Mr. D. P. Sanyal, Scientist - 'SD' Zoological Survey of India, for providing me the facilities to work out the collections and greatful to Dr. (Miss) M. Deb, O/C of the Crustacea Section in the same organisation for encouragement and going through the manuscript. Thanks ae due to T. Roy, Sri B. P. Halder and A. Misra, Asstt. Zoologists with their party members for making such collections.

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State Fauna Series 3 : Fauna of West Bengal, Part 10 : 345-403, 1998

CRUSTACEA : DECAPODA : CRABS

MAYA DEB

Zoological Survey of India, Calcutta

INTRODUCTION

The earlierst record of the crab fauna of the state and neighbouring areas can be traced back to Alcock's works (1894-1910). Subsequently Kemp (1915-1924) dealt with the members of the families Ocypodidae and Hymenosomatidae. Later Chopra (1933), Hora (1933-1934) and Chopra and Das (1930-1937) have dealt with the crab fauna of Sandheads, Gangetic delta and of lower Bengal. In recent year Chakrabarty, Choudhury and Deb (1986) have contributed towards the study of crab fauna of Sundarban mangroves.

During last fifty years through several surveys conducted by the Scientists of the Zoological Survey of India, a fairly good collection of materials have been deposited in the National Zoological collections.

In the present paper an account of 86 species of crabs (out of a total of 127 species known from all the 16 families) belonging to 49 genera and 14 families have been dealt. These include the freshwater, brackishwater and also marine fauna.

Lengthy synynymies have been omitted to avoid repetititon, as these are available in the works of Alcock (1894-1910), Kemp (1915-1919), Chopra 1937; Chhapgar (1959); Banerjee (1960); Sankarankutty (1960), 1962) and lastly of Deb, Chakrabarty and Choudhury (1986).

The keys for identification of families, genera and species are included. The collection dates and names of collectors were not available in some cases and hence these could not be given.

127 species of crab are spread over the 16 families as follows :-

Dromiidae (2 spp.); Raninidae (I sp.); Dorippidae (3 spp.); Leucosiidae (14 spp.); Calappidae (4 spp.); Majidae (6 spp.); Parthenopidae (2 spp.); Corystidae (I sp.); Xanthidae (12 spp.); Goneplacidae (2 spp.); Hymenosomatidae (5 spp.); Pinnotheridae (2 spp.); Potamonidae (12 spp.); Ocypodidae (20 spp.); Portunidae (17 spp.); Grapsiidae (24 spp.); The last but one Portunidae delt by Sipra Bhadra and last Grapsidae by S. K. Ghosh, separately.

The species recorded for the first time from West Bengal are marked with asterix.

MORPHOLOGY

Crabs belong to the order Decapoda, section Brachyura, characterised by broad carapace or shell; short flap like abdomen attached under the main body; the presence of four pairs of walking legs and a pair of chelipeds.

The term carapace refered to the broad shell, covered the fused head and thoracic segments. Regions of dorsal surface of carapace can be termed as the internal organs below. These are gastric branchial, hepatic, cardiac and intestinal regions. The branchial and gastric regions can be known as proto epi, meso, meta branchial and proto & meso gastric areas etc.

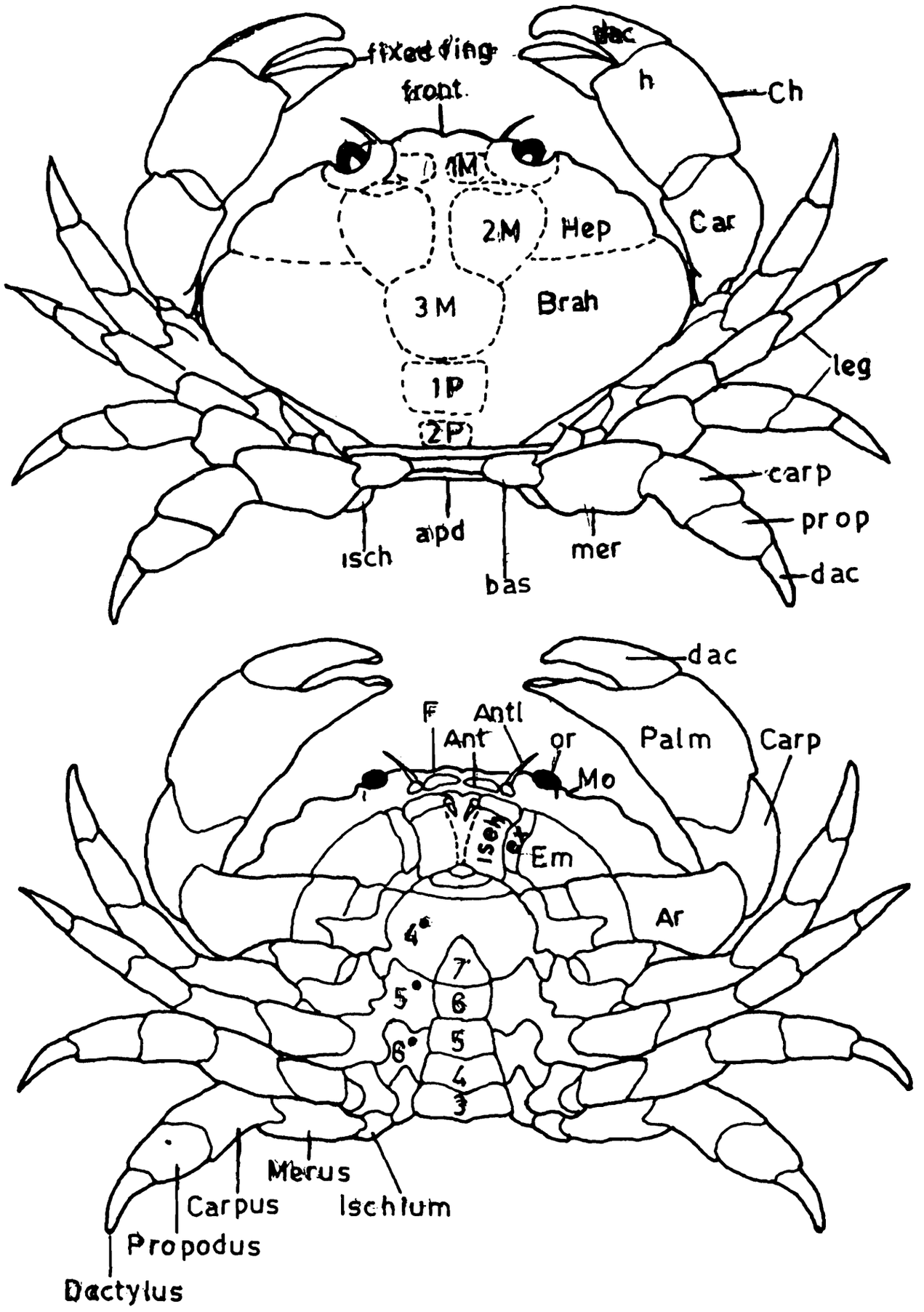
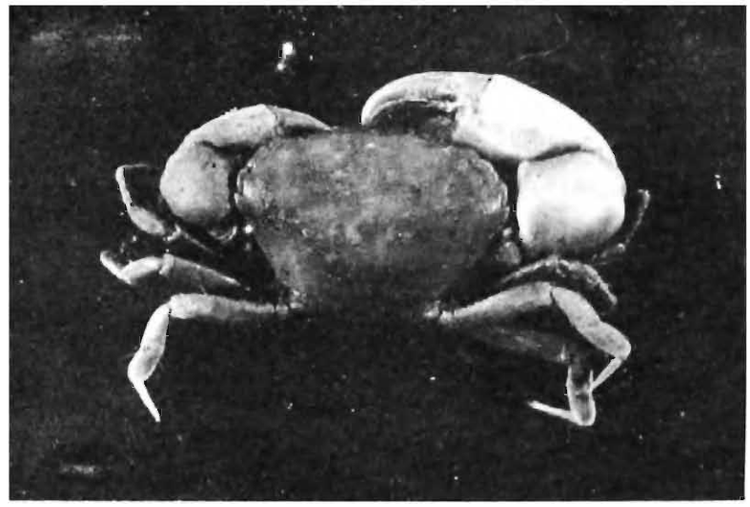
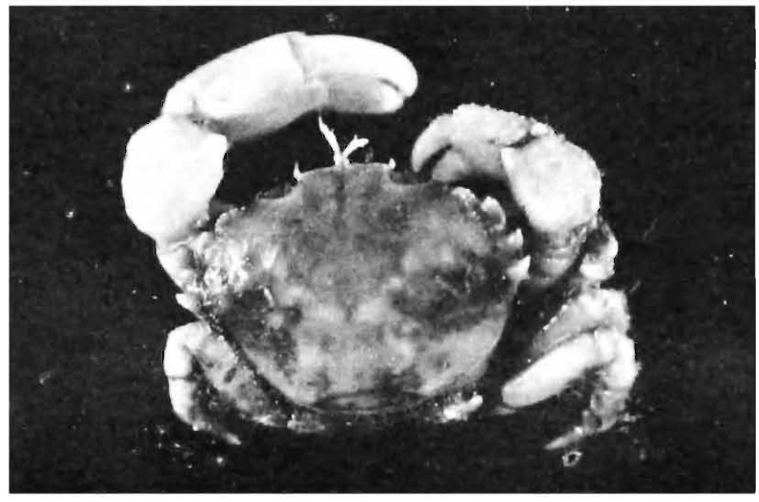


Fig. 1. Diagram of Crab. A, dorsal view; B, ventral view





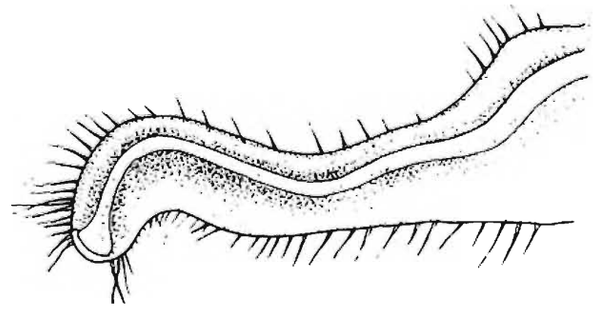


Fig. 2. *Eurycarcinus bengalensis* n. sp.
Fig. 3. *Heteropanope neolavis* n. sp.
Fig. 4. Anterior male pleopod (magnified) of *Heteropanope neolavis* n.sp.

The term frontal, orbital, supra-orbital, external orbital angle; infra orbital; antero-lateral sides, postero-lateral sides; posterior border are the portion of the margins of carapace near the respective organs or regions.

The antennules fold and fit transversely or obliquely or longitudinally into the antennular fossae, separated by interantennular septum below the frontal margin. Basal segment of antenna stands on the orbital hiatus i.e the space between the antennules and infraorbital margin. Mouth or Buccal cavity is bounded by external maxillipeds or third maxillipeds, it has flat basal joint ischium, attached with quadrate merus, tipped distally with narrow carpus, propodus and dectylus. The exopod is oblong elongate and often with a flagellum at its distal tip or reduced or absent in some genera. The areas by the sides of the mouth termed as pterygostomian region. The mouth is bounded anteriorly by the epistome, a narrow transverse space and the area behind the epistome is known as endostome or palate, traversed obliquely by endostomial ridge.

The portion of the ventral surface of carapace behind the mouth is sternum composed of fused thoracic joints termed as sternites. A long groove present on the middle of sternum extend from before backwards and covered by a flattened 4/5-7 jointed plate known as abdomen. The abdomen is broad in female and narrower & often fused in male. In female the abdominal joints bear long, hairy, biramous appendages ontheir inner surfaces are known as pleopods for carrying eggs.

In the male, only two pairs of pleopods attached on the inner side of the first two abdominal joints, which are termed as anterior and posterior male pleopods or Gonopod 1 & 2 or copulatory appendages. The G. 1 is long tubular process often aborned with a brush of long apical hairs and spinules on subapical areas. G. 2 is of variable length, solid process with a terminal or median concave hairy area and sometimes the long slender whip like flagellum extend beyond the concave area..

The first pair of thoracic appendages are termed as chelipeds or pincers composed of 7 joints viz. coxa, basis, ischium merus, carpus, propodus and dactylus. The propodus is swollen, enlarged and termed as palm or hand or pollex, with a fixed finger at lower distal corner and the dactylus or thumb or the moveable finger on upper distal corner. The four pairs of walking legs or ambulatory legs also 7 jointed as the first pair of pereiopods.

ABBREVIATONS USED IN THE TEXT FIGURES.

Dorsal view
Front — Horizontal or angular process between the eyes
1 M — Gastric
2 M — Protogastric
3 M — Mesogastric
1 P — Cardiac region
2 P — Intestinal region
abd. — Abdomen
car. — carpus or wrist of cheliped
h — Hand or palm or propodus of chelipeds
dac. — Dactylus or moveable finger of chelipeds

Ventral view—
Ante — Antenna
Antl. — Antennules
Or. — Orbit
mo — Mouth
E. max. — External maxilliped
Isch. — Ischium
Ex. — Exognath
Ar. — Arm of cheliped
1'-7' — 1-7 abdominal joints
1° 7° — Sternites
Ptry. — Pterygostomian region, or under side of branchial areas or sternites
Epistome — Narrow, transverse space on anterior end of mouth
Pleopods — Male copulatory process

CLASSIFIED LIST OF CRABS (CRUSTACEA) FROM WEST BENGAL

I. Family DROMIIDAE

1. *Conchoecetes artificiosus* (Fabr.)
2. *Conchoedromia alcocki* Chopra

II. Family RANINIDAE

3. *Raninoides personatus* Henderson

III. Family DORIPPIDAE

4. *Dorippe dorsipes* (Linn.)
5. *Dorippe fachhino* (Harbst)
6. *Dorippe fachhino* var. *alcocki* Nobili

IV. Family LEUCOSIIDAE

7. *Leucosia rhomboidalis* de Haan
8. *Leucosia craniolaris* (Herbst)
9. *Leucosia rotundifrons* chopra
10. *Philyra globosa* (Fabr.)
11. *Philyra globosa* M. Edw.
12. *Myra fugax* (Fabr.)
13. *Myra elegans* Bell
14. *Iphiculus spongiosus* Adams & White
15. *Pariphiculus mariannae* (Herklots)
16. *Arcania septemspinosa* (Fabr.)
17. *Arcania erinaceus* (Fabr.)
18. *Ixa cylindrus* (Fabr.)
19. *Ixa inermis* Leach
20. *Actaeomorpha morum* Alcock

V. Family CALAPPIDAE

21. *Matuta planipes* Fabricius
22. *Matuta lunaris* Hilgendorf
23. *Calappa lophos* (Herbst)
24. *Calappa pustulosa* Alcock

VI. Family MAJIDAE

25. *Hyastenus dicanthus* (de Haan)
26. *Doclea ovis* (Herbst)
27. *Doclea cenalifera* Stimpson

28. *Doclea cracilipes* Stimpson
29. *Doclea tetraptera* Walker
30. *Phalangipus longipes* (Linn.)

VII. Family PARTHENOPIDAE

31. *Lambrus (Platylambrus) prensor* Herbst
32. *Cryptopodia angulata* M. Edw. & Luios

VIII. Family CORYSTIDAE

33. *Gomeza distincta* var, *indica* Chopra

IX. Family XANTHIDAE

34. *Eurycarcinus maculatus* Dana
* 35. *Eurycarcinus bengalensis* sp. nov.
36. *Liagore rubromaculata* de Haan
37. *Heteropanope indica* de Man
* 38. *Heteropanope neolaevis* sp. nov.
39. *Menippe hardwickii* de Man
40. *Menippe rumphii* Fabr.
41. *Orphanoxanthus microps* Alcock
42. *Demania bangladeshensis* Ng, Huda, Banu
43. *Galene bispinosa* (Herbst)
44. *Galene granulata* Miers
45. *Halimede tyche* (Herbst)

X. Family GONIPLACIDAE

46. *Scalopidia spinosipes* Stimpson
47. *Typhlocarcinus nudus* Stimpson

XI. Family HYMENOSOMATIDAE

48. *Rhynchoplax wood masoni* (Alcock)
49. *Rhynchoplax inachoides* (Alcock)
50. *Rhynchoplax nasalis* Kemp
51. *Hymenicoides carteri* Kemp
52. *Elamina* sp.

XII. Family PINNOTHERIDAE

53. *Pinnotheres cardi* Burger
54. *Pinnotheres mactricola* Alcock.

XIII. Family POTAMONIDAE

55. *Potamon atkinsonianum* (W-M)

56. *Potamon monticola* Alcock = *P. koolooense* Rathbun
57. *Potamiscus sikkimensis* (Rath)
58. *Potamiscus tumidus* (W-M)
59. *Acanthopotamon martensi* (W-M)
60. *Barytelphusa (Barytelphusa) cunicularis* (W-M)
61. *Barytelphusa (Maydelliathelphusa) lugubris* (W-M)
62. *Liotelphusa campestris* (Alcock)
63. *Liotelphusa laevis gegei* (Alcock)
64. *Sartoriana spinigera* (W.M.)
65. *Spiralothelphusa hydrodroma* (Herbst)
66. *Lobothelphusa wood Masoni* (Rathbun) 1905.

XIV. Family OCYPODIDAE

67. *Ocypoda ceratophthalma* (Pallas)
68. *Ocypoda macrocera* (H.M.Edw.)
69. *Ocypoda platytarsis* (H.M.Edw.)
70. *Macrophthamus pectinipes* Guerin
71. *Macrophthamus transversus* (Latr.)
72. *Macrophthamus teschi* Kemp
* 73. *Macrophthamus erato* de Man
74. *Macrophthamus brevis* (Herbst)
75. *Dotilla blanfordi* Alcock
76. *Dotiloiopsis brevitarsis* (de Man)
77. *Ilyoplax gangeticus* (Kemp)
78. *Scopimera globosa* De Haan
* 79. *Scopimera proxima* Kemp
80. *Uca annulipes* (M.Edw.)
81. *Uca (Thalassuca) vocans hesperiae* Crane
82. *Uca acuta acuta* (Stimpson)
83. *Uca dussumieri* dussumieri (Edw)
84. *Uca (Deltuca) rosea* (Tweedie)
85. *Uca triangularis bengali* (Edw.)
86. *Ilyoplax stapletoni* (de Man)

XV. Family PORTUNIDAE (delt separately by S Bhadra)

87. *Scylla serrata* Forskal
88. *Portunus argentatus* (Edw)

89. *Portunus hastatoides* (Fabr.)
90. *Portunus pelagicus* Linn.
91. *Portunus pubescens* (Dena)
92. *Portunus sanguinolentus* (Herbst)
93. *Portunus pulchricristatus* Gordon
94. *Portunus gracilimanus* (Stimpson)
95. *Charybdis cruciata* (Herbst)
96. *Charybdis callianasa* (Herbst)
97. *Charybdis affinis* Dana
98. *Charybdis rostrata* A.M. Edw.
99. *Charybdis merguiensis* (de Man)
100. *Charybdis miles* (de Haan)
101. *Charybdis variegata* (de Maan)
102. *Charybdis vadorum* Alcock
103. *Lissocarcinus arkati* Kemp.

XVI. Family GRAPSIDAE (delt separately by S Ghosh)

104. *Sesarma bidens* (de Haan)
105. *Sesarma edwardsi* (de Man)
106. *Sesarma intermedium* (de Haan)
107. *Sesarma Krausii* de Man
108. *Sesarma Longipes* Krauss
109. *Sesarma Pictum* de Haan
110. *Sesarma quadratum* Fabr.
111. *Sesarma smithii* H. M. Edw.
112. *Sesarma taeniolatum* white
113. *Sesarma tetragonum* (Fabr.)
114. *Metasesarma rousseauxii* Edw.
115. *Varuna litterata* (Fabr.)
116. *Metaplax crenulata* Gerst.
117. *Metaplax distincta* Edw.
118. *Metaplax dentipes* Heller
119. *Metaplax intermedium* de Man
120. *Metaplax indica* A. M. Edw.
121. *Metaplax elegans* de Man.
122. *Metopograpsus messor* (Forskal)

123. *Metopograpsus maculatus* Edw.
124. *Ptychognathus dentata* de Man
125. *Ptychognathus onyx* Alcock
126. *Pyxidognathus fluviatilis* Alc.
127. *plagusia depressa* var. *squamosa* (Herbst)

I. Family DROMIIDAE Alcock 1899

Key to the genera of Dromidae.

1. Carapace hairy; lateral sides of carapaces granular, toothed..... *Conchoecetes* Stimpson

   Carapace granules, its lateral sides zigzug, minutely serrated, not teethed*Conchodromia* Chopra

Genus 1. *Conchodromia* Chopra

1934. *Conchodromia* Chopra, *Rec. Ind. Mus.*, **36**: 478

1. *Conchodramia alcocki* Chopra

1934. *Conchodramia alcocki* Chopra, *Rec. Ind. Mus.*, **36** : 478

Material examined : Two males from Sandheads mouth of river Hooghly on Feb.-March 1928, by Officers of the Bengal Pilot service on board the Pilot vessel "Lady Fraser"

Diagnosis : Carapace elongate, roughly pentagonal in shape owing to the prominently projecting angular front. Regional lobules well divided by grooves, areolated, surface closely covered with minute granules. Front cut into 3 teeth, median tooth on lower level. Upper orbital edge oblique, minutely serrated. Lateral sides of carapace zig zag, without any teeth but minutely serrated. Joints of external maxillipeds long, pediform, stouter than the legs. The third pair of legs shorter and stouter than the two preceeding pairs; its dactylus hook-like, curved. Fourth legs very much reduced, subdorsal in position, its minute dactyli ends to five - six long setae.

Distribution : West Bengal : Sandheads, mouth of River Hooghly.

Genus 2. *Conchoecetes* Stimpson 1858

2. *Conchoecetes artificiosus* (Fabr.)

1798. *Dromia artificiosa* Fabricius, *Ent. Syst.* Suppl., 360

1933. *Conchoecetes artificiosus*, Chopra, *Rec. Ind. Mus.* **35** : 28

Material examined : Several specimens from Sandheads, mouth of river Hooghly.

Diagnosis : Entire crab except the tips of fingers covered with soft thick valvet like hairy growth. Carapace pentagonal, posterior edge curved, dorsal survace flat, its length is equal to its width. Regional lobules well defined by grooves. Front cut into 3 teeth, middle tooth small and on lower plain. Upper edge of orbit oblique, granular. Lateral sides of carapace have two teeth, one behind the cervical and the other behind the branchail groove. Chelipeds very stout and much longer

than the other legs. Dactylus of third pair of legs hook like curved, 4th or last pair of leg very slender, end in a small claw.

Distribution : West Bengal Sandheads; Andamans, coasts of India; Sri Lanka; Pakistan; Persian Gulf; China; Japan, Australia and Cape of good hope.

II. Family RANINIDAE Dana

1852. *Raninidae* Dana : 380; Alcock 1896 : 288; Sakai 1976 : 47; Hist.Nat.Crust. 11 : 196.

Genus 3. *Raninoides* H. M. Edwards

3. *Raninoides personatus* white

1888. *Raninoides personatus* white & henderson, *'Challenger' Anomura* : 27

1976. *Raninoides personatus*, Sakai, *Crabs of Japan & adj. seas* : 52.

Material examined : Five specimens from Sandheads, West Bengal, collected on 1923 - 1927 by P. V. Lady Fraser.

Diagnosis : Carapace oblong, elongate, strongly convex, broadest in the middle and narrowed towards the end. Surface smooth, regions not defined, twice as long as wide. Arched lateral sides defined by a fine milled line in its posterior half, and the external orbital angle prolonged into a spine, behind which another strong spine present. Mid frotal tooth large, lateral two small. Carpus of cheliped with two, hand with one on upper distal border and three spines along the lower or inner edge. Dactylus smooth, fixed finger short, thick broad, cutting edge dentate. Abdomen of both the sexs consists of seven separate joints.

Distribution : West Bengal, Sandheads; East Coast of India, Burma; Indonesia; Japan; Amboina and Western Australia.

Remarks : *R. Personatus* can be separated from the other two Indian species by its nature of front orbital edge, lateral spines and chelipeds which are unlike the other species.

III. Family DORIPPIDAE

1847. Dorippidae White : 53; Alcock 1896 : 273; Sakai 1976 : 59

Genus 4. *Dorippe* Weber

1795. *Dorippe* Weber, *Nom. Eutom. Soc. Entom. Syste.* III :

Key to the species of genus Dorippe

1. Large nodules 10-12 or granules present on the carapace ..... *dorsipes* Linn.
   No large granules or nodules present on carapace 2
2. Hairs thick on carapace, regions, may or may not be with hairs ..... *facchino* Herbst
   Surface of carapace bare or scantily hairy 3
3. First two pairs of legs perfectly hairless ..... *alcocki* Nobili

4. ***Dorippe dorsipes*** (Linn)

1757. *Cancer dorsipes* Linneaus, *Syste. Natur.* xii, I.

1896. *Dorippe dorsipes* Alcock, *J. Asia. Soc. Bengal*: 277

1933. *Dorippe dorsipes* Chopra, *Rec. Ind. Mus.*, **35** : 50

Material examined : Two specimens collected in May 1927 from Sandheads by Pilot vessel "Lady Fraser"

Diagnosis : Carapace truncate, slightly longer than broad, flat, regions of carapace well outlined, surface of carapace wrinkled, nodular with a dozen of granules. The spine at outer orbital angle acute and projected well beyond the levels of frontal teeth. Lateral margins of carapace denticulated upto a large tooth near the middle of branchial border. On the second and third abdominal terga a row of 3 tubercles present, middle one large and polished, those on sides are small and acute; on the middle of 4th tergum, only one large tubercle present. Chelipeds unequal in adult male, outer surfaces of its joints covered with acute spines.

Distribution : West Bengal : Sundarban; Orissa, from Mergui; Andamans, Palk Strait; and Persial Gulf. Indo-Pacific, east coast of Africa, Red Sea to Japan and West Coast of Australia.

Remarks : In this species, proportional dimentions of carapace and presence of spines and tubercles may vary according to age, sex and season.

5. ***Dorippa facchino*** (Herbst)

1785. *Cancer facchino* Herbst, *Krabben*, I, ii : 190

1896. *Dorippe facchino*, Alcock, *J. Asia. Soc. Bengal*, **65** : 278.

Material examined : 7 males and 6 females, from Sandhead, south 24 parganas, coll. P. V. Lady Fraser in 1923-24.

Diagnosis : Carapace flat, hairy, smooth below hairs; its length is little less than its width. Last two pairs of legs, both edges of merus, posterior edge of carpus and propodus of 1st and 2nd paris of legs densely hairy in male. The spine at external orbital angle is broad but accuminate at tips and did not project beyond the frontal teeth. Lateral borders of carapace often ganular but not dentate. Male abdomen without granules; but 3rd - 5th female terga bluntly carinate, the carinae of 4th and 5th terga finely granuar. Chelipeds asymmetrical and quite smooth when denuded.

Distribution : West Bengal, from Sandheads extended to Tamilnadu coast, Andaman, Singapore and Hongkong.

Remarks : Most specimens carry bivalve shells on their backs. Carapace and the last two pairs of legs are thickly hairy and posterior edges of carpus and only protpodus, of 1st and 2nd legs, are thickly hairy.

6. ***Dorippe fachhino*** var. ***alcocki*** Nobili

1903. Nobili, *Boll. Mus. Zool. Tarino*, **18** : 25

1835. *Dorippe granulata* De Haan, *Fauna Japan. Crust* : 122

1896. *Dorippe granulata* Alcock, *J. Asia. Soc. Bengal*, **65** : 279

1933. *Dorippe fachhino alcocki* Chopra, *Rec. Ind. Mus.*, **35** : 51

Material examined : Two males from Sandheads, Bay of Bengal, Coll. Lady Fraser in 1923.

Diagnosis : Carapace resembles *D. facchino* (Herbst) in almost all respects but the surface granules on carapace slightly more in number and surface hairs hardly present or almsot scantly. On the chelipeds there is on upper edge a narrow fringe of hairs extending along the base of dectylus and on the lower edge a narrow fringe extending upto the end of merus, i.e. arm. 1st and 2nd pairs of walking legs perfectly hairless in both the sexes; last two pairs of legs slightly hairy. Chelipeds of both adult male and female almost same but slightly asymmetrical in size.

Distribution : West Bengal, Sandheads, from Mergui to Gulf of Manner common and reported at various stations of the Bay of Bengal.

Remarks : Besides the presence of scanty hairs on the carapace and last two pairs of legs, the first two pairs of legs are also devoid of hairs inadult males. Some of the male sternites are having some low tubercles on them.

IV. Family LEUCOSIDAE Dana

Leucosidae Dana, 1852 : 390; Alcock 1896; 164.

Key to the genera of the family LEUCOSIDAE

1. Carapace circular, flatish, surface granular, edge of carapace with a beaded line .***Philyra*** Leach
   Carapace not circular or flatish, no marginal beaded line present ..... 2.
2. Carapace rhomboid to hexagonal inshape ..... 3.
   Carapace oblong or broadly oval in shape ..... 5.
3. No spine present on the edges of carapace ..... ***Leucosia*** Fabr.
   Edges of carapace with spine or spines ..... 4.
4. Only one large, thick, spine tipped lateral process ..... ***Ixa*** Leach
   Few long, slender spines present on the lateral and posterior edges of carapace ..***Arcania*** Leach
5. Transversely oval crab ..... 6.
   Oblong oval in shape ..... 7.
6. Surface covered with dense hairs, sides of carapace with spines and dents .....
   ..... ***Iphiculus*** Ad. & White
   Surface covered with large bubble like smooth granules, no spines or dents on the side of carapace ..... ***Actaeomorpha*** Miers.
7. Lateral spines 12, posterior spine one ..... ***Pariphiculus*** Alcock
   Lateral spines 2, posterior spine one ..... ***Myra*** Leach.

Genus 5. ***Leucosia*** Weber

1795. *Leucosia Weber, Nom. Entom. Soc. Entom. Syst.* III : Holthius 1959; 105; Sakai 1976 : 115.

Key to the species of ***Leucosia***

1. Sides of carapace not beaded 2
   Sides of carapace with beads ..... *rhomboidalis* de Haan

2. Front ends in five prongs, merus of legs adorned with lines of sharp granules .... *craniolaris* Herbst

Front blunt and short, proximal half of arm of chelipeds tubercular..... *rotunidifrons* chopra

7. *Leucosia rhomboidalis* de Haan

1896. *Leucosia rhomboidalis* Alcock, *J. Asia. Soc. Bengal*, **65** : 234.

1933. *Leucosia rhomboidalis*, Chopra, *Rec. Ind. Mus.*, **35** : 32.

Material examined : Two males from Sandhead, S. 24 Parganas, collected by P. V. Lady Fraser on 1923 Nov.

Diagnosis : Small crab with very convex, rhomboidal shape, undivided and smooth carapace. Two sides of its front subparalled, so the junction of front and antero-lateral sides angular. Antero lateral sides of carapace smooth. Surface of carapace below the posterior edge of dorsum granular. Front as long as broad, sides parallel, edge sharp pointed. Two rows of granules present on the inner surface of hand, and on upper and lower edges of equal chelaepeds.

Distribution : West Bengal Sandheads, Andamans, coromandal coast; from Sri Lanka to Hongkong and Japan.

Remarks : The proportional dimentions of carapace, its front, smooth edges of carapace and chelipeds etc. are the main distinguishing characters from the other species.

8. *Leucosia craniolaris* (Herbst)

1896. *Leucosia craniolaris* Alcock, *J. Asia. Soc. Bengal*, **65** : 231.

1933. *Leucosia craniolaris*, Chopra, *Rec. Ind. Mus.* **35** : 33.

Material examined : Several specimens from Sandheads, mouth of River Hooghly, collected by P. V. lady Fraser.

Diagnosis : Carapace sharply hexagonal or so in shape, smooth, hairless. Anterolateral sides of carapace finely beaded, straight and meet the converging sides of the front in continuous sweep. Front prominent, truncate, triangular. Postero lateral sides beaded upto the base of first pair of legs. Posterior margin straight and finely beaded, the surface below it, covered with sharp granules. Trigonal arm of cheliped proximally beaded on upper lower and ventral sides, otherwise smooth. Inner upper edge of wrist with 2-3 granules and inner surface of hand bounded by two longitudinal rows of sharp granules which continued a little distance along the fixed finger. Cutting edges of fingers dentate.

Distribution : West Bengal; Sandheads, mouth of river Hooghly; Tamilnadu, Rameswaram; Sri Lanka; Gulf of Martaban; East Asia and Torris strait.

Remarks : Baeded antero, postero lateral sides and straight posterior edges of hexagonal carapace; its front ends in five prongs; merii of legs adrorned with lines of sharp granules etc. are unlike the other allied species.

9. *Leucosia rotundifrons* Chopra

1933. *Leucosia rotundifrons* Chopra, *Rec. Ind. Mus.*, **35** : 34.

Material examined : Several specimen from Sandheads, Coll. P. V. Lady Fraser in 1924, and Marine Survey of India.

Diagnosis : Carapace slightly longer than broad, convex dorsal surface quite smooth but distinctly punctate on hepatic, gastric and sides of branchial regions. Anterao lateral sides of carapace beaded throughout but not straight. Posterolateral sides crenulate, posterior margin finely milled and rounded in female, and almost straight in male. Front broader than long, prominent. The proximal half, inner and outer borders of arm of chelipeds tubercular. Wrists has got two rows of granules on inner surface, one each on upper and lower edge. Upper, lower and inner surfaces of palm granular. Fingers narrowly gapping, their cutting edges dentate.

Distribution : West Bengal : Sandheads, mouth of River Hughly; Tamilnadu Coast; Laccadives and Parsian Gulf.

Remarks : Distinct punctations and over all shape of carapace, short blunt front and nature, arrangements of tubercles on the chelipeds distinguishes the species from other allied species.

Genus 6. ***Philyra*** Leach 1817

Key to the species of genus Philyra

1. Marginal granules of carapace uniform in size ..... *globosa* de Man

   Some of the marginal granules enlarged at regular interval ..... *globulosa* Edwards

10. ***Philyra globulosa*** Edw.

1834. *Phylyra globulosa* H. Milne Edwards, *Cuvier Regne An Crust* p;. 1-86

1896. *Phylyra globulosa*, Alcock, *J. Asia. Soc. Bengal*, **65** : 245.

1933. *Philyra globulosa*, Chopra, *Rec. Ind. Mus.*, **35** : 38

Material examined : 21 specimens from Sandheads, Coll. P. V. Lady Fraser between 1922-1927.

Diagnosis : Circular crab, behind the hairy front its edges are defined all around by a line of granules, some of which are enlarged and disposed at regular intervals. Front broadly bilobed when denuded. A broad groove separates the branchial from the cardiac and intestinal regions on either side. Under surface of crabs except in some adult males granular leaving the abdomen in centre, the base of it is also granular. Arm of chelae granular upto basal 1/3 to half, upper and lower outer edges of wrists, inner surface of hands defined by a row of granules upto the base of fixed finger. Fingers hollowed at tips.

Distribution : West Bengal; Sandheads, all along the East Coast of India, Malabar coast, Andaman Island, Indian Ocean from Persian Gulf to the Gulf of Siam and Moluccas.

Remarks : Can be separated from other species by its Circular carapace with beaded edges, some enlarged beads are disposed at regular intervals; broadly bilobed front; base of abdomen, surface of sternum etc. are granular.

11. ***Philyra globosa*** de Man

1888. *Philyra globosa* de Man, *J. Linn. Soc. Zool.*, **22** : 202

1896. *Philyra globosa* de Man, Alcock, *J. Asia. Soc. Bengal*, **65** : 243.

Material examined : Several example from month of river Hooghly, Sandheads, Coll.

Diagnosis : Carapace subcircular, glazed, anterior half of crab narrower than posterior half, dorsum defined all along by a row of equal size, fine beads. Front hairy, epistome projects well beyond the frontal edge. Regions of carapace not at all defined. The thoracic sterna and the base of abdomen bordered by flattened granules. Both surface of arms of cheliped granular except a portion distally. The wrist and hand smooth except in some old males.

Distribution : From West Bengal coast of Bay of Bengal; Mergui Archipelago to Karachi.

Remarks : Small (18 mm - 20 mm) subcircular, glazed crab, with a row of equal size marginal beads; regions not defined and only the arm of chelae granular are the main distinguishing features for the species.

Genus 7. *Myra* Leach

1817. *Myra* Leach. Zool. Miscelf. III : 23

Key to the species of *Myra*

1. Carapace broadly oval, surface granular..... *fugax* Fabr.

   Carapace oblong oval, patches of granules present on the surface of carapace..... *elegans* Bell

12. *Myra fugax* (Fabr.)

1778. *Lucosia fugax*, Fabricius, *Ent. Syst. Suppl* : 351.

1933. *Myra fugax*, Chopra, *Rec. Ind. Mus.*, **35** : 39.

Material examined : males and 3 females from Sandheads, Gangetic delta, Coll. P. V. Lady Fraser between 1922-1928.

Diagnosis : Carapace ovoid, with three, sharap. recurved spines, one at both corners, of posterior borders and one median just above the borders, surface of carapace granular. Front broadly bidentate and projects beyond the buccal cavern. External maxillipeds granular, hairy; in females only, one longitudinal row of large granules present on the ischium. Arm of chaelipeds covered closely with large pearly granules upto its proximal 3/4.

Distribution : West Bengal, all round the coasts of India, Persian Gulf; Mergui Archipelago, Hongkong.

Remarks : M. fugax is a variable species regarding its dimentions of carapace, size of posterior spines, granulation of carapace, relative length of chelipeds etc.

13. *Myra elegans* Bell.

1855. *Myra elegans* Bell, *Trans. Linn. Soc.*, **21** : 297

1933. *Myra elegans* Chopra, *Rec. Ind. Mus.*, **35** : 40

Material examined : 2 females and one male from Sandheads, Coll. P. V. Lady Fraser during 1922 - 1923.

Diagnosis : Elongate oval carapace, median carina flat, terminating posteriorly in a long spine with two short spinules on each side. An elongale patch of tubercles on branchial region; carina and posterior regions also granular. Front broadly bilobed, sharp, rounded and projected, but the edge of

external maxillipeds seen in dorsal view. Chelipeds slender and similar in both sexes. Major part of arm of chalae pearly granular except the distal under surface.

Distribution : West Bengal; Sandheads, Madras Coasts; Burma, Java, Siam.

Remarks : Not a very common species, Elongate oval carapace adorned with patches of granules and three posterior spines; sharp, rounded projected frontal lobes etc. differentiates the species from its nearest allies.

Genus 8. *Iphiculus* Adams & White 1848

14. *Iphiculus spongiosus* Adams and White

1848. *Iphiculus spongiosus* Adams and White, 'Samarang' Crustacea : 57

1933. *Iphiculus spongiosus* Chopra, *Rec. Ind. Mus*; **35** : 42.

Material examined : One female specimen from Sandheads, Coll. P. V. Lady Fraser in Nov. 1923.

Diagnosis : Carapace transversely oval, convex, whole crab but for the fingers covered with dense songy hairs, beneath which the surface granulous, cardiac and intestinal regions marked by grooves. Antero-lateral sides of carapace adorned with four close spines and posterolateral sides by two widely apart denticles. Buccal cavity triangular; front broad, low, bilobed. Palm of cheliped short, globular, fingers slender, hook like.

Distribution : West Bengal : Sandheads, Gangam, Tamil Nadu, Addamans; Red Sea : Mekran Coast, Persian Gulf; Singapore, Gulf of Siam; Philippine and Hongkong.

Remarks : Broadly oval rough, granulous, convex crab with spongy covering at once separate the species from its nearest allies.

Genus 9. *Actaeomorpha* Miers 1878 : 184

15. *Actaeomorpha morum* Alcock

1896. *Actaeomorpha morum* Alcock, *J. Asia. Soc. Bengal*, **65** : 172.

1934. *Actaeomorpha morum*, Chopra, *Rec. Ind. Mus.* **35** : 480.

Material examined : One female from Sandheads, mouth of River Hooghly, Coll. P. V. Lady Fraser on Nov. 1923.

Diagnosis : Carapace broader than long, roughly oval, strongly convex, covered closely with large pearly granules over the whole body. The regions of carapace completely isolated from a broad marginal ring by a broad groove. The regional lobules markedly separated from each other by two oblique grooves into two large triangular branchial and one acute angular gastro-cardiac regions. Front broad low, bilobed, four broad, sharp cut laterl lobes present. Posterior margin rounded, tubercular. Chelipeds and legs covered closely with close spinous granules above and pearly granules below.

Distribution : West Bengal; Sandheads, Orissa Coast of Bay of Bengal.

Remarks : Regional lobules are deeply and diagonally divided into triangular branchial and acute angular gastero cardiac regions and the entire crab is covered with large pearly granules. These are unlike and other known species of crabs so far known.

Genus 10. ***Pariphiculus*** Alcock 1896

16. ***Pariphiculus marianne*** (Herklote)

1896. *Pariphiculus rostratus* Alcock, *J. Asia. Soc. Bengal*, **65** : 255

1933. *Pariphiculus mariannae*, Chopra, *Rec. Ind. Mus.*, **35** : 42

Material examined : One male and one female from Sandheads coll. P. V. Lady Fraser on Nov. 1923.

Diagnosis : Carapace globular, slightly longer than broad, front bidentate, prominent, projecting beyond in the form of snout. Surface rough with granules and tubercles below the dense fine hairs. Lateral sides of carapace with six sharp tubercles Intestinal region forms an circular swelling, mounted by two spines. At either end of short posterior edge one dent present. Chelipeds similar in both sexes, hand swollen and about half the length of fingers, fingers slender, hooked at tips and cutting edge dentate.

Distribution : West Bengal, Sandheads, coromandal and Malabar Coasts; Burma; Hongkong and China.

Remarks : Oblong, globular, rough, hairy crab with 5 sharp antero-lateral and two postero-lateral teeth separates the species from the other allied species.

Genus 11. *Arcania* Leach. 1817

Key to the species of genus *Arcania*

1. Surface of carapace densely spiny, 11 large marginal spines ..... *erinaceus* Fabr.

   Surface of carapace smooth or minutely granular, 7 marginal spines..... *septemspinosa* Fabr.

17. ***Arcania septemspinosa*** (Fabr.)

1778. *Cancer septemspinosus* Fabricius, *Mant. Ins. 1 and Ent. Syst.* **11**., 463

1963. *Aracania septemspinosa*, Chopra, *Rec. Ind. Mus.*, **35** : 43.

Material examined : 17 males and 13 females from Sandheads, mouth of riever Hooghly, Col. P. V. Lady Fraser, between 1922 to 1932.

Diagnosis : Carapace bluntly rhomboidal, the blunt angle form the bidentate front. Surface of carapace covered with granular patches. The lateral and posterior angles all terminates into a large, gently curved spines, the lateral ones are longest. Besides these four other smaller spines present on either side of posterior part of carapace Chelipeds symmetrical, slender and granular.

Distribution : West Bengal: Ganjetic and Mahanaddi Delta; Andamans, Arakan, Tamilnadu Coast and Persian Gulf. Indo Pacific, Cape of Good Hope, Red Sea, Indian Seas, Malay Archipdigo and Hongkong.

Remarks : Small, convex rhomboidal crab with seven large, spines present on posterior margins of the crab are the main diagnostic features for the species.

18. ***Archania erinaceus*** (Fabr.)

1798. *Cancer erinaceus* Fabricius, *Mantis Insect.* **1**. 325.

1933. *Arcania erinaceus*, Chopra, *Rec. Ind. Mus.*, **35** : 44

Material examined : 3 males and 2 females from Sandheads, Coll. P. V. Lady Fraser on 1923 to 1928.

Diagnosis : Carapace little longer than broad, globular surface entirely covered with dense spines, of which eleven arranged along the margins are most prominent than the other. Most of the marginal spines covered with secondary spinules, which may be absent in small young specimens. Front deeply bifid, ends in two dents. Entire ventral surface of the body sharply granular. Arm of chelipeds and merus of legs spiny even in young ones.

Distribution : Gangetic delta, entire east coast of India upto Gulf of Manner, Singapore.

Remarks : Small crab thickly spiny all over and granular below.

Genus 12. ***Ixa*** Leach 1817

Key to the species of genus ***Ixa***.

1. Channels on carapace deep, broad; lateral processes cylindrical, ends abruptly in a spine.....
.....*cylindrus* Fabr.

Channels of carapace not deep, lateral process gradually tapers to a spine. .....*inermis* Leach

19. ***Ixa cylindrus*** (Fabr.)

1798. *Cancer Cylindrus*, Fabricius, *Mantiss. Ins.* **1** : 323

1933. *Ixa Cylindrus* Chopra, *Rec. Ind. Mus.* **35** : 45

Material examined : One male and 2 females from Sandheads, Coll. Lady Fraser, between 1924-1927.

Diagnosis : Carapace broadly rhomboidal in shape, at the lateral corners one large, lateral, cylindrical process present, which abruptly ends in a spine. The median regions of carapace separated on either side by deep, broad hairy groove, surface granules in patches.

Distribution : West Bengal; Gangetic delta, Andamans, Tamilnadu and Palk Straits.

Remarks : Huge, cylindrical, spine tipped the lateral process of crab and with two broad, deep, hairy, longitudinal grooves on the granular dorsal surface of carapace leads to correct specific identification of the species.

20. ***Ixa inermis*** Leach 1817

1817. *Ixa inermis* Leach, *Zool. Miscell.*, **III** : 26.

1933. *Ixa inermis* Chopra, *Rec. Ind. Mus.*, **35** : 48.

Material examined : One female from Sandheads, Coll. Lady Fraser, on Sept. 1925.

Diagnosis : Carapace broadly rhomboidal, lateral pocess short, thick at base, gradually taper distally to a fine point. Both upper and lower surface of carapace granular. Shallow grooves separate median parts from the branchial regions. The posterior border of crab has on each end a petaloid process directed backward and outward. Chelipeds long narrow.

Distribution : West Bengal : Sandheads, Orissa; Persian Gulf; Red Sea; N. Australia and Zanzibar.

Remarks : Instead of two longitudinal broad deep, hairy grooves on the dorsal surface of carapace the species is having shallow depressions only; the two petaloid process of posterior border and short lateral process are species specific.

V. Family CALAPPIDAE Dana 1852

1852. *Calappidae* and *Matutidae* Dana : 393

1896. *Calappidae* Alcock : 137; Sakai 1976 : 126.

Key to the genera of CALAPPIDAE

Carapace broad, oval and much broader behind owring to the much expansion of posterolateral sides, beneath which the four pairs of walking legs are concealed..... ***Calappa*** Weber

Carapace circular and with a stout, strong, long spine at the junction of antero lateral and postero lateral sides of carapace. Flattened legs are all for swimming..... ***Matuta*** Weber

Genus 13. *Calappa* Weber 1795

Key to the genus Calappa

Surface of carapace with rows of tubercles..... *pustulosa* Alcock

Surface of carapace smooth, shiny ..... *lophos* Herbst

21. *Calappa lophos* (Herbst)

1782. *Cancer lophos* Herbst : Krabben, v, **1** : 201.

1933. *Calappa lophos,* Chopra, *Rec. Indian Mus,* **35** : 28

Material examined : 20 specimens of both the sexes from Gangetic delta, collected by P. V. Lady Fraser between 1923 to 1929.

Diagnosis : Carapace very convex, broadly oval in shape, smooth except few elevated areas in front and few scattered granules behind. It is rounded in front and much broader behind by a pair of expanded wings, beneath which the four pairs of walking legs lodged. Anterolateral sides of carapace and a part of postero lateral sides beaded. The expansions of posterior sides nearly as broad as long and formed of six large triangular teeth. Lower outer parts of carapace densely hairy. Front bifid and as broad as orbit. The chelipeds very large, distal end of arm has an expansion made of four teeth. Hands compressed, its upper edge very high, 6-7 dentate, crest like; outer surfaces of palms and wrists smooth, chalae symmetrical and equal. In the adult male, abdomen consists of five joints, 3rd, 4th and 5th joints fused together. But in the young male and adult female it consists of seven separate joints.

Distribution : West Bengal, East coast of India; Andaman, SriLanka; Laccadives; Persian Gult; widely distributed in the Indo Pacific region.

Remarks : Very convex, smooth, oval crab with expanded wing like dentate expsnsions of posterolateral sides of arm and palm of chelipeds are very much distinctive for the species.

22. *Calappa pustulosa* Alcock

1896. *Calappa pustulosa* Alcock, *J. Asiat. Soc. Bengal*, **65** : 147

1933. *Calappa pustulosa*, Chopra, *Rec. Indian Mus.*, **35** : 29

Material examined : 15 males and females from Sandheads, month of river Hooghly, by P. V. Lady Fraser in 1922 to 1928.

Diagnosis : Carapace subcircular, convex, surface covered with seven, parallel, longitudinal rows of large tubercles. Anterolateral sides of carapace smooth in their anterior half, crenulate in posterior half; postero-lateral sides with a low prominence. Under surface of crab scantly hairy. Front narrow, bilobed and projects beyond the orbits. Chelipeds with many large tubercles on outer surfaces of wrists and palms. In other cases the specimens are like C. lophos.

Distribution : West Bengal, Sandheads, Gangetic delta upto Orissa coast.

Remarks : Subcircular, convex carapace with seven longitudinal rows of tubercles on the upper surface of wrists and palms are the main characters to isolate and recognise *C. pustulosa.*

Genus 14. *Matuta* Fabricius 1793

Key to the species of Matuta

Minute red dots present on carapace.....*lunaris* Forskal

Red rings and elongated loops present on the carapace.....*planipes* Fabr.

23. *Matuta lunaris* (Forskal)

1775. *Cancer lunaris* Forskal, *Desc. Anim.* : 91

1793. *Matuta victor* Fabricius, *Entom. Syst. Suppl.* : 359

1937. *Matuta lunaris*, Chopra and Das, *Rec. Ind. Mus.* **39** : 383

Material examined : One female from gangetic delta, Coll. Lady Fraser in 1927

Diagnosis : Carapace subcircular, slighly convex, posterolateral sides strongly convergent, with a 1/2 inch long, very large, horizontal epibranchial spine present on either side. Carapace finely granular on epibranchial, post gastric and cardiac regions. Of the six, the anterior two tubercles on the middle of carapace are obsolate; in adults the other four tubercles are also less prominent. Anterolateral sides of carapace crenulate. The posterior and posterolateral sides of carapace form a finely beaded, slightly raised ridge which ends in rear of the lateral spine. Front distincly bilobed. Checlipeds equal and symmetrical.

Distribution : West Bengal, Gangetic Delta, East to West coast of India; Andamans; Arakan; Tavoy; Penang; China; Japan; Australia; Red Sea and South Africa.

Remarks : Freshly preserved specimens of *M. lunaris* are covered with minute red dots which are closely set.

24. ***Matuta planipes*** Fabr.

1798. *Matuta planipes* Fabricius, *Entom, Syst. Suppl.* : 369

1799. *Matuta lunaris,* Herbst, Krabben. III : 43

1986. *Matuta lunaris* Deb, Chakrabarty & Choudhury, *J. Bengal Natu. Hist.*, **5** : 63

Material examined : 12 exs., from Sandheads Coll. Lady Fraser in 1923 to 1927 and one from Sagar Is., Bay of Bengal coast by S. Chakraborty on 1984-1985.

Diagnosis : Except coloured spots which are minute dots, rings and elongated vermicular lines etc. the specimens are like *Matuta lunaris* differing only in following characters.

1). Surface tubercles are distinct in young but not in adults

2). Instead of a large spine at lower proxmial corner of hand, there is only one or a pair of tubercles present at the junction of wrist and palm.

Distribution : West Bengal; Sundarbans, East and West Coast of India, Andamans; Karachi, Burma; Mergui; Indian Ocean, China; Japan and N. W. Australia.

Remarks : Bright yellow colour in sprit with bright red, incomplete rings, mixed with narrow, elongated, oblong loops and small dots or spots etc. differentiate *M. lunaris* from *M. planipes.*

VI. Family MAJIDAE Richters

1880. *Majidae* Richters : 141; Sakai 1976 : 153

1895. *Maiidae* Alcock : 160.

Key to the genera of MAJIDAE

1. Carapace circular, few spines on lateral sides and on dorsal surface ..... ***Doclea*** Leach

   Carapace oblong elongate or slightly longer than wide ..... 2.

2. Elongate carapace narrowed anteriorly, rostrum formed .....

   of two long divergent spines.....

   .....***Hyastenus*** white

   Carapace nearly as long as broad, rostrum short formed.....

   of two spines, fused at base.....

   .....***Phalangipus*** Latreille

Genus 15. ***Hyastenus*** White

1847. *Hyastenus* White, *Proc. zool. Soc. London,* **15** : 56

25. ***Hyastenus dicanthus*** (de Haan)

1833. *Pisa (Naxia) diacantha* de Haan, *Fauna Japan Crust.*, : 96

1935. *Hyastenus diacanthus,* Chopra, *Rec. Ind. Mus.*, **37** : 466.

Material examined : One male from Sandheads, Coll. Lady Fraser in May 1926.

Diagnosis : Carapace elongate, narrower anteriorly, with moderately convex region. Body and legs densely hairy, often encrusted with sponges. Below hairs surface smooth, polished. On the gastric region, in the middle line, there is a sharp tubercle; on either pterygostomian region at least one large tooth, and on either branchial region a horizontal eipbranchial spine present. The rostum consists of two divergent, long horns, the length of horn in male is half of carapace length or more and little less in female. Chelipeds in male stouter and longer than legs. Palm swollen, fingers arched and as long as the palm. In female and young male chelipeds somewhat slender and shorter. Second pair of legs twice as long as the male chelae.

Distribution : West Bengal, Sandheads; Orissa, Andamans, Tavoy, Mergui, Srilanka; China; Japan and Australia, New Zealand to East Coast of Africa.

Remarks : Oblong, hairy, crab, narrower anteriorly and broad posteriorly, *H. dicanthus* is very close to *H. spinosus* Edw. but the *spinosus* has always two spins on the gastric region, in addition to a spine on intestinal region also.

Genus 16. *Doclea* Leach 1817

26. *Doclea ovis* (Herbst)

1778. *Cancer ovis* Herbst, *Krabben* **1** : 210

1895. *Doclea ovis* var Japonica Alcock, *J. Asia. Soc. Bengal*, **64** : 227

1935. *Doclea ovis* Chopra, *Rec. Ind. Mus.*, **37** : 467

Material examined : Elevan specimens from Sandhead.

Diagnosis : Carapace circular in shape, convex, thick, densly hairy, armed with few sharp tubercles on dorsal surface and lateral sides also. Rostrum consists of two very short, closely fused and vertically compressed spines. Antero lateral sides of carapace armed with four sharp, equal spines on each side. The pterygostomian region longitudinally grooved. Chelipeds stout, palm enlarged, fingers stout and meet only in distal third in male. In female fingers shorter and slenderer than the legs.

Distribution : West Bengal, Sandheads, Mergui, Andamans, Orissa, Tamilnadu widely ranges in Indopacific regions.

Remarks : The form of third antero lateral spine of carapace and the presence of a tubercle on the posterior border of carapace are always variable in *D. ovis* and *Japonica.* After carefull examination of the anterior male pleopods of both *ovis* and *japonica* Chopra did not marked any material difference between the two species.

27. *Doclea canalifera* Stimpson

1857. *Doclea canalifera* Stimpson, *Proc. Acad. Nat. Sci. Philad* : 217

1935. *Doclea canalifera* Chopra, *Rec. Ind. Mus.*, **37** : 469

Material examined : Two young males and two females from Sandheads. Coll. Lady Fraser, in 1922.

Diagnosis : Carapace subcircular, covered with valvety hairs and with a median line of tubercles or spines, some minute tubercles (not visible, below the hairs) followed by a spine on gastric and a larger one on cardiac region and a much larger spine on posterior border. A small spine on outer angle of buccal cavity, and four large spines on antero lateral sides of carapace present. Rostrum short and bifid at tip. Pterygostomian region longitudinally and deeply grooved.

Distribution : West Bengal Sandhead, Orissa; Arakan. Singapore; Gulf of Siam, Hongkong, Indo Pacific

Remarks : Presence of more large spines, well defined deep pterygostomian canal and unlike anterior male plepod separates this species from others. In smaller, younger specimenss the rostal spines are much longer and divergent than in older specimens. The dorsal spines are also generally longer in young specimens.

28. *Doclea gracilipes* Stimpson

1857. *Doclea gracilipes* Stimpson, *Proc. Acad. Nat. Sci. Philad.* : 216

1935. *Doclea gracilipes,* Chopra, *Rec. Ind. Mus.*, **37** : 470.

Material examined : One male from Sandhaes, also from Mergui, Andamans.

Diagnosis : Appendages and disc like carapace covered with short dense fur. Rostrum short 1/7 of length of carapace, deeply cleft, convergent or divergent or almost in contact throughout. Antero-lateral spines four, claw like curved, variable in length and size or may be tubercular. On the middle or posterior border a large spine present. On the middle line of carapace a series of variable tubercles and spines present and usually only two are prominent. These are erect spines one on gastric and the other larger on the cardiac region, in front of or in between them there may or may not be a line of tubercles. On denudation the carapace may have obliquely disposed lines of tubercles from near the front towards lateral epibranchial spine. Chellipeds in female rather shroter than carapace, in male longer. Pterygostomian region without groove.

Distribution : West Bengal Sandheads; Orissa; Gulf of Manner; Mergui; Andaman, Sri Lanka and Hongkong.

Remarks : The specimens are typical, the anterior male pleopods are also different than the other allied ones. The process is almost straight, distal half abruptly narrowed and the tip is sharply pointed.

29. *Doclea tetraptera* Walker

1890. *Doclea tetraptera* Walker, *J. Linn. Soc. Zool.*, **20** : 114.

1935. *Doclea tetraptera,* Chopra, *Rec. Ind. Mus.*, **37** : 471.

Material examined : Three females and one male from Sandheads.

Diagnosis : Carapace and walking legs except the palms and dactyli, covered with a coat of thick, dense stiff hairs. The hairs are so stiff and erect that the cylindrical leg joints appear as a quadrangular or triangular in sectional form. Carapace circular, but the rostrum, lateral epibranchial and postero median spines obscure. Rostrum 1/4 - 1/5 of carapace length, ends in widely diverted spinules. The antero lateral sides of carapace with four large spines. The last spine longest and stoutest and directed a little backwards and upwards. The median row of spines increasing in size from before backwards, the last spine consists of two branches, one vertically upwards and the other is horizontally backwards. Hands of chelaepeds swollen, broad and carinated along the lower border.

Distribution : West Bengal Sandheads, Gulf of Martaban; Singapore, Gulf of Siam etc.

Remarks : Dense coat of stiff, erect, hairs present on the body and legs except on palm and dactyli and presence of branched spine on the middle of posterior border of carapace differentiate the spines.

Genus 17. *Phalangipus* Latreille

1818. *Phalangipus* Latreille, *Encyc.* pl. 281 fig. 1.

30. *Phalangipus longipes* (Linn.)

1895. *Egeria arachnoides* Alcock, *J. Asia. Soc. Bengal,* **64** : 223.

1935. *Phalangipus longipes,* Chopra, *Rec. Ind. Mus.,* **37** : 471.

Material examined : 24 exs. both males and females from Sandheads, Coll. Lady Fraser between 1922 to 1932.

Diagnosis : Body and legs covered with very short fine hairs. Carapace convex, tuberculated, almost subcircular in shape except the rostum, its length breadth equal. Regions well defined; of the dorsal symmetrically disposed spines, six large and one on cardiac, one on intestinal, one on either subhepatic and a lateral epibranchial regions. Besides these a set of spinules on gastric region present which arranged in the form of !'T'! and two series on either branchial region. Rostrum short, tips little divergent, chelipeds of male 1 1/2 of carapace, infemale 1/4 or so in length. First pair of legs very long, six times the length of carapace, other legs gradually decreasing in length.

Distribution : West Bengal, Sandheads; Orissa; Tamilnadu; Laccadive Maldives; Andaman; Mergui Archipelago and Chittagong in Bangla Desh.

Remarks : The specimens are vary varibale in size and it is quite likely that disposition of spines on dorsal surface of carapace, proportional length of chelipeds and legs etc. all these variations are age difference only.

VII. Family PARTHENOPIDAE Miers

1879. *Parthenopidae* Miers : 641; Alcock 1895 : 257; Sakai 1976 : 265

Key to the genera of PARTHENOPIDAE

1. Carapace pentagonal, very broad, convex, all the edges dentate, all angles spinate ..... ***Cryptopodia*** Edwards

   Carapace broadly triangular, with pointed, short front, lateral sides rounded, only the antero-lateral sides armed with 7-8 flat dents ..... ***Lambrus*** Leach

Genus 18. *Cryptopodia* Edw.

31. *Cryptopodia angulata* Edw. & Lucas

1841. *Cryptopodia angulata* Edwards and Lucas, *Archiv. Mus.,* **II** : 481

1895. *Cryptopodia angulata,* Alcock, *J. Asia. Soc. Bengal.,* **64** : 282

Material examined : Sepcimens from Bay of Bengal, West Bengal Coast. Coll. P. V. Lady Fraser

Diagnosis : Carapace very broad, convex, and clearly pentagonal in shape, with all the edges markedly dentate and all the angles produced to form curved spines. Another spine in front of either anterolateral angle and two more strong spines present on the posterior border of carapace demarcated the abdomen. Rostrum sharp pointed, concave space on carapace bounded by granular lines. On branchial region a patch of granules and from the apex of triangular concave space a line of granules pasing forward on either side of rostrum. Chelipeds stout with trigonal joints, the inner and outer edges of arm and hand cristiform and spinate or dentate, their lower edges beaded. Carpus globular or so. Leg joints carinate on anterior edges, dectylus on both edges and form a swimming blade.

Distribution : Bay of Bengal, Coasts of West Bengal; Orissa, Malabar Coast.

Remarks : Convex, sharply pentagonal carapace with all the edges deeply dentate and corners equipped with curved spines. A deep, triangular depression bounded by a line of granules on the carapace separated the species from other allied species and varieties.

Genus 19. ***Lambrus*** Leach 1817

32. ***Lambrus* (Platylambrus)** *prensor*, Herbst

1796. *Lambrus prensor* Herbst, Krabben, **11** : 170

1895. *Lambrus (Platylambrus) prensor* Alcock, *J. Asia. Soc. Bengal* **64** : 262.

Material examined : Several specimens from Sundarban and Puri Coast.

Diagnosis : Carapace braodly triangular in shape, broader postero lateral sides arched, rounded. Rostrum sharp pointed and projected but broad and concave at base. Dorsal surface of carapace with three distinct carinae, one median having three small spinules in a line and the lateral one have two oblique granular ridges on either prominent branchial regions, one ridge very faint and runs to the lateral epibranchial spine, the other ridge is a strong carina and runs to the large spine at the postero lateral angle. Antero-lateral sides of carapace armed with 8 close-set, compressed, almost equal sized teeth, behind these a very large, blade like epibranchial spine. Behind this again on the postero-lateral sides there are two large spines; the outer of which is almost equal to the former. On the posterior border there are three large, curved spines Chelipeds long, stout, surface smooth, lower edges of arm, wrist and palm form a continuous beaded lines. Upper edge of arm, the inner and anterior edge of arm, wrist and hand spinate. These spines alternately larger and smaller. Anterior edges of leg joint merus, carpus propodus sharply crested while the posterior edge only of merus crestate.

Distribution : Bay of Bengal coasts of West Bengal & Orissa.

Remarks : Broadly triangular carapace with sides rounded and three distinct dorsal carinae, one median and one oblique on either side. Rostrum sharp, broad and concave at the base. All these are unlike other species of the genus.

VIII. Family CORYSTIDAE Dana

1852. *Corystidae* Dana : 296; Alcock 1899 : 103; Sakai 1976 : 303

Genus 20. ***Gomeza*** Gray 1831

1831. *Gomeza* Grey, *Zool. Misc.*, : 39

33. ***Gomeza distincta*** (de Haan) var. **indica** Chopra 1935

1905. *Gomeza distincta* var MacGilchrist, *Ann.Mag.Nat.Hist.*, **15** : 263

1935. *Gomeza distincta* var. indica, Chopra, *Rec.Ind.Mus.* **37** : 500

Material examined : One male specimen from sandheads, Coll. Lady Fraser, in Feb-March 1928.

Diagnosis : Carapace oblong or longitudinally oval in outline and strongly convex in both the directions, Regions well demarcated as raised swellings separated by grooves, the central one of swellings marked off from the marginal rim. Surface minutely granular and tubercular; and three rows of tubercles arranged in three longitudinal rows. Some of these tubercles surrounded by blunt, short spines. Front narrow, ends in two large spines. Oribits slanting, outer orbital spine sharp,

serrate bases, decreasing in size from before backwards. The posterior margin of carapace short, straight and not serrate. Pterygostomian region granular. Chelipeds stout, adorned with long thick hairs specially on the margins and scattered spines and spinules all over. Male abdomen long, slender and all seven joints distinct.

Distribution : West Bengal, Sandheads; Persian Gulf.

Remarks : *G. distincta* var. *indica* can easily be distinguished from the species and ohter variety *typica* Balss, in having variable number, disposition and nature of tubercles on carapace and regular rows of granules on chelipeds and presence of more spines etc.

IX. Family XANTHIDAE Macleay

1838. *Xanthidae* Macleay : 63-72; Alcock 1898 : 69, Sakai 1976 : 383

Key to the genera of the family XANTHIDAE

1. Carapace broad, thick, quadrilateral or so in shape 2
   Carapace not quadrilateral in shape 2

2. Carapace smooth, glazed, convex, regions not defined, antero-lateral sides entire, legs long slender 4
   ..... ***Liagore*** De Hann
   Carpace smooth or granular, Antero lateral sides never entire 3

3. Surface of carapace granular near the edges, regions ill defined, antero lateral sides with lobes or teeth ..... ***Galene*** de Hann
   Carapace smooth regions well defined and convex, antero-lateral sides with four, sharp teeth, cardiac region low, branchial regions very convex ..... ***Orphanoxanthus*** Alcock

4. Carapace 7/9 as long as braod, moderately convex, roughly Pentagonal in shape, regions and subregions strongly outlined and covered with smooth tubercles or flat pustules, the pustles on eaual chelaepeds are surrounded by hairy grooves. Upper edges of leg joints crested .....
   ..... ***Demania*** Laurie
   Carapace not pentagonal in shape 5

5. Carapace hexagonal in shape, flat or slightly convex, regions well outlined, front bilaminar, antero lateral sides of carapace with four lobes or teeth. The chelipeds are unequal in both the sexes, upper outer surfaces are covered with large tubercles ..... ***Halimeda*** De Haan
   Carapace not pentagonal in shape 6

6. Carapace subcircular or so; thick, moderately convex in both the directions, regions faintly outlined, anterolateral sides of carapace longer than postero lateral sides, cut into four teeth. Cheli peds stout, unequal; legs broader than long ..... ***Sphaerozius*** stimpson.
   Carapace not subcircular in shape 7

7. Carapace large, broadly oval, very convex, thick and brick red to brown in colour. Gastric regions faintly outlined, chelipeds stout, unequal, smooth, fingers dark brown in colour. Front less than 1/5 of width of carapace. Four accuminate antero lateral teeth ..... ***Menippe*** De Haan
   Carapace not large; convex and red in colour 8

8. Carapace bare and broad, smooth without trace of regions; front low; bilobed, straight, square cut; antero-lateral sides four lobed, shorter than postero-lateral sides. Chelipeds smooth unequal. Mud crab, grey or dirty brown in colour ..... ***Eurycareinus*** A. M. Edwards.
   Hairy crabs, usually small, chelipeds unequal 9

9. Carapace moderately broad, slightly convex, subcircular, to subquadrilateral or broadly oval in outline. Regions faintly indicated below the short hairs. antero lateral sides of carapace short and with four sharp teeth. Front 1/4 to 1/3 of the maximum width of carapace, bilaminar, sharp, entire ..... ***Heteropanope*** stimpson

Genus 21. *Liagore* De Haan

1833. *Liagore* De Haan : 19; Alcock 1898 : 93; Sakai 1976 : 389

34. *Liagore rubromaculata* De Haan

1833-35. *Cancer (Liagore) rubromaculata* De Haan, *Fauna Japon. Crust.* : 49

1935. *Liagore rubramaculata,* Chopra, *Rec.Ind.Mus.,* **37** : 508

Material examined : 2 males from Sandheads, mouth of River Hooghly, Coll. Lady Fraser, Nov. 1923.

Diagnosis : Carapace transverse, shape oval to quadrilateral type, thick, surface smooth, fresh specimens in spirit are yellowith with many red spots. antero lateral sides of carapace entire, sharp, faintly divided into four blunt lobes. Front broad and faintly bilobed. Chelipeds equal, smooth.

Distribution : West Bengal Sandheads; Persian Gulf, Hongkong; China and Japan.

Remarks : Shape Squarish, surface smooth, with red, small spots differentiates the specimens from others.

Genus 22. *Galene* De Haan

1833. *Galene* De Haan : 19; Alcock 1898 : 136; Sakai 1976 : 441

35. *Galene bispinosa* (Herbst.)

1834. *Cancer bispinosus* Herbst, Krabben **1**. ii. : 144

1935. *Galene bispinosa* Chopra, *Rec. Ind. Mus.,* **37** : 509

Material examined : Nine specimens from Matlah River and Sandheads, Coll. Lady Fraser.

Diagnosis : Carapace broad, convex, somewhat pentagonal in shape, surface smooth mid dorsally and rough near the postero lateral borders. Antero - Lateral sides faintly four lobed first lobe obsolate, others tubercular and slightly elongated. Posterior most border of carapace about half of the greatest width of carapace, Chelipeds unequal, other surfaces either smooth or rough. Anterior male pleopod is a straight tube, its apex bent in 90° angle. Male abdomen has seven separate joints.

Distribution : West Bengal coast, Vizagapatanam; Hong Kong, Japan and Tenasserim.

36. *Galene granulata* Miers

1848. *Galene granulata* Miers, *"Alert" Crustacea* : 208

1935. *Galene granulata,* Chopra, *Rec.Ind.Mus.,* **37** : 510

Material examined : Two female specimens from Sandheads, mouth of River Hooghly. Coll. Lady Fraser, in 1925, and 1928.

Diagnosis : The species resembles very closely *G. bispinosa* but for the following three important characters - (1) surface of carapace and chelipeds profusely granular, (11) There are three distinct teeth.on the anterolateral sides of carapce (111) and of the two teeth on each frontal lobe, the inner one is far more prominent than the outer one.

Distribution : Bay of Bengal; Singapore; Port Darwin, on the coast of North Australia.

Remarks : The species *G. granulata* is rather rare.

Genus 23. ***Halimede*** De Haan

1835. *Halimede* De Haan : 35; Alcock 1898 : 135; Sakai 1976 : 387

37. ***Halimede tyche*** (Herbst)

1801. *Cancer tyche* Herbst. Crabben and Krebse, **III**, A.2 : 35

1893. *Halimede thrustoni,* Henderson, *J. Linn.Soc.London* **5** : 360

1935. *Halimede,* Chopra, *Rec.Ind.Mus.*, **37** : 505.

Material examined : One small male from mouth of River Hooghly, Sandheads. Coll. Lady Fraser, March 1928.

Diagnosis : Carapace moderately broad, somewhat hexagonal in shape. Frontal lobes two, broad, laminar, free edge of the lobe finely crenulate and somewhat slanting outwards. Carapace covered with short tufts of hairs arising from groups of small clustered granules. Two raised flattened tubercles on each hepatic region, on inner side of second antero lateral tooth. Orbits dorsal and eyes large. Of the three antero lateral theeth of carapace, first one smallest and the third on largest. The chelipeds stout, subequal, outer surfaces of wrists and palms covered with raised flattened tubercles, inner angle of wrist bidentate. Leg joints hairy.

Distribution : West Bengal Sandheads, Krusadi Island, Tuticorin; Gulf of Siam and Hongkong.

Genus 24. ***Orphanoxanthus*** Alcock

1898. *Orphanoxanthus* Alcock : 128

38. ***Orphanoxanthus microps*** (Alc. and And.)

1894. *Xanthodes microps* Alcock and Anderson, *J. Asia.Soc.* Bengal, **63** : 183.

1898. *Orphanoxanthus microps* Alcock, *J. Asia.Soc.Bengal,* **67** : 128

Material examined : 29 specimens from Bay of Bengal, Coll. Lady Fraser.

Diagnosis : Carapace roughly quadrilateral in shape, strongly convex before backwards and concave from side to side owing to the convexity of epibranchial regions. Anterolateral sides of carapace armed with four, thin, sharp, granular teeth. Front square cut, bilaminar, prominent. Chelipeds more unequal in males than the females, upper outer surfaces of wrists and the upper border of palms rough, hairy; other areas smooth or finely granular.

Distribution : West Bengal Coast of Bay of Bengal, the type locality only.

Remarks : The quadrilateral shape of carapace, strongly convex branchial regions and presence of four sharp, finely granular teeth on antero-lateral sides of carapace differentiate the above from its nearest crabs.

Genus 25. *Demania* Laurie 1906

1906. *Demania* Laurie : 396; Deb 1986 : 127

39. *Demania bangladeshensis* Ng, Huda and Banu

1987. *Demania bangladeshensis* Ng, Huda and Banu, *J. Natu.Hist.* Singapore **21** : 987.

Material examined : One male from Chittagong coast of Bay of Bengal Coll. Huda. Two females from Bay of Bengal Coast of Waltair and Tamilnadu.

Diagnosis : Carapace broad, oval, moderately convex, regions of carapace well demarcated and the surfaces of these regional lobules strongly tubercular, especially on antero lateral and on posterior half or the surface. Under surfaces, sternum and abdominal joints also closely tubercular. Outer surfaces of arm, palm and wrist of cheliped covered with low, rounded, raised, large granules with short dense hairs in between them, which gives a reticulate appearance. Anterior edges of leg joints, merus, carpus and propodus strongly cristiform, and of dactylus covered with thick hairs. Male anterior pleopod tubular process, inner subapical area adorned with thick long setae and outer surfaces spinulose.

Distribution : Bangladesh Coasts of Bay of Bengal; Waltair and Tamilnadu coasts of India.

Remarks : The species is very near to *Demania indiana* Deb, except its small size, the profusely tubercular appearance and lower edges of palm and fixed finger with long, yellow, silky hairs. The lower distal edges of propodus and both the edges of dactylus of legs are hairy.

Genus 26. *Menippe* De Haan

1833. *Menippe* De Haan : 21; Alcock 1898 : 178.

40. *Menippe hardwickii* (Gray)

1831. *Myomenippe hardwickii* Gray, *Zool.Misc.* London : 39 - 41.

1989. *Menippe (Myomenippe) granulosa* Alcock, *J. Asia.Soc.Bengal.* **67** : 179.

1937. *Myomenippe hardwickii,* Chopra and Das, *Rec.Ind.Mus.,* **39** : 404.

Material examined : Several specimens from Bay of Bengal, Sandheads, Coll. P. V. Lady Fraser in 1923-27.

Diagnosis : Large, brown, thick crab, with subcircular or slightly braoder in shape. Only the meso and granular protogastric regions are well outlined. Epibranchial surface rugose. Antero-lateral sides of carapace four dentate. Front 1/4 of width of crab, bilobed; each lobe three dentate. Chelipeds very stout, unequal, outer surfaces granular. Fingers dark brown.

Distribution : Bay of Bengal, Port Okha; Akyab Harbour; Arakan; Mergui; Diamond Is. and Singapore.

Remarks : Large brown crab, with unequal, stout chelaepeds, dark fingers and the species differs from *M. rumphii,* the second known Indian species only in having clompletely closed orbital cavity and six dentate front.

41. *Menippe rumphii* (Fabr.)

1793. *Cancer rumphii* Fabricius, *Suppl.Entom.Syst.,* : 572.

1898. *Menippe rumphii,* Alcock, *J. Asia.Soc.Bengal,* 67 : 178.

Material examined : Many specimens from West Bengal Coast of Bay of Bengal, Coll. Marine Survey.

Diagnosis : Large, brown coloured, broad, thick, convex crab; only the proto and mesogastric areas well defined. Dorsal surface finely pitted, only antero-laterally and smooth elsewhere. Front 1/5 of the greatest width of carapace, consists two rounded teeth, outer angle of each of which forms a distinct tooth. Antero-lateral sides of carapace sharp, with four teeth, last two teeth sharp accuminate. Chelipeds stout, slightly unequal, fine scattered pits present on them, fingers short, stout, dark brown coloured.

Distribution : Sandheads, Bay of Bengal, Tamilnadu, Srilanka, Laccadives, Karachi, Persian Gulf, Penang, Tavoy and Mergui.

Remarks : *M. rumphii* is having only two rounded frontal lobes with small tubercular outer denticle. Orbits are not closed cavity, antenna stands on orbital hiatus.

Genus 27. ***Heteropanope*** Stimpson

1858. *Heteropenope* Stimpson, *Proc.Acad.Nat.Sci.Phil.*, **10** : 35, Alcock 1898 : 207; Sakai 1976 : 502.

Key to the species of ***Heteropanope***

Transverse, granular, hairy, small ridges present on carapace..... ***indica***

No such ridge present on the carapace..... ***neolaevis***

42. ***Heteropanope indica*** de Man

1887. *Heteropanope indica* de Man, *J. Linn.Soc.Zool.*, : 53

1976. *Pilumnopeus indica* Sakai, *Crabs of Japan and Adj.Seas* : 500

Material examined : One ex. coll. from Salt Lake near Calcutta.

Diagnosis : Carapace more than two thirds as long as wide, slightly convex, surface rough, hairy near the margins. Gastric regions faintly outlined. Two parallel series of granular hairy, small ridges cross the carapce transversely, starting from the 3rd and 4th antero-lateral teeth. Front bilobed, convex medialy, outer angle dentiform and well separated from supra orbital edge. Anterolateral sides of carapace with 4 thin teeth, first tooth small, last three sharp. Chelipeds markedly unequal, Smaller cheliped granular, larger chela smooth. Legs hairy.

Distribution : Salt Lake in West Bengal, East and West coasts of India, Andamans, Mergui archipelago and Japan.

Remarks : Presence of transverse, parallel two series of discontinuous, hairy, granular ridges on the carapace at once separate the species from other allied species.

43. ***Heteropanope neolaevis*** n. sp.

Material examined : Several (about 50) specimens including Holo type and Paratypes from Gangetic delta, collected by S. W. Kemp, Z.S.I. Regd. No. C 1503/2, and one from Kachuberia, lower Bengal, by A. Misra, on 16-6-1976; Measuring W 13.5 mm, L - 10 mm. F - 3.5 mm.

Diagnosis : Carapace broad, somewhat hexagonal to roughly oval in shape. Strongly convex from before backwards and moderately so from side to side. Regions faintly outlined or obsolate. Surface of carapace covered with very short fur; few microscopic granules present on the carapace

just only on epibranchial and post frontal regions. Front straight about one fourth of the greatest width of carapace, truncated, bilobed, faintly notched medially and corners rounded. Free edge sharp, smooth. Orbits small, edges sharp, smooth. Antero lateral sides of carapace divided into four teeth other than the outer orbital corner. First lobe small, low, rounded and with crenulate edge; second lobe most prominent, edge crenulate but anteriorly accuminate; third and fourth teeth sharp, spine tipped. Last spine smallest; from its tip, one granular, raised, ridge extend obliquely inwards on the middle of carapace, towards the gastric regions. Postero lateral sides straightly convergent. Chelipeds markedly unequal in size. larger chela very stout, outer surface of larger chela smooth on lower part and minutely granular on upper edge. Outer surfaces of smaller chela roughened with small sharp granules and hairs all over the surface. Fingers white in colour, stout, tips blunt pointed, cutting edgeds dentate and leaves no gap when closed. Leg joints narrow, hairy, only the upper edge of merii finely crenulate. Dark brown to light brown in colour, large chela white or gray.

Distribution : So far from type locality only.

Remarks : *H. neolaevis* Deb is different from other allied species viz. *H. indica, H. paralaevis* etc. in having convex smooth broad carapace, its frontal lobes are broad, truncate horizontal presence of four peculiar antero-lateral teeth which are unlike the former species. Unlike *H. paralaevis* it has four antero lateral teeth. Anterior male pleopods of these species are also unlike.

Genus 28. *Eurycarcinus* Edwards

1867. *Eurycarcinus,* A. Milne Edwards, *Ann.Soc.Entom.France* VII : 276.

44. *Eurycarcinus maculatus* (A.M.Edw.)

1867. *Pilumnopeus maculatus* A. M. Edwards, *Ann.Soc.Entom.* France, I : 277.

1986. *Eurycarcinus maculatus* Chakraborty, Choudhury and Deb; *J. Beng.nat.H.Soc.* 5 : 64.

Material examined : Large number of specimens from canning, Lower Bengal, Gangetic delta; freshly collected specimens are dark olive green colour on upper surface, white on under surfaces. Coll. A. Misra, A. K. Mandal & N. C. Naidi during 1983-1987.

Male measuring : W - 13 mm, L - 10 mm, F - 4 mm.

Description of male : Carapace broadly oval in shape vey convex in both the directions. Upper surface very smooth, shiny, though few minute granules and punctae may be present near the anterior periphery of very old specimens visible only under the lens. Faint depressions marked near the anterior periphery and separates the two distinct epigastric lobes. One oblique minulely granular raised ridge from the tip of last antero lateral tooth, proceeding inwards, towards the gastric, i.e. middle of carapace. Front horizontal, bilobed, free frontal edge minutely crenulate. Oribts large, lower orbital edge crenulate. Antero lateral sides of carapace arched, slightly shorter than the straight and convergent postero-lateral sides. The first antero-lateral tooth or external orbital angle low, broad, truncate; the second tooth prominent, obtuse angular; third tooth acute, sharp, directed forward. Last one smallest, sharp, acute, from its tip the transverse ridge originates. Under surface of the crab hairy; endostomial ridge faintly marked on both side of buccal cavity. The male abdomen seven jointed and evenly narrowed distally. Chelipeds markedly unequal, stout, and almost smooth on upper outer surfaces. Upper distal edge of arm with a tooth, inner angle of wrist bidentate, the upper dent more sharp and prominent in smaller chelae. Palm smooth, rather narrow; movable finger narrower, strongly curved, cutting edge minutely dentate; tips pointed and crossed. Fixed finger stout, a large tooth present near the base of its cutting edge; fingers of smaller chelae not prominently dentate.

Distribution : Very common in muddy mangrove swamps of Sundarban, Lower Bengal, East coast of India, Goa; Mergui Archipelago and Shores of Zanzibar.

Remarks : Small, oval, olive green crab can easily be differentiate from other allied species by the presence of three distinct truncate, angular antero lateral teeth, and one oblique granular ridge from the last antero lateral tooth, present on the dorsal surface of carapace. The species was wrongly named so far because of no detail descriptions are published by Alcock or subsequent scientists.

45. ***Eurycarcinus bengalensis*** n.sp.

Material examined : Several males and females from Sundarban area; Holotype male, Z.S.I. Reg.No.C3349/2, Chamta Block Sundarbans. W-26 mm, L-17 mm, F-7 mm.

Diagnosis : Carapace broad, surface covered with very short valvety algae, smooth, when denuded, no indications of regional lobules and granular ridges present on the carapace of adults. Very convex crab from before backwards and slightly so from side to side. Front about one fourth of the maximum width of carapace, diagnoally deflexed downwards, square in shape, distinctly bilaminar, free frontal edge, sharp, smooth and slightly concave in the middle. Orbits small, elongate, both upper and lower edges entire. Antero lateral sides of carapace sharp, cut into four very low, distinct lobes only in the adult males. In the sub adult and very young specimens three fine, obscure sutures divided the obsolate lobes. The first lobe or the outer orbtal angle almost horizontal, second lobe low, truncate and broadest, third and fourth lobes anteriorly accuminate, fourth one smallest. Postero lateral sides of carapace convergent and longer than anterolateral. Chelipeds markedly unequal, stout, swollen. Upper edge of arm adorned with 5 tubercles, the last three tubercles large, dent like. Inner corner of writst blunt, angular. Palms smooth; fingers brown in colour, dactylus narrower and strongly curved downward and inward, tips blunt pointed and crossed. Cutting edge of both the fingers adorned with two large and few small teeth, and leaves a narrow gap when closed. Leg joints narrow and with scattered stiff hairs present on both the edges. Male anterior pleopod is !'S'! like curved process, its apex spring like coiled and appears as a rounded ball. Inner subapical area adorned with few hyaline fine setae only.

Distribution : So far known from lower bengal only, the type locality.

Remarks : The *Eurycarcinus bengalensis* Deb, specimens are very-broad in anterior third and its fronto orbital and first antero lateral teeth are almost in horizontal and the posterior edge is almost half of its anterior edge. There is no transverse, raised granular, oblique ridge present on the surface of carapace from the tip of the last antero lateral teeth. The georaphical diamentions of the crab, the chelipeds, brown coloured fingers and the male abdomen, anterior male pleoped etc. are different from the other allied species known so far from India and other countries. The *E. bengalensis* is different form *E. natalensis* and *E. orientalis* in not being shiny, glazed and sub oval in shape like the later two species and it is much broader, larger than *E. maculatus* Edw, a nearest ally of the *E. bengalensis*.

X Family GONEPLACIDAE Dana

1851. Gonoplacidae Dana : 285;

1978. Goneplacidae Rathbun : 14; Sekai 1976 : 522.

Key to the genera of family GONEPLACIDAE

1. Semicircular crab, eyes minute and placed below the anterior edge of carapace.....
.....*Scalopidia* Stimpson

Subquadrilateral crab, much broader than long, postero lateral sides parallel; eyes obsolate or so ..... ***Typhlocarcinus*** Stimpson

Genus 29. *Scalopidia* Stimpson

1858. Scalopidia Stimpson, Proc.Acad.Nat.Sci.Philadal : 95; Chopra 1935 : 513.

46. **Scalopidia spinosipes** Stimpson.

1858. *Scalopidia spinosipes* Stimpson. *Proc.Acad.Nat.Sci.Philad.* : 95.

1935. *Scalopidia spinosipes,* Chopra, *Rec.Ind.Mus.*, **37** : 513.

Material examined : One female from Sandheads West Bengal, Coll.Lady Fraser on 1923.

Diagnosis : Small crab, carapace broader than long, deep, convex before backwards; semicircular in outline. Greatest width of carapace on posterior part, the postero lateral sides convergent anteriorly. Antero-lateral sides evenly curved, rounded. Surface of entire crab covered with very short fur. Three gastric, two epibranchial and one convex cardiac regions well defined by grooves. Anterior border and sharp cut antero-lateral sides of carapace finely serrate and ended in a minute spine at the junction of postero-lateral sides. Chelipeds unequal in adults, lower edges of both arms of chelae finely serrate and upper edge armed with a spine on their distal corners. One spine present at outer angle of wrist. Inner angle of wrist dentiform or spiniform. Outer surfaces of chelipeds may be granular in old adult specimens only. Edges of leg joints except dectylii closely and evenly spinate in old and adult specimens. Marii of legs broad, compressed and dactyli of only the last pair curved other dactylii straight, sharp, strong.

Distribution : West Bengal, Sandheads, Gulf of Manner; Hongkong; Gulf of Siam; Gulf of Marban and Flores Sea.

Remarks : It is a rare small crab, semicircular in outline. Fingers of chelipeds very compressed, bent inwards. Four pairs of legs, their joints are very long the dactyli of last pair of legs curved and unlike the other dactylii. Surface sculpture, presence of short hairs, granules etc. are very variable according to their age and sex.

Genus 30. *Typhlocarcinus* Stimpson

1858. *Typhlocarcinus* Stimpson, *Proc.Ac.Nat.Sci.Philad.*, : 95.

1900. *Typhlocarcinus* Alcock, *J. Asia.Soc.Bengal.* **69** : 321.

47. *Typhlocarcinus nudus* Stimpson

1858. *Typhlocarcinus nudus* Stimpson, *Proc.Ac.Nat.Sci.* Phila., : 96

1900. *Typhlocarcinus nudus* Alcock, lit cit., **69** : 322.

Specimen examined : 24 exs. from Sandheads, and other coasts of Bay of Bengal coll. Marine Survey.

Diagnosis : Broad carapace, length 5/8 of its width, surface smooth, bare; regions faintly marked. Antero-lateral sides of carapace with 2-3 faint notches. Front bilobed, 1/5 of width of carapace. Buccal cavity narrower anteriorly, Chelipeds and legs smooth, only few scant hairs present on the margin. Inner angle of wrist sharp, small; palm unequal, smooth, polished, upper border smooth, crest like, lower border distinctly moulded.

Distribution : West Bengal, East coast of India; Andamans; Mekran Coast and Karachi.

Remarks : Deep, smooth, quadrilateral crab with obsolate eyes marked by a narrow strip of pigment only, are the main distinguishing features.

XI Family PINNOTHERIDAE Dana

1851. *Pinnotheridae* Dana, *America. J. Sci.*, **2** : 289; Alcock 1900 : 287.

Remarks : Small pea crabs, usually living as commensals in the mantle cavity of Bivalve molluscan branchiopods; cloaca of Holothurian, ascidians, in polychaetes tubes, in coral stocks and often some of their special sense organs get degenerated. Merus of external maxilliped very large, shape not quadrilateral, never have the palp at the antero-external angle, Ischium small, or fused with merus. Buccal cavity short, very broad and semicircular in outline.

These crabs cause a good deal of damage on their hosts.

Genus 31. ***Pinnotheres*** Latreille

Key to the species of ***Pinnotheres***

Carapace quadrangular with large brown patches on the dorsal surface..... *cardii* Burger

Carapace perfactly circular, smooth convex and without brown large patch.....
..... *mactricola* Alcock

48. ***Pinnotheres cardii*** Burger

1895. *Pinnotheres cardi* Burger, *Zool.Jahrb.Syst.*, **8** : 369.

1979. *Pinnotheres cardii*, Misra & Ghatak, *Bull.Zool.Surv.India.* **2** : 107.

Material examined : 2 females from Digha Coast Coll. G. C. Rao, dt. 18.8.78. The crab was found to occur in the internal mentle cavity of a bivalve Mollusc.

Diagnosis : Carapace rounded quadrangular in shape, dorsal surface convex on anterior half. Front narrow, 1/3 of width and visible from dorsal aspects. Lateral sides of carapace weakly arched. The dactylus of external maxillipeds slightly longer than the propodus, with short hairs; fingers not sharp and not much curved inwards; 2nd pair of legs longest, 3rd pair slightly shorter than 2nd pair but longer than the 1st pair; the last pair shortest. Dectylii of legs short hook like or claw like.

Distribution : Digha, West Bengal Coast of Bay of Bengal; Thailand North China and Japan.

Remarks : Two, symmetrical, large yellowish brown patches present on the anterior part of carapace in freshly preserved condition of *P. cardii* helps in its quick identification.

49. ***Pinnotheres mactricola*** Alcock

1900. *Pinnoteres mactricola* Alcock, *J. Asia.Soc.Bengal.* **69** : 339.

Material examined : One male collected from Digha coll. A. Misr, Measurements width - 6mm, Length - 5mm.

Diagnosis : Like the type female the Male carapace also convex, smooth and polished, shape almost circular to octogonal. Eyes minute, pigmented. Front deflexed downwards, free edge nearly straight. Chelipeds equal and stouter than the legs and about as long as first pair of legs. Fingers light brown in colour. Dectylus stout, curved like a beak of bird; one large molariform tooth present on the basal end of its cutting edge. Fixed finger much shorter than the former and straight, when closed fingers leaves a wide gap in between them. Inner border of wrists only scantily fringed with hairs. Leg Joints rounded, their lower edges thickly hairy. In all four pairs of legs the dactyli claw like. and equally short.

Distribution : West Bengal, mouth of River Hooghly and Digha.

Remarks : The *P. mactricola* Alcock is close to the *P. cardii* Burger, except the almost rounded shape of its carapace and larger brownish patch of its dorsal surface.

XII Family HYMENOSOMATIDAE Macleay

Hymenosomidae Macleay 1838, *Smith Illustr. Zool. S. Africa Inst.* 1 : **68**, Alcock 1900 : 285.

Hymenosomatidae Stebbing 1905 : 49 Kemp 1917 : 243; Sakai 1976 : 145.

Very small estuarine crabs; Carapace thin, flat, cuticle soft, triangular or subcircular to circular in shape, usually narrow anteriorly and produced to from a rostrum; Eyes exposed, no orbits present, epistome large. Buccal cavity quardrate. Antennules folded longitudinally.

Key to the genera of HYMENOSOMATIDAE

1. Small, (5mm-10mm) thin, rounded oblong or triangular crab
   Circular, depressed crab; without rostrum; lateral margins upturned; regions well defined..... ..... ***Hymenicoides*** Kemp

   Flat, circular or oblong crab with trident shaped rostrum; marginal rim well defined, regions well outlined ..... ***Rhynchoplax*** Stimpson

2. Small, triangular, smooth, leaf like crab, rostrum simple -

a) Male chelae stouter than legs ..... ***Elamina*** Edw.

b) Male chelae narrow, like legs..... ***Trigonoplax*** Edw.

Genus 32. *Hymenicoides* Kemp 1917.

50. *Hymenicoides carteri* Kemp

1917. *Hymenicoides carteri* Kemp, *Rec. Ind. Mus.*, **13** : 268

Material examined : Types from Bank of River Hugli at Sibpur, Botanical Garden and seven exs. From Jamuna River at Gobardanga, N.24 Parganas, Coll. N. C. Nandi, in 22.7.88.

Diagnosis : Carapace nearly circular, only slightly broader than long (5.7 mm). Surface sunken, regions divided by grooves, closely covered with minute hairs. Margin entire and upturned. Rostrum entirely absent. Chelipeds stout, swollen in both the sexes but more so in male. Sharp keels on both upper and lower borders of palm continued upto the tip of fixed finger. Inner edge of carpus, upper edge of palm and finger fringed with long hairs. Inner surface of palm convex and the outer surface

bears a huge tubercular angular process only in very large males. Leg joints long, slender hairy, on large males the propodus and dactylus of 1st pair of legs adorned with very thick, dense long hairs. Dectylii curved, long, slender, on their posterior edge 10-11 spines present, of them the one near the apex is large and recurved. The sternum and abdomen thickly hairy.

Distribution : Hawrah near Calcutta, Gobardanga N.24 Parganas, so far known from West Bengal only.

Remarks : Sunken, circular carapace, marginal rim entire upturned, absence of rostrum; presence of swollen palms, and long hairs on the joints of appendages, lastly the spines on long dactyili are unlike any other known forms.

Genus 33. ***Rhynchoplax*** Stimpson

1858. *Rhynchoplax* Stimpson, *Proc. Acad. Sci.* Philad., **X** : 109.

1900. *Hymenicus* Alcock, *J. Asia.Sco.* Bengal, **69** : 387

1917. *Rhynchoplax*, Kemp, *Rec. Ind. Mus.* **13** : 251.

Key to the species of ***Rhynchoplax***

1. Rostrum one dented, simple ..... *nasalis* Kemp.

   Rostrum more than one dented 2

2. Median lobe of rostrum long; no teeth on lateral side of carapace ..... *inachoides* Alcock

   Median lobe of rostrum short, 3 teeth on lateral side of carapace ..... *woodmasoni* Alcock

51. ***Rhynchoplax inachoides*** (Alcock)

1900. *Hymenicus inachoides* Alcock, *J. Asia.Soc.Bengal*, **69** : 388.

1917. *Rhynchoplax inachoides*, Kemp, *Rec.Ind.Mus.*, **13** : 264.

Material examined : Type male from Port Canning, Length of carapace 8.5 mm, maximum width 6 mm.

Diagnosis : Carapace flat, oblong elongate, remarkably narrowed anteriorly and ending in a trident rostrum, the median lobe 1/3 of the length of carapace, the other two side lobes more than half of the median lobe in length. Surface finely hairy. Regions well outlined by grooves. Lateral sides of carapace without teeth or spines. Chelipeds stouter than legs, finely hairy. Legs very long slender, posterior edge of dactyli armed with hook like teeth.

Distribution : Port canning, S. 24 Parganas of West Bengal.

Remarks : Flat, oblong hairy carapace with the long, well formed trident shaped rostrum is very species specific.

52. ***Rhynchoplax wood masoni*** (Alcock)

1900. *Hymenicus woodmasoni* Alcock, *J. Asia.Soc.Bengal*, **69** : 388.

1917. *Rhynchoplax woodmasoni*, Kemp, *Rec.Ind. Mus.*, **13** : 252.

Material examined : Type specimens from Port canning, S. 24 Parganas.

Diagnosis : Carapace flat or depressed, slightly longer (7.5 mm) than wide (6 mm). Body and appendages finely hairy. Regions of almost circular carapace well outlined by grooves. Front separated from carapace by a ridge between the eyes. Arms of the trident shaped rostrum shorter than the former species. Lateral sides of carapace armed with three spines. Chelipeds very much stouter than legs in males and less so in females. Dactylii of legs long, curved, armed with small recurved spinules on their dorsal edges.

Distribution : Port canning West Bengal from Andamans.

53. *Rhynchoplax nasalis* Kemp

1917. *Rhynchoplax nasalis* Kemp, *Rec.Ind.Mus.*, **13** : 265.

Material examined : Several small Type (4.4 mm long) specimens collected from foul water of Bidyadhari River; Chingrighata very near to Calcutta, S. 24 Parganas.

Diagnosis : Carapace flat, sunken; almost exactly circular in shape except the rostrum. Entire crab and its appendages covered with hairs. The regions sharply defined by grooves. The entire upturned border of crab continuous across the base of rostrum. Rostrum long, plate like, broad at base and pointed at apex, twice as long as wide and bordered with hairs. The chelipeds stout and swollen in both the sexes. Walking leg joints long, slender, densely hairy; only the dactyli of last three pairs of legs armed with a single spine on their posterior edge. Male abdomen abnormally broad, narrowed distally, ultimate joint small almost square shaped.

Distribution : S. 24 Parganas of West Bengal The Type locality only.

Remarks : *R. nasalis* can be separated by its almost circular, sunken carapace with a long pointed single lobed rostrum. Its very broad, octogonal male abdomen is also unlike the other known species.

Genus 34. *Elamina* Edwards 1834.

1834. *Elamina* H, M, Edwards

54. *Elamina* sp.

1834. *Elamina* H. M. Edwards, *Hist.Nat.Crust.* **II** : 33

1900. *Elamina* Alcock, *lit cit.* : 385.

Material examined : One specimen from Sundarban, under soft coastal mud, coll by A. K. Mandal in 1985, 5 mm. wide.

Diagnosis : The dark brown, triangular leaf like flat, smooth thin carapace. Rostrum broadly triangular, simple. Regions of carapace not at all defined by grooves or marks. External maxillipeds completely close the square shaped buccal cavity. Leg joints very slender, long.

Distribution : West Bengal, Andaman Nicobars, SriLanka, Goa, Minikoi, Karachi and Japan.

Remarks : *Elamina* sp. was lying with the collector of the specimen who had refused to give it for further study after my tentative identification of the same for the collector of the specimen.

XII Family POTAMONIDAE Ortmann

1896. *Potamoninae* Ortmann, *zool.Jb.(Syst.)* **9** : 445

1910. *Gecarcinucinae* Alcock, *Rec.Ind.Mus.*, **5** : 258

1970. *Potamidae* Bott, *Rev.Suisse (Zool.)* **77** : 335

Carapace oval or subquadrilateral in shape flatish or convex, traversed anteriorly by (1) shorter, coarser post frontal or epigastric and (2) longer, sharper post orbital part of the crests, these two portions may be continuous or discontinuous or indistinct.

Key to genera of POTAMONIDAE

1. Front always little broader than orbit, weavy or bilobed, mandibular palp composed of 3 joints - 2

   Not as above 6

2. Anterolateral sides of crab finely serrulate except the lateral epibranchial spine; no subterminal spine on upper edge of arm of cheliped 3

   Antero lateral sides with more than one spine or without spine or spines 4

3. Exopod of external maxilliped with a long plumose flagellum ..... ***Potamon*** Savigny

   Exopod of external maxilliped with the flagellum vestigial or absent ..... ***Potamiscus*** Alcock

4. Anterolateral sides of crab with four spines, upper edge arm of cheliped with a subterminal spine ..... ***Acanthopotamon*** Kemp

   Ant lateral sides with five spines, upper edge of arm with a single spine .....

   ..... ***Lobothelphusa*** Bouvier.

5. Anterolateral sides of crab serrulate. No subterminal spine on upper edge of arm of chelae -

   Epigastric and post orbital crests indistinct ..... ***Liotelphusa*** Alcock

   Epigastric and post orbital crests very distict, and in a line, either broken or unbroken .....

   ..... ***Barytelphusa*** Alcock

6. Front much wider than the orbit, mandibula palp composed of two disticnt joints only .....

   ..... (***Paratelphusa*** Edw.) ***Sartoriana*** Bott.

   Epigastric and post orbital crests distincly separated, exopodite of external maxilliped with a strong plumose flagellum ..... (***Oziotelphusa*** Muller) ***Spiralotelphusa*** Bott

Genus 35. ***Acanthopotamon*** Kemp 1918

1918. *Acanthopotamon* Kemp, *Rec. Ind. Mus.* 14 : 101; Bott 1970 : 144

55. ***Acanthopotamon martensi*** (Wood Mason)

1875. *Paratelphusa martensi* Wood Mason, *Proc. Asiat. Soc. Bengal* : 230

1910. *Potamon (Acanthotelphusa) martensi*, Alcock, *Cat. Ind. Decap. Crust.*, 1(2) : 68

1970. *Acanthopotamon martensi*, Bott *Abh. Senckonb. Naturf. Ges.* no. 526 : 145

Material examined : 7 exs. from Barangar nr. Calcutta, Coll. Alcock; 1 ex. from Kasai canal, Midnapore; 14 exs. from Jessore, Bangla Desh; 2 exs. from Teesta Riv. at Jalpaiguri.

Diagnosis : Carapace squarish, convex, surface smooth but uneven, except for some fine ripples near the postero-lateral edge. Carapace deep, its length 3/4 of its maximum width. Cervical groove deep only behind the mesogastric area, broad and shallow in the other parts. All the regional areas well outlined and the small pair of precardiac facets very distinctly defined. Front 2/5 of the width,

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deflexed, broadly bilobed. Antero-lateral sides of carapace equal to the well defined posterolateral sides and armed with three spines, other than the blunt, angular, outer orbital angle. Epigastric and post orbital crests distinct, blunt, the former ahead of the later, which become indistinct or obsolate beyond the point of contact with the cervial groove. Chelipeds markedly unequal in both the sexes, their surfaces usually smooth, the usual spine on the upper distal corner of arm, inner corner of wrist, present. Fingers longer than the palp, they gape much only in larger chele of old males. Leg joints slender, three distal joints hairy. 6th abdominal joint of male twice as broad as long.

Distribution : West Bengal; Bangladesh; Bihar; Uttar Pradesh; Punjab Larkana Dist., Sindh; Jullundar dist., and Sri Lanka

Remarks : Smooth, convex, squarish small crab with three anterolateral spines with markedly unequal chela separates the species from the wood-masoni and feae.

Genus 36. *Barytelphusa* Alcock

1909. *Barytelphusa*, Alcock, *Rec.Ind.Mus.* 3 : 376; Bott 1970 : 30

56. *Barytelphusa (Barytelphusa) cunicularis* (Westwood)

1836. *Telphusa cunicularis* Westwood, in Sykes & Westwood, *Trans. entom. soc.* London, 1 : 183

1871. *Telphusa indica*, Wood Mason, *J. Asiat. Soc. Bengal* 40 : 196

1910. *Paratelphus (Barytelphusa) jacquemonti*, Alcock, *Cat. Ind. decapod. Cust.* 1 : 79

1970. *Bartelphusa (Barytelphusa) cunicularis*, *Bott. Abs, Senckb. Naturf. Ges.* no. 526 : 31.

Material examined : 2 males and 2 females from Kalimpong, Jalpaiguri, Darjeeling Coll. F. H. Gravely April-May 1915. From Manbhum, Barrabhum districts of West Bengal and from other parts of India.

Diagnosis : Carapace flatish, but regions rather convex, length of carapace three fourth or more in the adults. Cervical groove broad, v-shaped, deep, very bold, run into the lateral epibranchial tooth. Front about 1/4 of width of carapace, faintly bilobed, and smooth. Orbits wide, external orbital angle distinct. Antero-lateral sides of carapace convex, distinct, crenulate epibranchial spine sharp, prominent, many oblique, fine ridges from the sides traverse the epibranchial region. Eroded epigastric and post orbital crests bold, extend to the epibranchial tooth but separated by deep cervical groove. Chelipeds markedly unequal in adult male but not so much in female and subadult. Edges of arm crenulate upper outer surfaces of arm and wrist rugose, inner corner of wrist strong spine like the palm and fingers pitted, pits linear in arrangement on fingers. Sixth segment of the male abdomen squarish, with sides slightly concave.

Distribution : West Bengal; Chilka Lake; Bihar; Assam; Uttar Pradesh; Madhya Pradesh; Gujrat; Rajasthan; Andhra Pradesh, Tamil Nadu, Bombay, Maharashtra and Kerala.

Remarks : The crabs attain large size of about 4 inches in width and 3 inches in length, dark brown colour with flatish carapace. In the subadult, the nature of cervical groove is shallow and post orbital crests arecontinuous with the eipbranchial tooth.

57. *Barytelphus (Maydelliathelphusa) Lugubris lugubris* (Wood-Mason)

1871. *Telphusa lugubris* Wood-Mason, *J. Asiat. Soc.* Bengal, 40 : 197

1910. *Paratelphusa (Barytelphusa) lugubris*, Alcock, *Cat. Ind. decap. Crust.* 1 : 91.

1910. *Paratelphusa (Barytelphusa) harpex*, Alcock, ibid : 95.

1970. *Barytelphusa (Maydelliathelphusa) lugubris lugubris. Bott. Abs, Senckenb. Naturf. Ges.* no. 526 : 34.

Material examined : 38 exs. from Bengal Duars and Teari, Coll. S. L. Hora; 32 exs from Kalimpong, 4 Kms. W. of Inispection Bunglow; 4 exs from Teesta Valley; 1 exs from Mahananda River nr. Siliguri, Coll. B. N. Chopra; 8 exs from Darjeeling; 3 exs from Darjeeling

Diagnosis : Carapace flatish, regions slightly convex, length about 3/4 of width, surface finely pitted. Cervical groove very broad, deep, runs to the the epibranchial tooth or behind it. Front 1/4 of width in adult, faintly bilobed with thick, crenulate edge. Orbits wide, outer orbital angle broad, low, blunt sometime dentiform. Antero-lateral sides less convex, well defined, not crestiform, finely crenulate. Epibranchial tooth small obsolate in young. Epigastric crests blunt, rugulose, may or may not continuous with the sharp post orbital crests, sometime run into epibranchial dent withut break or may be tubercular. Chelipeds unequal in both sexes, most so in old males. Upper outer surfaces of all the joints rough, inner angle of wrist small tubercular. Fingers in old adult male very strong, stout and curved, meet only at tips leave a wide gap; but in female and young male fingers broad, compressed, evenly dentate and do not gape when closed.

Distribution : West Bengal Duars, Teari; Chittangong (Bangladesh); North Sikkim; Khasi, Jaintia Hills, Cherrapunji, Manipur, Dafla Hills, Bhutan; Assam, Naga Hills, Lushai, garo hills; Bihar, and Nepal.

Remarks : The specimens of the species are enormoulsy variable in nature according to their size, age, sex, season and location. Many varieties and new forms were established by the scientists for such variations.

Genus 37. ***Liotelphusa*** Alcock

1909. *Liotelphusa* Alcock, *Rec. Ind. Mus.* **3** : 377; Bott 1970 : 47

58. ***Liotelphusa campestris*** (Alcock)

1909. *Paratelphusa (Phricotelphusa) campestris* Alcock, *Rec. Indian Mus.* **3** : 377

1970. *Liotelphusa campestris*, Bott, *Abh. Senckenb. Naturf. Ges.* no. 526 : 48.

Material examined : One male from Baranagar, Norh Calcutta and 1 male from North India.

Diagnosis : Very close to the specimens of *L. gageii* from the Darjeeling Hills. From *L. gageii* it differs in following points - 1) The preserved specimens greenish to yellowish brown coloured 2) Carapace thick, convex 3) Front distinctly bilobed, 4) External orbital angles distinctly tooth shaped 5) Antero lateral sides of carapce no defined, no trace of an epibranchial tooth or notch detectable 6) epigastric crests oblique, elliptical, eroded patches not as distinct elevations as in *gageii.* 7) Exopodite of external maxillipeds without flagellum and the longitudinal groove on the ischium very faint.

Distribution : Baranagar near Calcutta, S. 24 Parganas, West Bengal.

59. ***Liotelphusa laevis gagei*** (Alcock)

1909. *Paratelphusa (Phricotelphusa) gageii* Alcock, *Rec. Indian Mus.*, **3** : 251.

1970. *Leotelphusa laevis gagei*, Bott, *Abh. Senckenb. Naturf. Ges.* No. 526 : 48

Material examined : Several specimens from Kurseong, Darjeeling, Sikkim and Bhutan, present in Z.S.I. Coll.

Diagnosis : Carapace subquadrilateral in shape, its length 3/4 of its width, not much convex or deep. Surface finely pitted, uneven, fine oblique ridges present along the lateral sides. The

mesogastric, cardiac and precardiac facets very distinct. In some specimens three shallow pits or scars present on either side of the gastric region. Front more than 1/3 of the width, square cut, faintly bilobed, vertically deflexed. Outer orbital corner blunt. Antero-lateral sides short, well defined, entire notched in the young specimens. Epigastric crests oblique, blunt, broad, rugose, slighly in advance and separated from the post orbital crests, which is blunt, at the level of the outer orbital angle. Chelipds equal in female but unequal in male. Surface of arm, wrists and leg joints rugose; inner angle of wrists dent like. The palm in adult male longer than high and shorter than fingers, which gape when closed and meet only at tips. Length of 6th abdominal joint of male barely equal to its width.

Distribution : Darjeeling, West Bengal; sikkim and Bhutan.

Remarks : Greenish brown, subquadrilateral, flatish crab is very distinctive and specific to be mistaken for other known allied species, *L. campestris* (Alc.)

Genus 38. ***Potamon*** Savigny

1816. *Potamon Savigny, Mem. Anim. Sans.* Vert. **5** : 251; Alcock 1910 : 18; Bott 1970 : 134

60. ***Potamon atkinsonianum*** (Wood-Mason)

1871. *Telphusa atkinsonianum* Wood Mason, *J. Asiat. Soc. Bengal*, **40** : 205

1910. *Potamon (Potamon) atkinsonianum*, Alcock, *Cat. Ind. decap. Crustacea.* **1** : 29

1970. *Potamon atkinsonianum*, Bott. *Abh. Senckenb. Naturf. Ges* no. 526 : 140

Material examined : One male from Darjeeling; Coll. W. King; one male from Darjeeling; Teesta riv. Alcock's coll; one more from Darjeeling Mangpoo, alt 4000 ft.; 4♂♂ 2♀♀ Kurseong, 5000 ft. E. Himalaya, Coll. N. Annandale, 21 - 5 - 1906. 2 ♂♂ from N. Sikkim, C. B. Srivastava Coll. 28-4-1976; 2♂♂ 2♀♀ Teesta Valley, Kalijhora, S. L. Hora, 11-4-1933; 13♂♂, 2♀♀ from Dharampur, W. Himalaya.

Diagnosis : Carapace in adult quite flat behind the frontal slope, length 3/4 of the maximum width or so. Gastric region well defined, cervical groove very deep, cuts and post frontal crests at a point in line with the inner angle of the external orbital spine. Frontal and sub orbital spine. Frontal and sub orbital regions tubercular, anterior part of gastric region rugose, epibrachial region obiquely rugose. Antero lateral sides of carapace tubercular; postero lateral sides obliquely rippled. Post orbital and post frontal crests separated by gap but form a common curve. Front less than a third of width of carapace, faintly bilobed free edge beaded. External orbital angle subacute, the epibranchial tooth tubercular. Chelipeds unequal, upper outer surfaces of all the joints and inner surface of larger palm rugose, surface of fingers rough, upper edge of dactylus tubercular. Length of the 6th abdominal joint of male nearly 2/3 of its length.

Distribution : West Bengal, Darjeeling; N. Sikkim, Ratang Khola; Dharampur, Simla, Almorah, Salt Range Punjab, Jammu State; Nepal, Burma; Tibbet front, and Unnan.

Remarks : The species is larger in size, carapace flat, its epigastric and post orbital crest form a common curve, these are unlike *P. Koolooense* and *P. fluviatile*, the geographical dimensions and sculptural pattern of the later species is also different from the present species.

61. ***Potamon Koolooense*** Rathbun

1904. *Potamon (Potamon) Koolooense* Rathbun, *Nouv. Arch. Mus.* **6** : 270

1910. *Potamon (Potamon) fluviatile monticola* Alcock, Lt. Cit. : 23

1910. *Potaman (Potamon) Koolooense* Alcock, *Cat. Ind. decap. Crust*, 1 : 24.

1970. *Potamon Koolooense*, Bott. *Abh. Senckenb. Naturf. Ges.* no. 526 : 143.

Material examined : Two males from Gopaldhara, Darjeeling, West Bengal Coll. H. Stevens, 1-11-1916.

Diagnosis : Small and almost flat crab. Proto gastric and mesogastric areas deeply defined, smooth; other areas quite faintly defined. Cervival groove deep, cutting the post orbital crests at a point in line with the inner angle of external orbital spine. Epigastric crests rugulose, little advance of the post orbital crests. Front 1/3 of width of carapce, faintly bilobed, free edge well defined and beaded. Antero lateral sides of carapce well defined, beaded, no large eipbranchial tooth present. Post frontal regions tuberculur, epibranchial regios obliquely rugose, side walls obliquely rippled. Sub orbital and pterygostomian regions pimpled. Chelipeds unequal, upper outer surfaces of arm, wrist and palm rough, faintly rippled, inner angle of wrist drawn into a strong spine, palm longer than high, fingers stout, compressed, pointed and slightly hooked at tips. Leg joints stout, compressed, upper surface and anterior edge of merii rough, both borders of propodus serrulate. Length of 6th segment of male abeomen more than half of its length.

Distribution : West Bengal, Darjeeling; Simla, Garwhal, Dharamshala, Koshi Dam, Nainital, Bhimtal, Nagla, Hazara, Punjab and Nepal Terai

Remarks : The species is different from the allied *P. fluviatile ibericum* in the following points. Carapace smaller, flatter, more rough and rugose, cervical groove more deeply defined but the epibranchial tooth is not prominent than the general serrations of the antero lateral sides.

Genus 39. *Potamiscus* Alcock

1909. *Potamiscus* Alcock, *Rec. Ind. Mus.*, 3 : 246; Bott 1970 : 158

62. *Potamiscus sikkimensis* (Rathbun)

1905. *Potamon (Geotelphusa) sikkimense* Rathbun, *Nouv. Arch. Mus. Hist. nat.*, 7 : 219

1910. *Potamon (Potamiscus) sikkimense*, Alcock, *Cat. Ind. decap. Crust.* 1 : 57.

1970. *Potamiscus sikkimensis*, Bott. *Abh. Senckenb. Naturf. Ges.* no. 526 : 159.

Material examined : 6♀♀ 7♂♂ from Kurseong, 5000 ft, Darjeeling; 2♀ from Dow Hill Kurseong 5000 ft, Darjeeling; 8♂♂, 1♀ from Sukhia Pukuri, Nepal; 4 exs from Kurseong, Coll. E. Barolow, Sept., 1896.

Diagnosis : Carapace small, less than an inch in width, convex before backwards, surface dull.

The frontal, post frontal, post orbital, anterolateral regions rugose. Antero lateral sides of carapace well defined, crenulate, the position of the very small epibranchial tooth marked by a small notch or break, Epigastric crests blunt, swollen, rugose; post orbital crests not very distinct. Cervical groove deep behind the mesogastric area, the rest of the groove faint, shallow. Front one third of the width of carapace, square shaped, deflexed, faintly bilobed in dorsal view. Chelipeds slighly unequal in male, almsot equal in female, outer surface rough, rugose; inner angle of wrist spine like, coarse, its lower cusp also coarse; fingers as long as palm, pitted, upper edge of dactylus granular, tips fluted. Leg joints long slender, dactylus longer than propodus. 6th abdominal joint of male twice as broad as long.

Distribution : West Bengal, Darjeeling Sikkim, Assam, Naga Hill; Hot spring at Bihar, Ajmere, Rajasthan, and Nepal.

Remarks : The species can be distinguished by its blunt swollen epigastric crests; post orbital crests merged with the rugosities of the carapace. Cervical groove is quite indistinct anteriorly.

63. *Potamiscus tumidus* (Wood Mason)

1871. *Telphusa tumida* Wood-Masn, *J. Asiat. Soc. Bengal*, **40** : 453

1910. *Potamon (Potamon) tumidum*, Alcock, *Cat. Ind. decap. Crust.*, **1** : 41.

1970. *Potamiscus tumidus*, Bott, *Abh. Senckenb. Naturf. Ges.* no. 526 : 161.

Material examined : Two males from Darjeeling, Coll. J. Anderson one female from Darjeeling coll. N. Annandale & F. H. Gravely.

Diagnosis : Carapace strongly convex before backwards, deep, length of carapace not much shorter than its width. Frontal, epigastric, epibranchial, postero-lateral regions rugulose, obliquely wrinkled and groups of granules covered pterygostomian regions. Antero lateral sides of carapace, raised, beaded, longer than posterolateral. Front more than 1/3 of width of carapace, vertically deflexed, edge smooth, hardly concave; external orbital angle low, angular; epibranchial tooth small and the gap between them is less. Epigastric crest swollen, indipendent and in advace of blunt post orbital crest which is broken and cut by the cervical groove at the usual point. Chelipeds unequal, outer surfaces of arm, wrist and all the surface of palm rough rugose, the edges of arm crenulate; inner angle of wrist obtuse angular, upper edge of palm serrulate; cutting edges of fingers dentate and leave gap when closed. 6th joint of the male abdomen twice as broad as long.

Distribution : Darjeeling in West Bengal; Kakhyen Hills, Yunan and Moulmein (Burma)

Remarks : The species can be differentiate from the nearest *P. pealianum* in having the mouth broader front; swollen epigastric crests are in advace of the post orbital crests, the outer orbital and epibranchial teeth are less prominent.

Genus 40. *Sartoriana* Bott.

1969. *Sartoriana* Bott, *Senck. Biol.*, **50** : 361, 1970 : 38.

64. *Sartoriana spinigera* (Wood Mason)

1871. *Paratelphusa spinigera* Wood Mason, *J. Asiat. Soc. Bengal* **40** : 194

1910. *Paratelphusa (Paratelphusa) spinigera*, Alcock, *Cat. Ind. decap. Crust* **1** : 72.

1970. *Sartoriana spinigera*. Bott, *Abh. Senckb. Naturf. Ges.* no. 526 : 39

Material examined : Seen large number of specimens from tanks of Indian Museum; Calcutta, Pulta, Chinsura, Raigunj, Dinahpur, Jalpaiguri, Cooch Behar and Assam.

Diagnosis : Carapace broad, deep, convex, its length 2/3 of its maximum width. Surface smooth except for some fine ripples at the postero lateral sides. Cervical groov deep, narrowly 'V' shaped, becomes shallow, indistinct below the outer ends of post orbital crests. All the regional areas distinct, convex, except, the two small, sunken, oval precardiac facets. Epigastric crests rugose, prominent, slightly in advance of post orbital crests, the latter thin, sharp and become indisticnt beyond the point of junction with cervical groove. Front about 1/3 of the maximum width of carapace, free edge sharp, slightly concave. Orbits small, outer orbital angle prominent, broad. Antero-lateral sides of carapace curved, sharp, entire or crenulate faintly prominent, sharp epibranchial spine placed far back. Chelipeds very unequal in adult males and females, upper outer surfaces smooth. The spine near the distal end of upper edge of arm acute, that at the inner angle of carpus strong, stout and sharp pointed. Male abdomen triangular, 6th joint with concave sides.

Distribution : West Bengal, Bihar, Orissa, Assam, Tripura; Punjab, Uttarpradesh, Patiala, Jhelum Dist. and Bangladesh, Sind, Karachi (Pakistan).

Remarks : *S. spinigera* (W - M) is a very common crab of paddy fields of West Bengal and cause much damage to the standing paddy by cutting the entire bunches for hiding the mouth of their holes by accumulating the same on holes. During rainy season the crab grows profusely. Dark brown, large, thick crab with a sharp epibranchial tooth or spine can easily be recognised as spinigera.

Genus 41. *Spiralotelphusa* Bott

1968. *Spiralotelphusa* Bott, *Senck, Biol.* 49 : 403; 1970 : 96.

65. *Spiralotelphusa hydrodroma* (Herbst)

1794. *Cancer hydrodromus* Herbst, *Naturgesch. Krabben und Krebse*, **2** : 164.

1910. *Paratelphusa (Oziotelphusa) hydrodroma*, Alcock, lit. cit. : 97.

1970. *Spirelotelphusa hydrodroma* Bott, *Abh. Senckene, Nodurf, Ges.* no. 526 : 97.

Material examined : One male from Calcutta, J. Wood Mason 1888-89; 5♀♀, 4♂♂ from Ranigung, Coll.; 2♀♀, 3♂♂ from Barabhum, W. Bengal ; 1♂ from Ganga River Coll. A. K. Mukherjee.; 1♀ from Bankura, C R M. Green coll.; 1♂ 1♀ from Kasain canal, Midnapore coll. A. N. Mitra, 11.9.34 and 1 ex. from Dinajpur, T. Roy; 2-7-1988.

Diagnosis : Carapace strongly convex before backward, length two third to three fourth of the maximum width, surface smooth, cervical groove shallow but distinct, ends behind the post orbital crests, at a point in line with the orbital tooth. The regions gastric, cardiac, epibranchial and a pair of small precardiac facets distinct. Front about 1/3 width of carapace in adult. Orbits broad, external orbital tooth blunt. Antero-lateral sides of carapace convex, crest like, entire in adult, crenulate in youngs. Epibranchial tooth prominent. Sharp epigastric crests slighly advance of post orbital cests. Chelipeds unequal, surface of wrists, palms smooth, inner corner of wrist a sharp spine. Fingers stout, compressed and little longer than the palm.

Distribution : Calcutta, West Bengal, Bihar, U. P.; Allahabad, Orissa; Andhra, Tamilnadu, Cochin, Bangalore, Goa, Bombay Rajasthan (Tinpahar n. Annandale 7-7-1909) and Sri Lanka; Peninsular India mainly.

Remarks : Shape of carapace, its surface, nature of cervical groove; sharp epigastric crests are slighly in advance of the post orbital crests and the chelipeds are unlike other known allied speices.

Genus 42. *Lobothelphusa* Bouvief 1917

1917. *Hydrothelphusa (Lobothelphusa)* Bouvier, *C. R. Acad. Sci. nat. Paris*, **165** : 620.

1970. *Lobothelphusa*, Bott : 146.

Antero-lateral sides of carapace with 5 strong spine like teth including the external orbital angle.

66. *Lobothelphusa wood-masoni* (Rathbun)

1905. *Potamon (Paratelphusa) wood masoni* Rathoun, *Nouv.Arch.Mus.*, (4) **7** : 262.

1910. *Acanthotelphusa wood-masoni*, Alock, lit cit. 63.

1970. *Lobothelphusa wood masoni*, Bott, : 149.

Material examined : 2 exs. from Gargaria river, Toofanganj, Coochbihar, Coll. T. Roy. dt. 17-6-1988.

Diagnosis : Carapace broader than long, roughtly hexogonal in shape, convex, dorsal surface uneven, its depth about half of its length. The frontal areas and anterolateral corners granular; many short oblique wrinkles on postero lateral sides; cervical groove distinct, cuts the post orbital crests in line with inner angle of the orbital tooth. All the regions viz. gastric, branchial, cardiac and the paired prae cardiac facets distinctly defined. Front 1/3 of greatest width of carapace, slighly deflexed, free frontal edge sharp, entire and faintly bilobed. Orbits broder, lower edge crenulate and separated from the external orbital corner on antero lateral sides of carapace. Epigastric crests regulose, well advance of the sharp post orbital crests. Chelipeds equal, slender and shorter than legs, upper edge of palm and carpus rough. A sub-terminal spine on upper border of arm, strong spine at inner angle of carpus, fingers slender, longer than palm and do not gape much.

Distribution : West Bengal, Assam, Cachar, Tripura, Garo Hills, Burma and Bangladesh.

Remarks : Broad, hexagonal shape of carapace with five strong antero lateral spines; deeply defined cervical groove are very much distinctive and unlike other allied species viz. *calva, fungosa* (Alcock).

XIV Family OCYPODIDAE Ortmann

1894. *Ocypodidae* Ortmann : 700; Sakai 1976 : 597.

Key to the genera of OCYPODIDAE

1. Carapace medium in size 40-50mm inwidth inadult, almost cubic, square, shaped or little broader than long, surface closely and uniformly granular. Eyes large, orbits very long, chelipeds unequal. Brush of hairs between the basis of legs present. ..... ***Ocypode*** Weber

   Carapace small cubic or thick, quadrilateral, smooth or thin, flat, surface not uniformly granular ..... 2.

2. Carapace flat, thin, quadrilateral, broader than long, sometimes more than twice as broad as long, Regions well defined on the carapace. Lateral sides of carapace with two thin teeth. Front narrow, orbits also narrow trenches but very long; eye stalks usually very long, slender. No tympana on leg joints ..... ***Macrophthalmus*** Latreille

   Carapace smooth, thick medium, broad and quadrilateral in shape or small cubic or subcubic, soft delicate crabs look like very early stages and remain in groups 3

3. Carapace much broader than long, deep subquadrilateral or lateral sides convergent posteriorly. Surface smooth, orbits narrow, long trenches; only one cheliped in male is gigantic in size, other is small, narrower than legs and like female chelae ..... ***Uca*** Leach

   Surface of sub cubic carapace and side wall of crab grooved or smooth, chelipeds equal or groups absent ..... 4.

4. Carapace grooved 5

   Carapace without grooves 6

5. Carapce small 10-15mm in size; subcubical, surface and side walls of carapace grooved. Buccal cavity enormus, maxillipeds bulged. Chelipeds equal, shorter than legs, fingers usually narrowr. Penultimate joint of 2nd maxilliped expanded, 4th joint of abdomen of both male and female with a thick brush of hairs; male abdomen not constricted. Merii of legs have membranous tympana ..... ***Dotilla*** De Haan

   Almost like *Dotilla* except the penultimate joint of maxilliped not expanded. 4th joint of male abdomen remarkably expanded, nearly 3 times as broad as the 5th but not overlapping the 5th and there is no brush of hairs present on its edge..... ***Dotillopsis*** Kemp

6. Grooves on crab absent .....

   Carapace narrower, chelipeds slender, male abdomen wasp like constricted medially, but normal infemale, Merii of legs with tympana..... ***Scopimera*** De Haan

   Carapace quadrilateral, chelipeds stout; male abdomen not wasp like. Tympana on merii of legs not very disticnt ..... ***Ilyoplax*** Stimpson

Genus 43. *Ocypode* Weber

1795. *Ocypode* Weber, *Nom. Ent. Syst.*, : 92; Saka 1976 : 598

1803. *Ocypoda* Latreille, *Hist. Nat.* : **27**; Alcock 1900 : 343.

Key to the species of *Ocypode*

1. Tips of finger of smaller chelae broad and blunt..... ***mcrocera*** Edw.

   Tips of finger of smaller chelae pointed and sharp ..... 2.

2. Surface of external maxilliped quite smooth ..... ***platytarsis*** Edw.

   Surface of external maxillaped tubercular ..... ***Ceratophthalma*** (Pallas)

67. *Ocypode ceratophthalma* (Pallas)

1772. *Cancer ceratophthalmus* Pallas, *Spicilogia zool.* **IX** : 83

1900. *Ocypoda ceratophthalma* Alcock, *J. Asia. soc. Bengal*, **69** : 345

1986. *Ocypoda ceratophthalma* Chakrabarty, Choudhury & Deb, *J. Bengal Nat. Hist. Soc.*, **5** : 57

Material examined : Large number of specimens from Sagar Is. and Digha coast, Bay of Bengal; Coll. A. Chakrabarty & A. Choudhury Width - 40 mm Length - 35 mm.

Diagnosis : Carapace square and cubic; convex, dorsal surface evenly granular; outer orbital corner accuminate or right angular. The eye stalk prolonged beyond the eyes in adult, into a long, blunt style. Chelipeds unequal, compressed, outer surfaces rough, granular on inner surface, stridulating ridge more than half of hight of palm. The propodus of first two pairs of legs profusely hairy on their anterior edges.

Distribution : West Bengal Sagar Is., Orissa; Chandipur, Tamilnadu, Tuticorin, Rameswaram, Gulf of Manner, Nicobar Is., Tropical Indo Pacific; from Japan, Hawaii to New South Wales, Red Sea, East and South Africa.

Remarks : The stridulating ridge consists of thick strip of hairs and tubercles gradually becoming striae, which are fine, regular thick close set like a comb.

Palm of smaller hand compressed and fingers of both palms are pointed at tips. Profuse hairs on the first two pairs of legs may be absent in young and subadult stage.

These are unlike any other species of the genus.

68. *Ocypode macrocera* Edw.

1834. *Ocypoda macrocera* H. Milne Edwards, *Hist. Nat. Crust.* II : 49

1986. *Ocypoda macrocera,* Deb, Chakraborty and Choudhury J. *Beng. Natu. Hist. Soc.*, **5** : 57

Material examined : One male and one female from Sagar, Bakkhali Beach, Coll. S. Chakraborty; dt. 18.12.87, Width - 27mm, Length - 21 mm, Front 3.5mm.

Diagnosis : Carapace square, deep, strongly convex from before backwards and moderately so from side to side. Surface covered uniformly with small granules. Gastric and cardiac regions separated by grooves. Outer orbital corner prominent right angular. Chelipeds markedly unequal. The length of stridulating ridge more than half of the breadth of larger palm, this ridge consists of striae only, hairs less. Fingers of the smaller chelipes broad, thin, tips also broad and blunt.

Distribution : West Bengal and coasts of Bay of Bengal

Remarks : At a glance the *O. macrocera* Edw. specimens can be separated from its nearest species in having broad and blunt finger tips of the smaller chelaeped only.

69. *Ocypode platytarsis* Edw.

1852. *Ocypoda platytarsis* Milne Edwards, *Ann. Sci. Nat. Zool.* **18** : 141

1900. *Ocypoda platytarsis*, Alcock, *J. Asia. Soc. Bengal*, **69** : 348

Material examined : Few males and females from Digha coast, and Sundarban; areas, Coll. A. K. Mandal, A. Misra and A. Chakrabarty in 1980-87.

Diagnosis and Remarks : The species differs from *O. ceratophthalma* a closely related species in the following points :- a) Carapace very distincly broader; orbits not much oblique as in *ceratophthalma*; b) Surface of external maxillipeds quite smooth; c) Stridulating ridge consists of granules and fine tubercles only; d) Propodus of walking legs without the thick coat of hairs on their anterior edge like former species; e) Dactyli of legs are dorso ventrally compressed, braod and fluted

Distribution : West Bengal, Sundarbans; east and west coasts of India, Gulf of Manner and SriLanka.

Genus 44. *Dotilla* De Haan, Stimpson.

1835. *Doto*, De Haan, *Fauna Japan, Crust* : 24

1858. *Dotilla*, Stimpson, *Proc. Ac. Nat. Sci.* Philad : 98

70. *Dotilla blanfordi* Alcock

1900. *Dotilla blanfordi* Alcock, *J. Asia. Soc. Bengal*, **69** : 366

1986. *Dotilla blanfordi* Deb, Chakraborty & Choudhury, *J. Bengal Natur. Hist. Soc.*, **5** : 60.

Material examined : Two males from Sagar Is, Coll. S. Chakrabarty 21-12-87 measuring Widtn - 7.5 mm, Length - 4 mm

Diagnosis : Small cubical, hair less crab. Whole dorsal surface of the carapace grooved. A six - rayed star of grooves of nearly equal length can be made out on the dorsal surface, grooves smooth and spaces between these grooves and the whole side wall of carapace finely granular.

Merus of external maxilliped twice as large as the ischium and its surface also grooved longitudinally. Chelipeds equal, stouter than the legs, fingers slender and slightly longer than the palm. A tympanum present on the merii of legs; only in the last pair, dactylus twice as long as the propodus. No sternal tympana.

Distribution : West Bengal Sagar and other adjoining Islands; Gangetic delta, Bay of Bengal, West Coast of India, Coast of Sind and Beluchistan.

Remarks : A six rayed star of grooves on the dorsal surface of carapace at once separates the ***D. blanfordi*** Alcock from other species.

Genus 45. ***Dotillopsis*** Kemp.

1919. *Dotillopsis* Kemp. *Rec. Ind. Mus.*, 16 : 334

71. ***Dotillopsis brevitarsis*** (de Man) Kemp

1887-88. *Dotilla brevitarsis* de Man, *J. Linn. Soc. Zool.*, **22** : 130

1986. *Dotillopis brevitaris*, Deb, Chakrabarty, Choudhury, *J. Bengal. Natu. Hist. Soc.* **5** : 60.

Material examined : 4 exs. from Harwood point, Kakdwip, 27-12-87; 4 males and 2 females from Narain Gunj, namkhana; 16-2-87

Diagnosis : Small, square shaped, thick crab, like a cube. The whole surface of carapace grooved faintly as follows. - a broad and deep groove runs from front to the back on the middle line of carapace, another runs parallel with the posterior border. On each lateral side of the carapace a third groove takes a bent course. Other small grooves joint the median and the lateral grooves. Eye stalks long. The lower side of crab also grooved faintly. Chelipeds short, thin and upper edge of palm and dactylus fringed with hairs.

Distribution : West Bengal coasts of Bay of Bengal, Gangetic delta; Andaman Nicobar; Burma and Mergui Archipelago.

Remarks : The sculptural patterns of the surface of caraface are unlike any ohter known species of the genus. Lateral sides of carapace grooved these are unlike other allied species.

Genus 46. ***Macrophthalmus*** Latreille

1829. *Macrophthalmus* Latreille : 44; Sakai 1976 : 609

Key to the species of the genus ***Macrophthalmus***

1. Carapace not much, but little broader than long. 2

   Carapace much broader than long ..... 3.

2. Surface of carapace pearly granular, lateral sides convergent, borders of legs spiny in adults.....

   .....*pectinipes* Guerin

   Surface smooth, lateral sides of carapce parallel and finely crenulate, a spine present on the inner surface of palm of males only ..... *erato*, de Man

3. Length of carapace less than half of its width. External orbital angle long, acute, spine like, followed by two broad teeth. Upper edge of arm and palm of chalae spinate, cutting edge of fixed finger armed with two erect spines ..... *transversus* Latreille

   Length of carapace 1/2 - 2/3th width 4

4. Length of carapce about half of its width. External orbitl angle acute angular forwardly directed, 2nd tooth spine like. Fingers broad, thin, only one basal tooth present on their cutting edges, inner side of dactylus thcikly hairy ..... *brevis* Herbst

   Length of carapace almost 2/3 of its width. Lateral sides paralle, outer orbital corner square shaped, Small scattered granules and two transverse rows of granules from the postero lateral tooth. Present only on dorso lateral surface of carapce. Upper edge of palm granular, lower edge quite smooth ..... *teschi* Kemp.

72. *Macrophthalmus brevis* (Herbst)

1804. *Cancer brevis* Herbst *Kraben u. Krebse*, **3** : 9

1919. *Macrophthalmus brevis* Kemp, *Rec. Ind. Mus.*, **16** : 188.

Material examined : One male from Harin Bari, Sagar Is.

Diagnosis : Carapace quadrilaterial, its length about half of width. Regions well defined, surface microscopically granular. Front bifid, narrow, upper orbital edge finely granular, lower edge evenly tubercular. Eye stalks little shorter than outer angle. External orbital angles acute angular, forwardly directed and spinate on lower sides. Second tooth spinate, acute angular followed by a notch. There are thrre grups of granules present on posterodorsal side parallel to lateral sides of carapace; the anterior most group transverse. Last two groups rounded. Three edges of arm of cheliped and inner edge of wrist spinate. Upper proximal edge of palm with two, below these two on inner surface one spine present on the middle. Fingers broad, thin, vertically deflexed, cutting edge of fixed finger with one dent near base and tip of the finger sharp and when closed just fitted on the notch at the tip of thumb, cutting edge of broad thumb with one basal tooth, inner surface of finger thickly hairy.

Distribution : West Bengal, Port Canning, Sundarban; Pondicherry; Arakan coast; Singapore; East India; Mergui Archipelago; Celebes and Maurititus.

Remarks : M. brevis can be separated from *M. transversus* in having short eye stalks. Spinate, broad forwardly directed antero lateral teeth; presence of only three groups of granules; of which first group is transverse and last two groups rounded. Nature and arrangements of spines on chelipeds, broad thin fingers with only one large tooth on their cutting edges. This last point at once differentiate it from the allied species.

73. *Macrophthalmus erato* de Man

1888. *Macrophthalmus erato* de Man, *J. Linn. Soc. Zool.*, **22** : 125

1915. *Macrophthalmus erato* Tesch, *Zool. Mededeel*, Leiden, **1** : 179

Material examined : One male from Boakkhali, Sagar Is., 22-12-88, Coll. Mopping Survey Party. Width - 12 mm, L 8 mm, F - 2.5 mm.

Diagnosis : Carapace quadrilateral in shape, depressed, thin, almost flat anteriorly and slightly convex posteriorly. The gastric regions well defined, the cervical and branchial grooves shallow but well marked. Front narrow, deflexed downwards, free edge obscurely bilobed. Orbits narrow, weavy, oblique, upper edge finely beaded, and occupy the whole anterior edge of the carapace between the front and the antero-lateral angles. Eye stalk long, slender, eyes terminal and extend a little ahead of the external orbital angle. Buccal cavity square and arched anteriorly; merus of the external maxillipeds broader than long and half of the ischium in length.

The first tooth or outer orbital corner sharp, truncate and square cut; second tooth similar but narrower than the first and the carapace broadest at the level of second tooth. Rest of the lateral sides of the carapace parallel and finely crenulate. One row of raised granular transverse line from the tip of second tooth extend inside on carapace upto the gastric region. Another longitudinal line just inside and parallel to the lateral sides of carapace present on the carapace, rest of the dorsal surface of crab smooth, bare.

Chelipeds unequal in male, not longer and much stouter than the legs. All the three borders of the arm serated; upper border of arm and inner angle of wrist finely denticulate. A finely serrate musical crest present on the middle of the inner surface of arm and parallel to that border.

Distribution : West Bengal (First record) Sundarban (Bay of Bengal) Chandipore, Orissa, Malacca; Mergui Archipelago; Akyab; Gulf of Siam; Java and Hongkong.

Remarks : The specimens from Boakhali, Sundarban is much smaller in size than the largest specimens i.e. 17.4 mm wide and 11.9 mm long, from Arakan coast, otherwise secimens are quite identical.

74. *Macrophthalmus pectinipes* Guerin

1839. *Macrophthalmus pectinipes* Guerin, *Mag. de Zool*, **11** : 167

1986. *Macrophthalmus pectinipes*, Deb, Chakrabarty, Choudhur, *J. Bengal Nat. Hist. Soc.* **5** : 60

Material examined : 2♂♂ and 1♀ from Sagar Is., Lower Bengal, collected by Chirananda De in 1980.

Diagnosis : Carapace subcircular in shape, flatish but slightly convex medially, surface studded with large granules. Lateral sides of carapace distinctly convergent and beaded posteriorly. Anteriorly three acute teeth, first one outer orbital angle and the last one minute. Front 1/6 of greatest width of carapace distinctly bilobed. Orbits oblique, weavy, upper edge denticulate, lower edge crenulate, eye stalks do not project beyond the anterolateral angles of carapace, Inner border of arm crest like, serrated and with a horny musical crest. Inner angle of wrist, upper proximal edge of palm serrated, palm smooth dectylus has a tooth at its basal end of cutting edge, fingers meet only at tips. Second and third pairs of legs very long and strong. The anterior edge of all joints and posterior edge of merus only spiny in adults and denticulate in youngs.

Distribution : West Bengal Sagar Is., Sundabans, Orissa, Bombay; Karachi, Sind; and Penang.

Remarks : Anterior edges of merus, carpus and propodus of all the legs and the distal ends of posterior edge of merus only are spinate in adult or denticulate in young ones. During the growth and moulting their carapace and chelipeds undergo great changes of shape size and sculptural texture spinations of appendages are very much confusing in young stages which leads to the quick identification of adults.

75. *Macrophthalmus teschi* Kemp

1919. *Macrophthelmus teschi* Kemp, *Rec. Ind. Mus.*, **16** : 305

1986. *Macrophthelmus teschi*, Chakrabarty, Choudhury and Deb, *J. Bengal. nat. Hist. Soc.*, **5** : 60

Material examined : Four males, 2 females from sagar Is. Port Canning Coll. S. Chakrabarty in 1981-84 and few Arakan Coast, Mergui.

Diagnosis : Carapace quadrilateral, length of male almost two third of its width. Lateral sides of carapace parallel, first antero lateral tooth or the outer orbital corners truncate, square. Scattered granules present on the dorso lateral parts of carapace, the interspaces between the granules much wider than the size of granules. Two prominent, transverse rows of granules extending inwards from the posterior antero-lateral tooth. The lateral and frontal edge of narrow front crenulte. Upper outer sides of palm of chelipeds without large granules, but lower proximal surface distincly granular. Fixed finger of hand strongly bent downwards, and a very large tooth present near the base of its cutting edge, not reaching beyond the middle of its length. Surface of sternum granular only near abdomen and quite smooth externally.

Distribution : West Bengal, Northern and eastern sides of Bay of Bengal, Port canning, Gangetic delta; Arakan coast and Mergui.

Remarks : The species differs from *M. depressus* a nearest alley, in not having the following characters - The surface granules are very close, thick, interspaces are smaller than the size of granules; the two transverse rows of granules from postero lateral tooth are faint and obscure. Edges of front smooth. Upper edge of palm with a row of large granules, lower edge quite smooth. Fixed finger of chelae slightly bent and the low teeth of its cutting edge extend beyond the middle. The sternal surface is granular all over.

76. *Macrophthalmus transversus* (Latr.)

1817. *Gonoplax transversus* latreille, *Nouv. Dist. d'hist. nat.*, **13** : 237

1919. *Macrophthalmus transversus* Kemp, *Rec. Ind. Mus.*, **16** : 386.

Material examined : Few speciemens from Sandhead and Chandipore Orissa, Coll. Mopping Survey parties in 1983-1987.

Diagnosis : Carapace quadrilateral inshape, maximum width more than twice of its length. Dorsal surface finely granular, region well defined, front bifid, 1/8 of maximum width of carapace. Eye stalks long projecting well beyond the lateral sides in adults. Upper orbital edge finely crenulate, lower edge sharply denticulate External orbital angles long acute, sharp spine like, behind it two, broad, teeth followed by minute tubercles. On postero dorsal sides, four sharp spine like tubercles arranged in line parallel to lateral sides of carapce. Upper, anterior edges of arm of cheliped with three and lower edge with one spine. Upper edge of palm spinate, cutting edge of fixed figer with two erect spines and of thumb with one basal sharp tooth only.

Distribution : West Bengal and Orissa coasts of Bay of Bengal; Pondichery East coast of India; Sumatra and Massouah (Cano)

Remarks : The length of eyes stalks are variable as per the age of specimens, the presence of small surface granules are only on males, the more part of female carapace is bare, smooth. Narrow, slender palm and almost vertically deflexed fingers with their peculiar shape and dents are quite unlike the other species of the genus.

Genus 47. *Ilyoplax* Stimpson

1835. *Cleistostoma* De Haan : Fauna Japan. : 26

1858. *Ilyoplax* Stimpson : 98; Sakai 1976 : 622.

1897. *Tympanomerus* Rathbun, Proc. Biol. Soc. Wash. **11** : 16

77. *Ilyoplax stapletoni* (de Man)

1908. *Tympanomerus stapletoni* de Man, *Rec. Ind. Mus.*, **2** : 212

1919. *Tympanomerus stapletoni* Kemp, ibid, **16** : 334.

Material examined : 119 exs of males and females collected at various stations along the shores of Ganga near tidal mark by B. P. Halder in 1987-1988.

Diagnosis : Small (8mm - 12mm in width) crabs remains collectively; bright, dark brown coloured in freshly preserved condition.

Crabs are quadrilateral, orbits long, transverse, eye stalks also long, without projecting terminal style. Front broad, about 1/4 of the anterior width of carapace, deflexed downwards, median dorsal groove broad and distinct. Groove on the sidewalls of carapace seen only near the angles of buccal cavity. Crest defining lateral sides of carapace discontinuous posteriorly. Surface of carapace covered with close clusters of hairs, regions faintly defined; a row of granules on the carapace. Chelipeds of male equal, stout, in female narrower. Carpus without a corner on its inner angle; outer surface of palm smooth or rough below, without a carina near lower border; upper border of palm rounded. 5th joint of male abdomen deeply constricted; 7th joint as long as wide. Anterior male pleopod angularly bent distally.

Distribution : West Bengal Bank of River Ganga, from burrows near tidal mark; other rivers of Khulna and Dacca, Bangladesh.

78. *Ilyoplax gangeticus* (Kemp)

1919. *Tympanomerus gangeticus* Kemp, *Rec. India Mus.*, **16** : 347

Material examined : Few specimens from Gangetic delta, 4mm long, 5.3mm wide. Coll. S. Chakrabarty in 1983.

Diagnosis : Small, quadrilateral thick, cubic crab, orbits long transverse; surface of carapace withut hairs. Lateral sides of carapace convex behind the notch below outer orbital corner. Front about one third of width of carapace. Lower outer edge of hand traverse by a granular ridge from base to the tip of fixed fingers. The carpus and propodus of first two legs thickly coated with short basis. Lateral sides of fifth abdominal joint of male slightly constricted.

Distribution : West Bengal Gangetic delta, opposit Port canning.

Remarks : The species can easily be recognised and separated from the *orientalis* in having convex lateral sides of carapace behind the outer orbital notch and thickly hairy carpus and propodus of first two pairs of legs. Membraneous tympana is absent on the merii of the legs.

Genus 48. *Uca* Leach.

1815. *Uca* Leach, *Trans. Linn. Soc. XI* : 309; Crane 1975 : 15;

Key to the species of genus *Uca*

1. Front about 1/5 to 1/6 of greatest width of carapace; two oblique granular ridges on inner surface of large palm present 2

   Front narrow about 1/10 to 1/12 of width of carapace. 3

2. Carapace subquadrilateral, true lateral sides moderately convergent posteriorly tip of fixed finger of chela notched or truncate ..... *annulipes* H. M. Edw.

   Carapace hexagonal owing to oblique orbits and convergent lateral sides, tip of fixed finger not truncate or notched ..... *triangularis* A. M. Edw.

3. Inner border of arm of longer chela ends insharp tooth or spine excepting the terminal lobe like constriction of arm, cutting edge of fixed finger of palm weakly 'W' like weavy ..... *Vocans* var *hesperiae* Crane

   Inner border of arm ends in a constricted lobe but no spine or sharp teeth inside the lobe present on inner edge of arm 4

4. Finger tips of large male chela simple and hooked ..... *dussumieri* H. M. Edw.

   Finger tips forceps like because of large granules on opposable edges 5

5. Outer side of entire dactylus transversed by two grooves ..... *rosea* Tweedie

   No such grooves tranversed the outer side of entire dactylus ..... *acutus* Stimpson

79. *Uca (Celuca) lactea annulipes* (Edw)

1834. *Gelasimus annulipes* H. M. Edwards, *Hist. Natu. Crustes*, Paris, **1** : 55

1975. *Uca* (*Celuca*) *Lactea annulipes*, Crane, *Fiddler Crabs of World* : 299

Material examined : Onemale from Bakkhali Beach, 18-12-87; 7 males, 4 females from Sagar Island, Coll. Mopping Survey Party 1983-1987. Width - 13 mm Length - 7 mm Front - 2 mm.

Diagnosis and Remarks : Antero lateral angles of carapace claw like, sharp; lateral sides of carapace defined by fine, raised convergent lines, in two thirds of their extent. Front between the eye stalks measured about one fifth or so of the maximum width of carapace. Outer surfaces of the large male cheliped joints smooth, lower border of palm obscurely marginate. Fingers are not very broad and leaves a wide gap when closed, tip of dactylus sharp, hook like and the tip of finger is notched.

Distribution : West Bengal coasts of Bay of Bengal; east and West coasts of India, Andamans; Singapore, Mergui Archipelago; Philippines to Madagascar and east coast of Africa.

80. *Uca acuta acuta* (Stimpson)

1858. *Gelasimus acutus* Stimpson, *Proc. Ac. Nat. Sci* : Philad. : 99

1986. *Uca acuta acuta* Deb, Chakraborty & Choudhury, *J. Bengal Natu. Hist. Soc.*, **5** : 59

Material examined : Large number of specimens from Sundarban S. 24 Parganas. Coll. S. Chakrabarty and Mopping Survey Parties in 1983-1987.

Diagnosis : Carapace very convex before backwards, regions well defined, lateral sides stronly convergent and defined by raised line upto two thirds of their extent. Front very narrow, orbits oblique both upper and lower edges finely crenulate. Upper outer surfaces of the wrist and palms covered with pearly ganules; upper and lower borders of large palm well defined and two oblique granular crests present on the inner surface of palm. Fingers broad, thin; one enlarge tooth present near the tips which give forceps like grip to the fingers when closed. The merus of the last pair of leg also distinctly foliaceous.

Distribution : West Bengal Sundarbans Bay of Bengal, Andamans; Mergui and Karachi.

Remarks : Strongly curved lateral sides of carapace gives it a triangular shape, narrow front, oblique orbit and forceps like grip of fingertips are the main distinctive features for the *U. acuta*. The species is very much alike to *U. rosea* but differs in not having the two longitudinal grooves on the major chela dactylus and smooth low floor of the orbits. Many of the scientist have ignored the above mentioned negligible differences before Crane 1975, and wrongly named all specimens as *U. acuta*.

81. *Uca dussumieris dussumieri* (Edw.)

1852. *Gelasimus dussumieri* A. M. Edwards, *Ann. Sci. Nat. Zool.* (3) : 148

1986. *Uca (Deltuca) dussumieri dussumieri*, Deb, Choudhury & Chakrabarty *J. Beng. Nat. Hist. Soc.* **5** : 59

Material examined : Several males and females from Sagar Is., Prentice Is., Luthian Is., S-24 Parganas, Coll. S. Chakrabarty and other in 1982-1987.

Diagnosis : Carapace very much like *U. acuta* but for the following differences (1). Regions of carapace much more deeply defined, (2) theraised lateral lines less distinct and less convergent (3) Orbits less oblique. (4) Front narrower (5) Arm of the longer chela longer and more slender (6) The two granular ridges on the inner surface of the large palm, very strongly pronounced (7) Fingers more broader and compressed; tips hooked and without enlarged tooth near the tip but one enlarged tooth or lobe present on the middle of fixed finger.

Distribution : West Bengal : coast of Bay of Bengal; Orissa, Bimlipatam, Andamans, Mergui; Singapore; Java; Indonesia; Japan and New Caledonia.

Remarks : The fully adult male specimens of *Uca dussumieri* (Edw) are distinguishable from the closely related spcies *Uca acutus*, by the above mentioned characaters.

82. *Uca triangularis bengali* (Edw)

1873. *Gelasimus triangularis* A. M. Edwards. *Nouv. Archiv. Mus.*, **IX** : 275

1986. *Uca (Celuca) triangularis bengali*, Deb, Chakrabarty, Choudhury, *J. Beng. Nat. Hist. Soc.*, **5** : 58

Material examined : Large number of males and females from Sagar and other Islands Coll. S. Chakrabarty and Mopping Survey Parties in 1981-1988.

Diagnosis : Carapace almost hexagonal in shape, very convex, regions not at all indicated. Posterior edge of crab less than half of its greatest width, hence the lateral borders strongly convergent and defined by a fine raised line in more than two thirds of their extent. Front about a sixth of the maximum width of carapace. Orbits oblique, weavy, edges minutely beaded, upper edge mostly double lined. Arm, wrist and palm smooth to unaided eye, and their edges granulate. Dactylus of palm hook like curved and overhangs the tip of fixed finger. Merus of last pair of legs not as broad as that of the two preceeding pairs.

Distribution : West Bengal : Sundarbans, coast of Bay of Bengal.

Remarks : The hexagonal shape, very convex undivided carapace, broad front, beaded, double edged upper orbital edge and simple hook like thumb finger of the palm indicates distinctly the *uca triangularis* specimens are different from other allied species

83. *Uca (Deltuca) rosea* (Tweedie)

1937. *Gelasimus roseus* Tweedie, *Bull. Raffles Mus.* Singapore, **13** : 145

1895. *Gelasmus acutus* de Man, *Zool. Jahrb, Syst.* **8** : 485-609

1937. *Uca manii* Chopra & Das. *Rec. Indian Mus.*, Calcutta, **39** : 422.

1954. *Uca rosea* Tweedie, *Bull. Raffles Mus.* **13** : 145

1975. *Uca (Deltuca) rosea*, Crane, *Fiddler crabs of the world* : 29

1988. *Uca (Deltuca) rosea*, Bairagi & Misra, *J. Bombay Nat. Hist. Soc.*,**85** : 449.

Material examined : 4 males from Sajnakhali, Coll. S. M. Ali, 15.9.83. 3 males 2 females from Basirhat: 13 males 3 females from Jharkhali Sundarban; 4 males 4 females from Gosaba; I males from Narayanpur, Tamluk, Coll. N. Misra.; 2 males from Port Cnning. Coll. bt Mopping Survey parties during 1984-1988.

Diagnosis : Front narrow, median groove deep, distinct; fronto-orbital edge oblique; antero external angle acute, strong, directed outward. Dorsolateral margins finely serrate, convergent. Upper orbital edge tuberculate, lower edge finely crenulate, orbital floor low, smooth. Merus of male chela adorned with clustered tubercles distally, ventral edge tuberculate. Outer surface of palm covered with small tubercules and smaller granules covered the inner surface between the ridges. Outer side of entire dactylus traversed by two grooves. Finger tips forceps like because of large granules on opposable edges.

Distribution : Ranging from Bay of Bengal Coast of West Bengal, Sundarban Mangrove Swamp: Malay, Singapore, Mergui, Siam.

Remarks : The small, pink Uca crabs are quite common in the mud flats and mangroves of Sundarbans they were very much well known but determined wrongly as *acuta* or *manii* or *triangularis* by various scientists. *Uca rosea* differs from true *acuta* inhaving two long grooves on its dactylus of major chela, strongly oblique orbits, and smooth low floor of orbits.

84. *Uca (Thalassuca) vocans hesperiae* Crane.

1705. *Cancer vocans* Rumphius, pl. 10 fig. E.

1758. *Uca (Thalassuca) vocans* Linnaeus, : *Systema Naturae* : 626

1825. *Gelasimus marionis* Desmarest, *Consid. Gen. Crust.*, : 124

1900. *Gelasimus marionis*, Alcock, *J. Asia. Soc. Bengal*, **69** : 359.

1900. *Gelasimus marionis nitidus*, Alcock, ibid **69** : 360

1961. *Uca marionis excisa* Sankarenkutty, *J. Mar. Biol. Ass. India*, **3** : 113

1975. *Uca (Thalassuca) vovans hesperiae* Crane, *Fiddler crabs of World* : 92.

Material examined : 9 exs. from Chemaguri Creek, Sagar Is. Coll. G. C. Rao : 14.4.78. and 19 exs. from Gomdi River, Saznakhali Sagar Is. Coll. A. S. R. Aienger; 2-5-61. S-24 Parganas, W. Bengal.

Diagnosis : Crabs with very narrow front 1/10 or 1/12 of the width of carapace, regions well defined. Lateral sides slightly convergent, dorsolateral line short, slightly raised, not beaded. Major cheliped of male 3 times as long as carapace. Outer surfaces of arm, wrist, and palm smooth to naked eye, with few small granules on inner border of wrist. Fingers thin, broad, blade like lower border of palm crestlike.Of the two tubercular ridges on the inner surface of palm, one ridge oblique, runs to the lower border of fixed finger; the other ridge vertical and becomes continuous with the dentry edge of the same finger. Dactylus longer than fixed finger; hook like curved leaves a wide gap between them when closed. Cutting edge of fixed finger with two, large, triangular lobes, and the curved edge look like shallow 'W'.

Distribution : West Bengal, (Sundarban Mangroove Swamps); Gulf of Mannar; Ernakulam, Chochin; Andaman Nicobars; Singapore; Mergui, Hongkong and Japan.

Remarks : For many years *Uca vocans* was described and known in India as *Gelasimus marionis*, by Milne Edwards 1852; Alcock 1900, Raj. 1927, Chopra 1937, Chhapgar 1957 etc. and its variety as *U. marionis* nitidus Alcock 1900; Raj 1927; Chhapgar 1957. etc. The species is very easy to separate from its nearest allies by having flattened, compressed fingers; the cutting edge of fixed finger is shallow 'W' like in appearance and makes its diagnosis easy and sure.

Genus 49. ***Scopimera*** De Haan

1833. *Scopimera* De Haan, *Fauna Japon - Crust.*, : 24; Alcock 1900 : 369

1917. *Scopimera*, Kemp : 311; Sakai 1976 : 620

85. ***Scopimera globosa*** de Haan

1835. *Ocypode (Scopimera) globosa* de Haan, *Fauna Japon, Crust.*, : 53

1917. *Scopimera globosa* Kemp, *Rec. Ind. Mus.*, **14** : 312

1989. *Scopimera globosa* Mandal & Nandi, *Fauna Sunderban* Mangrove. : 1-116

Material examined : From sundarbans few males and females, Coll. S. Chakrabarty in 1983.

Diagnosis : Cubical carapace one and half time as long as broad, upper surface widest posteriorly at the base of 2nd pair of legs. The lateral walls of cubic carapace slope outwards and downwards. Mid dorsal surface distinctly outined, upper surface covered with strong, shiny granules and fine regular pitting. Front narrow, blunt pointed. Orbits dorsally visible, slanting, lower border dentate and strongly curved. External maxillipeds strongly convex, large. Chelae long stout, edges of arm, wrist, palm rounded and their surfaces covered with granules. Fingers longer than palm. Legs very long, merii broad and bear large undivided tympana on both surfaces. Male abdomen deeply constricted at the junction of 4th & 5th joints.

Distribution : West Bengal : Sundarbans, coast of Bay of Bengal, Simoda, Hong Kong and Japan.

Remarks : The surface of carapace adorned with granules, fine pits and faint grooves, tympana of mari of legs notdivided, large oblique orbits, lower edge of orbit granular, convex and are unlike the other species. Propodal joint of external maxillipeds is greatly expanded while the last joint is a narrow strip attached laterally to the fomer. All these chaacters are distinctly different from other species.

86. *Scopimera proxima* Kemp

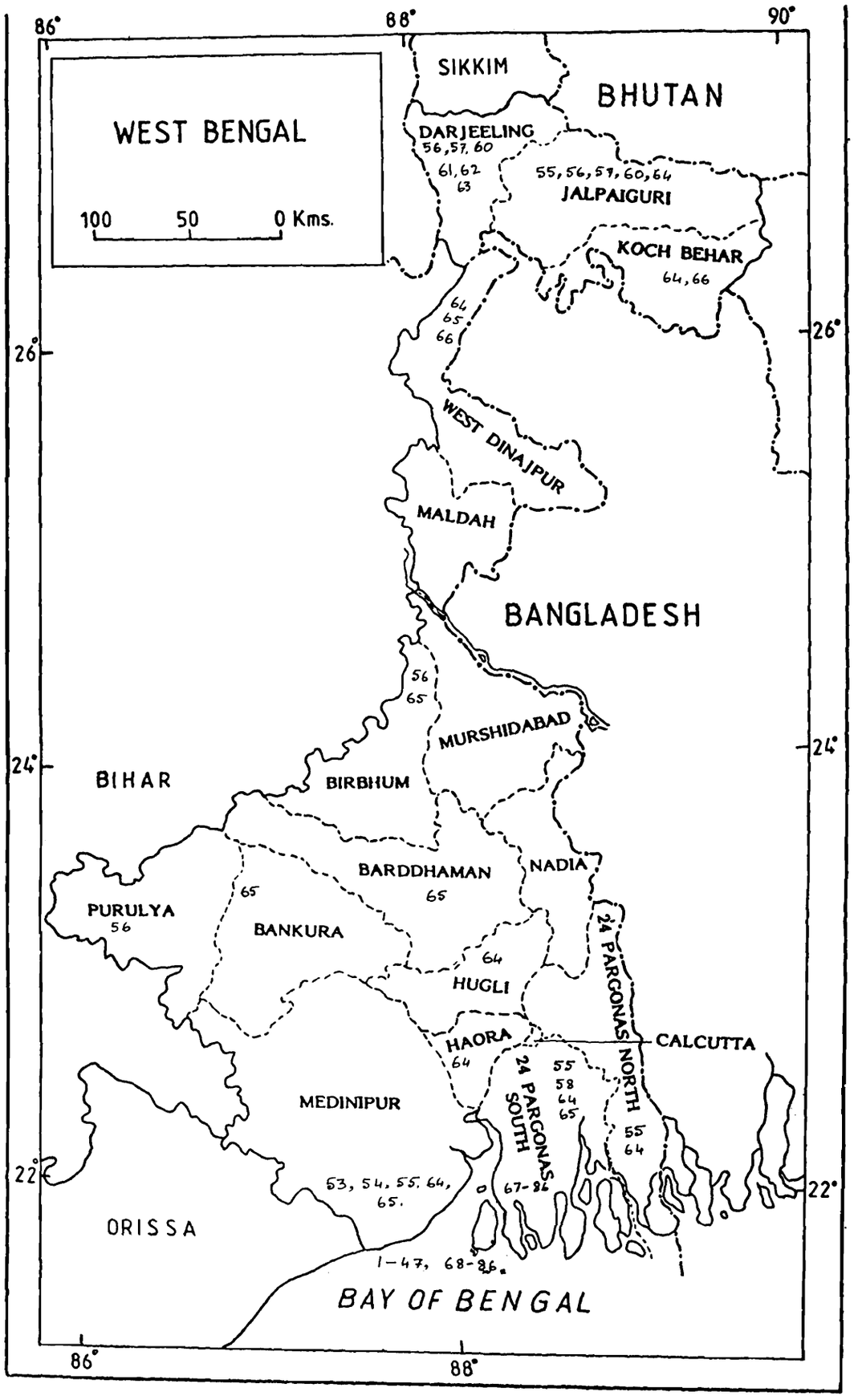
1917. *Scopimera proxima* Kemp, *Rec. Ind. Mus.*, **14** : 316

Material examined : Few specimens collected from Sundarban Bay of Bengal Coast by S. Chakrabarty in 1983 of Science College, Calcutta.

Diagnosis : Convex carapace much broader than long, pentagonal in shape, surface smooth, dark greenish brown in colour in freshly preserved condition. Regions not at all defined, the side walls of carapace and pterygostomian regions finely granular. Front narrow, rounded, orbits long, oblique upper edge and finely denticulate lower edge. Chelipeds long, large tympanum on inner surface of arm and small on outer surface; fingers as long as palm and without any teeth. Merii of all the legs very broad and with large well defined tympanum, all of the tympanum except the one on the last pair divided longitudinally by a fine ridge.

Distribution : West Bengal coast of Bay of Bengal, Tamil nadu Tutiicorin and Mormugao Bay.

Remarks : The specimens were of juvinile stages and their surface of carapace were dark brown, smooth, no granules were detectable on the carapace and it appeared very much like *S. proxima*. I hardly got enough adult specimens, time & opportunity to examine the specimens carefully, thoroughly and subsequently the repeated request of mine, for loaning these specimens had denied by the collector of the specimens.



Serial Nos. 1 - 86 denotes the serial number of species.

SUMMARY

Result of extensive study of the crab fauna of entire West Bengal including lower part has been presented. The recent collections of brackish water crabs made from the remote places of Sundarbans which were not previously visited by earlier survey parties have also been delt. The fauna of the state now comprises 127 species under 64 genera and 16 families. Two species new to science have been described as *Eurycarcinus bengalensis* sp. nov and *Heteropanope neolaevis* sp. nov. Further *Elamina* sp., *Scopimera proxima* Kemp and *Macrophthalmus erato* are recorded for the first time.

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CRUSTACEA : DECAPODA : PORTUNIDAE

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INTRODUCTION

While the portunidae species from India is estimated to be 69, only 15 species belonging to 4 genera have been recorded from West Bengal. Most of the specimens were either estuarine or brackish water.

Several papers on brachyura have been published by Milne Edwards (1861), de Man (1887), Henderson (1888), Alcock (1889-90), Sakai (1939, 1976).

Notable contribution on Indian Brachyura were made by Kemp (1915 1919), Chopra (1935), Chopra & Das (1937), Pillai (1951), Chapghar (1957), Sankarankutty (1961) and Chakraborty, Chowdhury & Deb (1986). These papers deal mostly with the crabs of Chilka Lake, Bay of Bengal, Tavoy and mergui Archipelago, Travancore, Bombay, Adaman & Nicobar Island and Sunderbans. Alcock (1889-90) made collections throughout India.

The present study is based on the named as well as unnamed material of portunid crabs brought by different survey parties from the mopping survey of West Bengal. Materials have mainly been collected from South 24 parganas and Midnapur district. This paper contains key to the genera & species along with details of material examined, diagnostic characters and distribution in India & Elsewhere. The collection dates were not available in many cases and these could not be given.

MORPHOLOGY

Portunid crabs are generally broader than long. The body is divided into two regions - an anterior, the chephalothorax which is covered by a carapace and a posterior, the abdomen which is divided into distinct segments. The rostrum is absent.

Mouth is situated on the ventral side of the anterior end of cephalothorax. One pair of compound eyes are placed at the anterior end of cephalothorax.

Appendages : : It is divisible into two parts.

(1) Cephalic and (2) thoracic

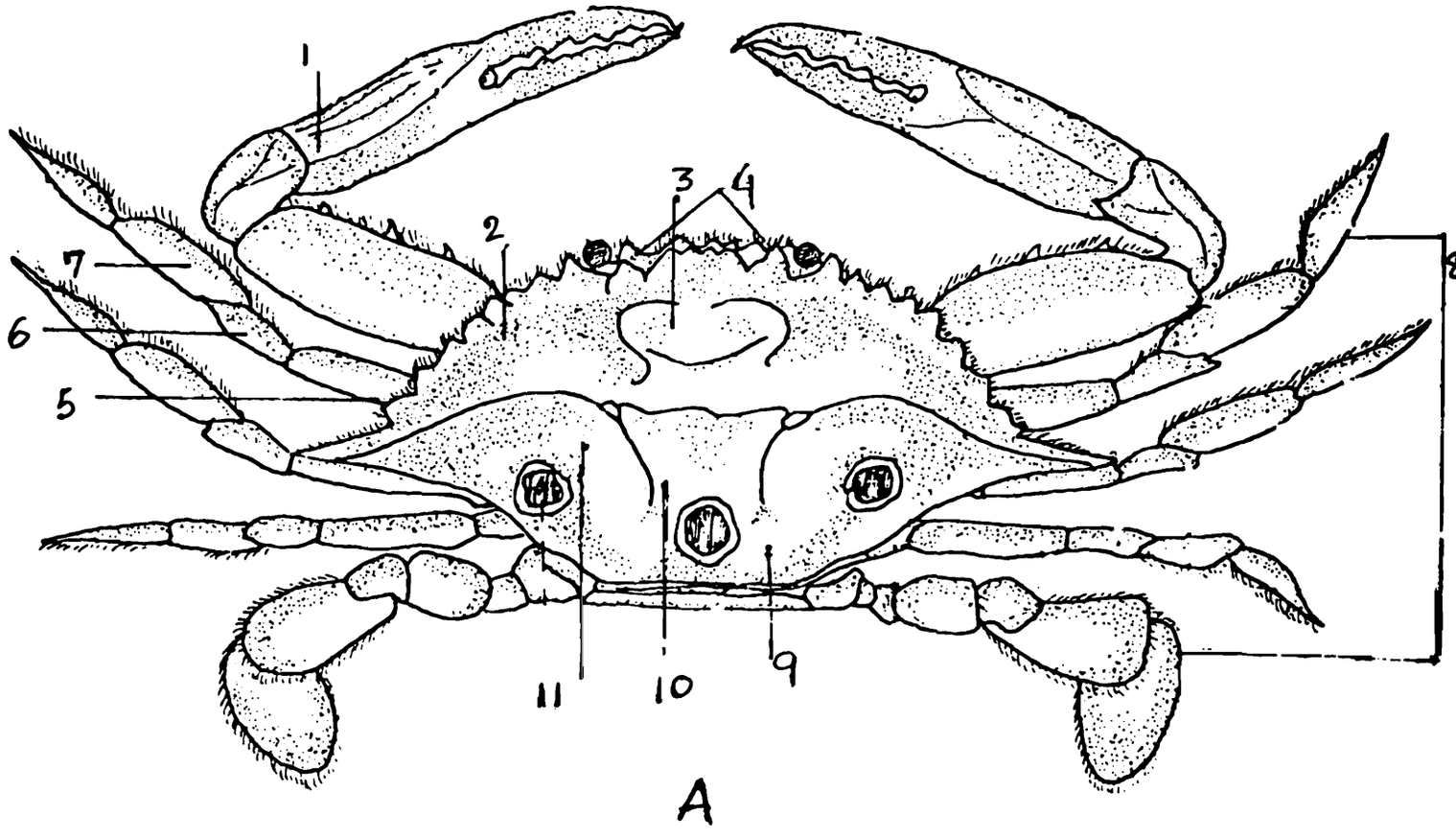
A. The cephalic appendages include

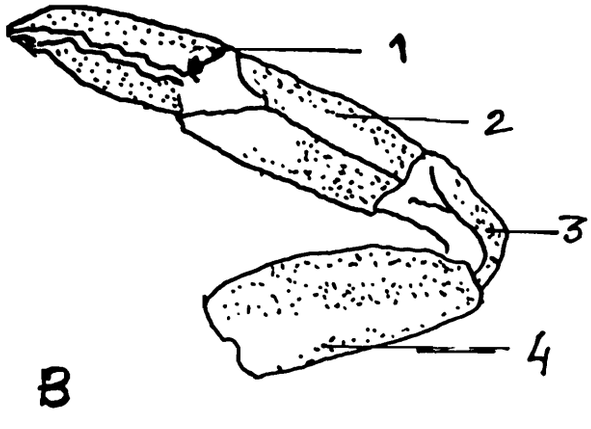
(i) Antennule or Ist antenna : - It remains folded sidewise and its bases are contained in sockets.

(ii) 2nd antenna : - It is usually small. It may be included or excluded from the orbit.

(iii) Mandibles are used for chewing food.

(iv & v) 1st and 2nd maxillae : - The first maxilla is a very small organ. 2nd maaxilla is prominent.





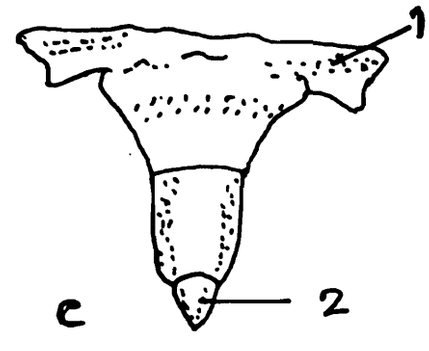


Fig. A. Diagram of dorsal side of a portunid crab. 1; cheleped, 2; hepatic region, 3; mesogastic region, 4; front, 5; merus, 6; carpus, 7; propodus, 8; walking legs, 9; intestinal region, 10; cardiac region, 11; branchiel region.

Fig. B. Diagram of cheleped.
1; dactylus, 2; palm, 3; wrist, 4; arm.

Fig. C. Diagram of abdoman.
1; first segment, 2; last segment.

(B). The thoracic appendages are

(i) Thre pairs of maxillipeds

(ii) Five pairs of walking legs. The first pair of legs are enlarged and form chelipeds. It is used for food capture and defence. The other legs are clawed but not chelated and are used for walking sideway. In the swimming crabs distal segment in the fifth pair is flattened and helps in swimming.

Abdomen :- It is greatly reduced in portunid crabs and fits tightly beneath the cephalothorax. The abdomen is made up of seven segments. These segments have a ring like form known as tergum, a narrow ventral region or sternum. Sternal region is uncalcified and it lies permanently flexed in a groove on the very broad thoracic sterna. Two pairs of copulatory stylets formed by 1st & 2nd pleopods are seen in the male and four pairs of pleopods formed an egg carrying, basket are seen in the female. Anus is present on the terminal end of last abdominal segment.

SYSTEMATIC ACCOUNTS

Class CRUSTACEA
Order DECAPODA
Family PORTUNIDAE

Family PORTUNIDAE

Carapace generally broader than long. Frontal teeth 2 to 6 in number. Last pair of legs modified for swimming. Antero lateral teeth vary from five to nine in number.

The following portunid crabs have been recorded from West Bengal.

Scylla serrata (Forskal)

Portunus sanguinolentus (Herbst)

Portunus pelagicus (Linnaeus)

Portunus pubescens (Dana)

Portunus hastatoides (Fabricius)

Portunus gladiator Fabricius

Charybdis (Charybdis) cruciata (Herbst)

Charybdis merguiensis (de Man)

Charybdis (Charybdis) miles (De Haan)

Charybdis (Charybdis) Variegata (Fabricius)

Charybdis (Charybdis) callianassa (Herbst)

Charybdis (Goniohellenus) Vadorum Alcock

Charybdis (Goniosoma) rostrata (A. Milne Edwards)

Charybdis (Goniosoma) affinis Dana

Lissocarcinus arkati Kemp.

Key to the genera of the family PORTUNIDAE

1. Antennal Flagellum small and stands in the orbital hiatus. Nine large teeth present on the antero lateral border of carapace ..... 2.

   Antennal Flagellum excluded from the orbital hiatus ..... 3.

2. Hand inflated. Surface of carapace smooth and the regions ill defined ..... ***Scylla*** De Haan.

   Hand costate and prismatic. Surface of carapace divided into regions ..... ***Portunus*** Weber

3. Antero lateral borders with six teeth including the outer orbital angles. Front cut into six lobes, exclusive of the supra orbital angles ..... ***Charybdis*** De Haan

   Antero lateral borders cut into five teeth including the outer orbital angles. Front with two broad lobes besides the inner supra orbital angles ..... ***Lissocarcinus*** Adam & White

Genus 1. *Scylla* De Haan

1833. De Haan, *Faun. Japon. Crust.* : 44

Surface of carapace almost unbroken, smooth Hand inflated and smooth.

The Genus Scylla is represented by only one species.

1. *Scylla serrata* (Forskal)

1755. *Cancer serratus* Forskal, *Descr, Anim.* : 90

1986. *Scylla serrata* Chakraborty, Chowdhury & Deb, *J. Ben. Nat. Hist. Soc.* **5** : 64

Material : 46 exs., from Baghmara, 17.9.83, S. R. Dey Sarkar; Bakkhali, 7.3.85, B. P. halder; Basanti, 16.3.85, T. Roy; Bhangaduni Island, 18.9.83, K. Misra; Canning, 18.5.85, B. P. Halder; Chani block, 15.9.83; S. Bhanga; Chota Mollakhali, 12.9.84, B. P. Halder; Diamond Harbour, 19.3.85, T. Roy; Gosaba, 8.9.84, B. P. Halder; Jhingakhali, 13.9.83, S. Biswas; Matlah river, 11.3.85, T. Roy; Peerkhali river, 15.3.85, T. Roy; Sagar Island, 14.3.68, A. Daniel; Sajnakhali, 2.5.1961, A. S. R. Aiengar (South 24 Parganas district); Junput, 8.3.66, K. V. Rama Rao. (Midnapur district).

Diagnosis : Hand and surface of carapace smooth. Hand inflated. Antero lateral borders cut into nine teeth of about equal size. Dark greenish grey in colour.

Distribution : India : West Bengal : South 24 Parganas, Midnapur; Orissa; Andhra Pradesh; Tamil Nadu; Karnataka; Mahrastra and Gujarat. *Elsewhere* - Pakistan; Mergui; Burma; Formosa; Sagami Bay, Japan; Africa; Australia; Tahiti; Auckland.

Remarks : Scylla serrata is the common edible crab of India. It is known in bengal as "Nona Kankra" or the salt water crab. It is generally a brackish water species, but adapt to fresh water also.

Genus 2. *Portunus* Weber,

1795. Weber, *Nomen. entom.* : 93

Key to the species of the genus ***Portunus***

1. Posterio lateral angle of carapace angular. -

   Two distinct spines present on posterior border of arm. Posterior border of propodus of last legs finely serrulate ..... *Hastatoides* Fabricius.

   Posterio lateral angle of carapace rounded ..... 2.

2. Antero - External angle of merus of external maxillipeds strongly produced in lateral direction -

No spot on dactylus of last pair of legs..... *gladiator* Fabricius.

Antero External angle of merus of extrnal maxillipeds rounded, not laterally produced .....3.

3. A spine at the distal end of the posterior border of arm .....*pelagicus* (Linnaeus)

No spine on the posterior border of the arm -

(a) Carapace marked with three large blood red spots..... *sanguinolentus* (Herbst)

(b) No such large spots on the carapace.

Body covered with short hairs and granules. .....*pubescens* (Dana)

2. ***Portunus sanguinolentus*** (Herbst)

1783. *Cancer sanguinolenthus* Herbst, *Krabben,* I(ii) : 161.

1961. *Portunus sanguinolentus* Sankarankutty, *J. Mar. Biol. Ass. India* **3** : 103.

Material : 7 exs. from Sandheads, 20.2.1924, P. V. Lady Fraser, (South 24 Parganas); Digha 6.8.1976, K. N. Reddy, 30.3.1977, S. K. Talukdar, K. K. Tiwari (Midnapur)

Diagnosis : The antero lateral borders are cut into nine teeth, of which the last is the largest. Three blood red spots are present in the carapace. No spine on the posterior border of the arm of the chelipeds.

Distribution : India : West Bengal; South 24 Parganas, Midnapur; Orissa; Andhra Pradesh; Tamil Nadu; Kerala; Karnataka; and Nicobars. *Elsewhere* : Pakistan; Sri Lanka; Tokyo; Hongkong; Phillippine; Hawaii; East coast of Africa.

3. ***Portunus pelagicus*** (Linnaeus)

1758. *Cancer pelagicus* Linnaeus, *Syst. Nat.* Xth ed, 1 : 626

1961. *Portunus pelagicus* Sankarankutty, *J. Mar. Biol. Ass. India,* **3** : 103.

Material : 3 exs. from Sandheads, 26.8.1922 & 20.2.1923, P. V. Lady Fraser, (South 24 Parganas); Digha, 6.8.1976, K. N. Reddy (Midnapur).

Diagnosis : Whitish or pale bluish irregular spots present on thecarapace. The granulation on the dorsal surface is very prominent. A spine present at the far end of the posterior border of the arm of chelipeds.

Distribution : India : West Bengal : South 24 parganas, Midnapur; Orissa; Tamil Nadu; Kerala; Karnataka; Andaman. *Elsewhere* : Hongkong; Phillippines; Japan; Nagasaki; Formosa; East Coast of Africa; Australia etc.

4. ***Portunus pubescens*** (Dana)

1852. *Lupa pubescens* Dana *U. S. explo. exped.* : 1838-1842 : 274

1961. *Portunus pubescens* stephenson, *Aust. J. Mar. Freshw. Res.* **12**(1) : 111

Material : 1 ex. from Sagar Island, 6.6.1977, S. Palma, (South 24 Parganas).

Diagnosis : Body covered with short hairs and granules. The front composed of four teeth, the middle two being most prominent. Length of carapace distinctly more than half the greatest width.

Distribution : India : West Bengal : South 24 Parganas; Tamil Nadu; Elsewhere : Japan; Hawaii & Australia.

5. ***Portunus hastatoides*** Fabricius

1798. *Portunus hastatoides* Fabricius, *Ent. Syst. Suppl.* : 368

1959. *Portunus hastatoides* Stephenson & Campbell, *Aust. J. Mar. Freshw, Res.* **10**, no. 1, : 101

Material : 2 exs. from Sandheads, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : Two distinct spines present on posterior border of arm. Posterio lateral border of carapace angular. Posterior border of propodus of last legs finely serrulate.

Distribution : India : West Bengal : South 24 Parganas; Tamil Nadu; Laccadive & Andaman. *Elsewhere* : Sri Lanka; Persian Gulf; Singapore; and Hongkong.

6. ***Portunus gladiator*** Fabricius

1798. *Portunus gladiator* Fabricius, *Ent. Syst. Suppl.* : 368

1959. *Portunus gladiator* Stephenson & Campbell, *Aust. J. Mar. Freshw. Res.* **10**. no. 1, : 84-124.

Material : 3 exs. from Matlah river, Jan. - Feb. 1911, J. H. Row, (South 24 Parganas)

Diagnosis : Two spines present on the posterior border of the arm and one spine on the hand. Dactylus of last pair of legs have no spot. Antero external angle of merus of external maxillipeds very strongly produced in a lateral direction.

Distribution : India : West Bengal : South 24 Parganas; Pondicherry and Tamil Nadu.

Elsewhere : Sri Lanka; Mergui; Nagasaki; Sumatra and Queensland.

3. Genus ***Charybdis*** De Haan

1833. De Haan, *Japan. Crust.* : 9

Key to the species of the genus ***Charybdis***

1. No distinct transverse ridges on the carapace behind the level of the last antero-lateral spines . 2

   Transverse ridges present on the carapace behind the last antero-lateral spines 4

2. Four or more large spines on the anterior border of the arm of cheliped -

   First tooth of antero lateral border anteriorly truncated and notched..... *miles* (De Haan).

   Not more than three large spines on the anterior border of the arm of cheliped ..... 3.

3. First spine of antero lateral border of carapace anteriorly truncated and notched.....

   ..... *cruciata* (Herbst)

   First spine of antero lateral border acute -

a) An acute spine on the posterior border of carpus of last pair of legs. ..... *merguiensis* (de Man)

b) One transverse ridge present on the cardiac region but none on the posterior half of the branchial region. Carapace flat 5 spines present on upper surface of hand.....

   ..... *affinis* Dana

4. Spine present on posterior border of arm of cheliped. Posterio-lateral border of carapace angular.

   Last antero lateral spine much longer than the other spines. The sixth abdominal segment of male is much broader than long. ..... *vadorum* Alcock

   No spine present on posterior border of arm. Posterio-lateral border of carapace rounded 5

5. One or two transverse ridges present on the posterior half of either branchial regions -

   Carapace very broad. Last antero lateral spine twice as long as any of the others .... *variegata* (Fabricius)

   No transverse ridge present on the posterior half of either branchial region 6

6. Carapace convex. 2 spines on anterior border of arm of cheliped

a) Carapace about two thirds as long as broad. 3 spines on the hand..... *callianassa* (Herbst)

b) Carapace about four fifths as long as broad. 2 spines on the hand. The two mid frontal teeth prominent..... *rostrata* (A. Milne Edwards)

7. ***Charybdis (Charybdis) cruciata*** (Herbst)

1794. *Cancer cruciatus* Herbst, *Krabben* **5** : 155

1986. *Charybdis (Charybdis) cruciata* Chakraborty, Chowdhury and Deb, *J. Bengal. Nat. Hist. Soc.*, **5** : 64

Material : 4 exs. from Bakkhali, 7.3.1985, B. P. Halder; Jharkhali, 25.6.1986, B. P. Halder; Mouth of river Hooghly, 1922-23, P. V. Lady Faser, (South 24 Parganas).

Diagnosis : First spine of the antero lateral sides of carapace bifid. Dorsal surface of crab with six longitudinal bands of dark brown colour extending over three quarters of its length. Sixth abdominal tergum of male with curved and distally gradually convergent sides.

Distribution : India : West Bengal : South 24 Parganas; Orissa; Tamil Nadu; Maharastra. *Elsewhere* : Australia; Hongkong; Formosa; Nagasaki; Singapore & Pakistan.

8. ***Charybdis merguiensis*** (de Man)

1887-88. *Goniosoma merguiense* de Man, *J. Linn. Soc. Zool.*, **22** : 82

1950. *Charybdis merguiensis* Barnard, *Ann. S. Afric. Mus.* **38** : 168.

Material : 6 exs. from Sandheads, 1922-23, P. V. Lady Fraser; Gosaba, 5.3.1981, H. C. Ghosh, 20.6.1986, B. P. Halder, (South 24 Parganas).

Diagnosis : There is an acute spine on the posterior border of the carpus of the last pair of legs. The teeth on the frontal lobe of crab acute. The 6th abdominal tergum of male as long as broad.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh; Tamil Nadu; Maharastra and Andaman. *Elsewhere* : Hongkong; Tavoy; Singapore; Mergui; Pakistan and Persian Gulf.

9. *Charybdis (Charybdis) miles* (De Haan)

1835. *Portunus (Charybdis) miles* De Haan, *Faun. Japon. Crust.* : 41.

1976. *Charybdis (charybdis) miles* Sakai, *crabs of Japan & adjacent Seas* : 358

Material : 1 ex. from Sandheads, 22.3.1923, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : Entire animal covered with soft hairs. First tooth of the antero lateral sides of carapace notched. This species is easily recognized by the sharpness of the anterolateral teeth and frontal lobes and by the slender chelipeds.

Distribution : India : West Bengal : South 24 Parganas. *Elsewhere* : Tokyo Bay; Sagami Bay; Nagasaki; Hongkong and Gulf of Martaban.

10. *Charybdis (Charybdis) variegata* (Fabricius)

1798. *Portunus variegatus* Fabricius, *Ent. Syst. Suppl.* : 364.

1976. *Charybdis (Charybdis) variegata* Sakai, *Crabs of Japan & adjacent Seas* : 359.

Material : 1 ex. from Sandheads, 1922-23, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : Carapace very broad. Last spine of the antero-lateral border twice as long as any of the others. Front cut into 6 pointed teeth of which the middle two are the most prominent.

Distribution : India : West Bengal : South 24 Parganas; Tamil Nadu. *Elsewhere* : Malay Archipelago; Persian Gulf; Red Sea; Nagasaki and Hongkong.

11. *Charybdis (Charybdis) callianassa*((Herbst)

1790. *Cancer Callianassa* Herbst, *Krabben* **3** : 45

1961. *Charybdis (Charybdis) Callianassa* Stephenson, *Aust. J. Mar. Freshw. Res.* **12**(1) : 116.

Material : 1 ex. from Sandheads, 1922-23, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : Carapace about two thirds as long as broad. The teeth of the antero lateral borders are serrulate. Sides of 6th abdominal tergum of male parallel for half their extent.

Distribution : India : West Bengal : South 24 Parganas; Maharastra. *Elsewhere* : Pakistan and Sumatra.

12. *Charybdis (Goniohellenus) vadorum* Alcock

1899. *Charybdis (Goniohellenus) hoplites* Var *Vadorum* Alcock. *J. Asiat. Soc. Bengal* **68** : 67

1935. *Charybdis (Goniohellenus) Vadorum* Chopra, *Rec. Ind. Mus.* **37** : 493.

Material : 1 ex. from Sandheads, 1922-23, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : The carapace flat, depressed and covered with a short fine hairs. Regions well defined and areolated. The length of the carapace half or slightly more than half of its greatest breedth.

Distribution : India : West Bengal : South 24 Parganas; Orissa and Andhra Pradesh. *Elsewhere* : Persian Gulf, Arakan Coast and Gulf of Oman.

13. *Charybdis (Goniosoma) rostrata* (A. Milne Edwards)

1861. *Goniosoma rostratum* A. Milne. Edwards, *Archiv. du. Mus.* **10** : 379

1935. *Charybdis (Goniosoma) rostrata* Chopra, *Rec. Ind. Mus.* **37** : 491.

Material : 180 exs., from Piali river, 18.5.34, S. L. Hora; Frasergung 13.11.1909 Nil; Junput, 8.3.1966, K. V. Rama Rao; Matlah river, 11.3.85, T. Roy; Bakkhali, 7.3.85, B. P. Halder; Ganga Sagar, 25.10.1979, K. N. Reddy; Sandheads, 1923, P. V. Lady Fraser; Gosaba, 5.3.81, H. C. Ghosh. (South 24 Parganas)

Diagnosis : The two mid frontal teeth remarkably prominent. First anterolateral tooth of carapace very acute and the last more spine like than the others. The 6th tergum of the male abdomen broader than long and with curved and gradually convergent sides.

Distribution : India : West Bengal : South 24 Parganas; Orissa; Tamil Nadu and Andaman. *Elsewhere* : Sri Lanka; Mergui and Gulf of Martaban.

14. *Charybdis (Goniosoma) affinis* Dana

1852. *Charybdis affinis* Dana, *Proc. Ac. Nat. Sci. Philad.* : 85

1937. *Charybdis (Goniosoma) affinis* Shen, *Bull. Raffl Mus.* no. **13** : 119

Material : 16 exs. from Bakkhali, 7.3.1985, B. P. Halder (South 24 Parganas); Digha, 2.3.1979, K. K. Tiwari; Junput, 8.3.1966, K. V. Rama Rao (Midnapur).

Diagnosis : Surface of carapace and cheliped is pubescent. A transverse ridge on the cardiac region but none on the posterior half of the branchial region, 3 spines on the anterior border of arm, 5 on upper surface of hand. Sides of 6th abdominal tergum of male curved and gradually convergent.

Distribution : India : West Bengal : South 24 Parganas; Midnapur; Orissa and Karnataka. Elsewhere : Mergui and Akyab.

Genus *Lissocarcinus* Adams & White,

1848. Adams & White, *Samarang Crust.* : 45.

15. *Lissocarcinus arkati* Kemp.

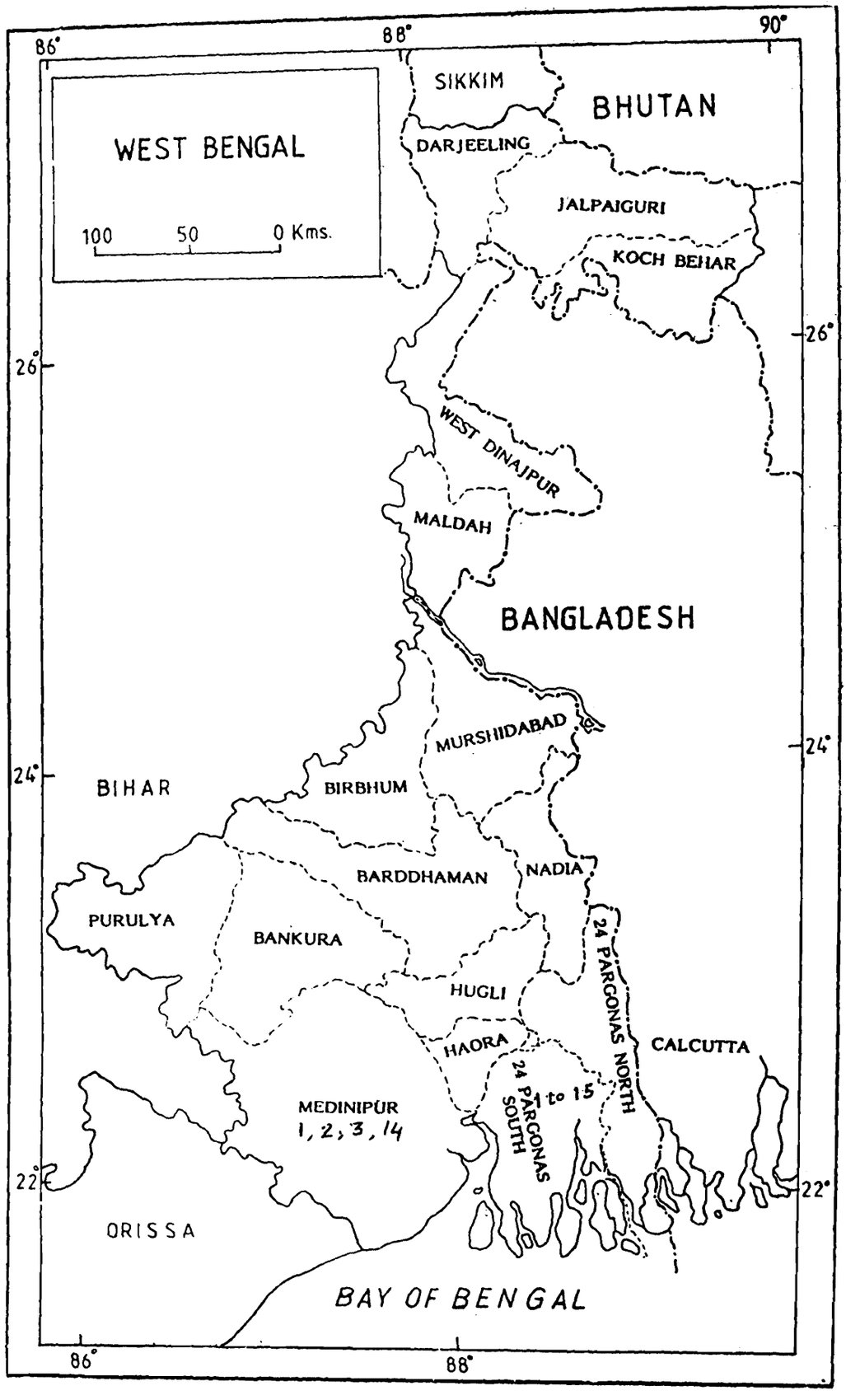
1923. *Lissocarcinus arkati* Kemp, *Rec. Ind. Mus.* **25** : 405-408

1976. *Lissocarcinus arkati* Sakai, *Crabs of Japan* and *adjacent seas* : 329

Material : 2 exs. from Sandheads, 1922-23, P. V. Lady Fraser (South 24 Parganas).

Diagnosis : Dorsal surface of the carapace is covered with transverse ridges but the posterior part smooth. Chelipeds covered with ridges and granules. Front cut into two broad lobes besides the inner supra orbital angles.

Distribution : India : West Bengal : South 24 Parganas. *Elsewhere* : Japan; Tosa Bay; Hongkong; and Madagascar.



Serial Nos. represent the serial number of species

SUMMARY

Portunid crabs have been collected from different districts of West Bengal. These belong to subfamilies Portuninae and Caphyrinae. Subfamily Portuninae is represented by fourteen species belonging to the genera *Scylla, Portunus* and *Charybdis.* Caphyrinae is represented by a single genus *Lissocarcinus.*

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CRUSTACEA : STOMATOPODA

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INTRODUCTION

Members of the order Stomatopoda are mainly littoral and sublittoral animals of marine and brackish water environment. However, a few species extend into deeper waters to about 760 meter. They live in sand and mud burrows or in rock and coral crevices. The West Bengal coast extends from Digha (Medinipur District) in the West to Haribhanga River across the Sundarban on the eastern border, a major part of which comes under South 24 Parganas District.

Wood Mason (1995) was the first to report a single species of stomatopod off the coast of West Bengal. Subsequently Kemp (1913) added seven species, Chopra (1934) six species and Tiwari and Biswas (1952) and Tiwari and Ghosh (1973) two more species, totalling to sixteen.

The present study is based on named and unnamed material housed in the Zoological Survey of India as well as additional material collected by the author during recent years. Most of the earlier records of stomatopods from the study area were collected from Sandheads off the Hooghy River Mouth. The present report includes material from the brackish and estuarine regions of Medinipur and South 24 Parganas Districts. This study added six more species including one new to science, totalling to 22 species in 10 genera. Following the recent classifiation of Manning (1980) all the 22 species are keyed and briefly described together with remarks on their variations and distribution.

Shallow water stomatopods are usually collected from cast or drag mets operated by fishermen or hand-picked from the intertidal zone during lowtide. In the field stomatopods are temporarily preserved in 10% formaline to keep the body soft for easy handling during identification. Rectified spirit (90% alcohal) is used for permanent preservation.

Measurements and terms used in the text are explained below and represented in the text figures 1-3.

TL is the total length from anterior margin of the rostrum to the tip of the submedian teeth of telson; CL is the carapace length from its anterior margin to the posterior margin. The count of teeth on the dactylus of raptorial claw included the terminal one. The abdominal spine formula indicates the carinae with posterior spine and the abdominal sagment with such spines. A telson denticle formula indicates respectively the number of submedian, intermediate and lateral denticles on each side of the midline of telson.

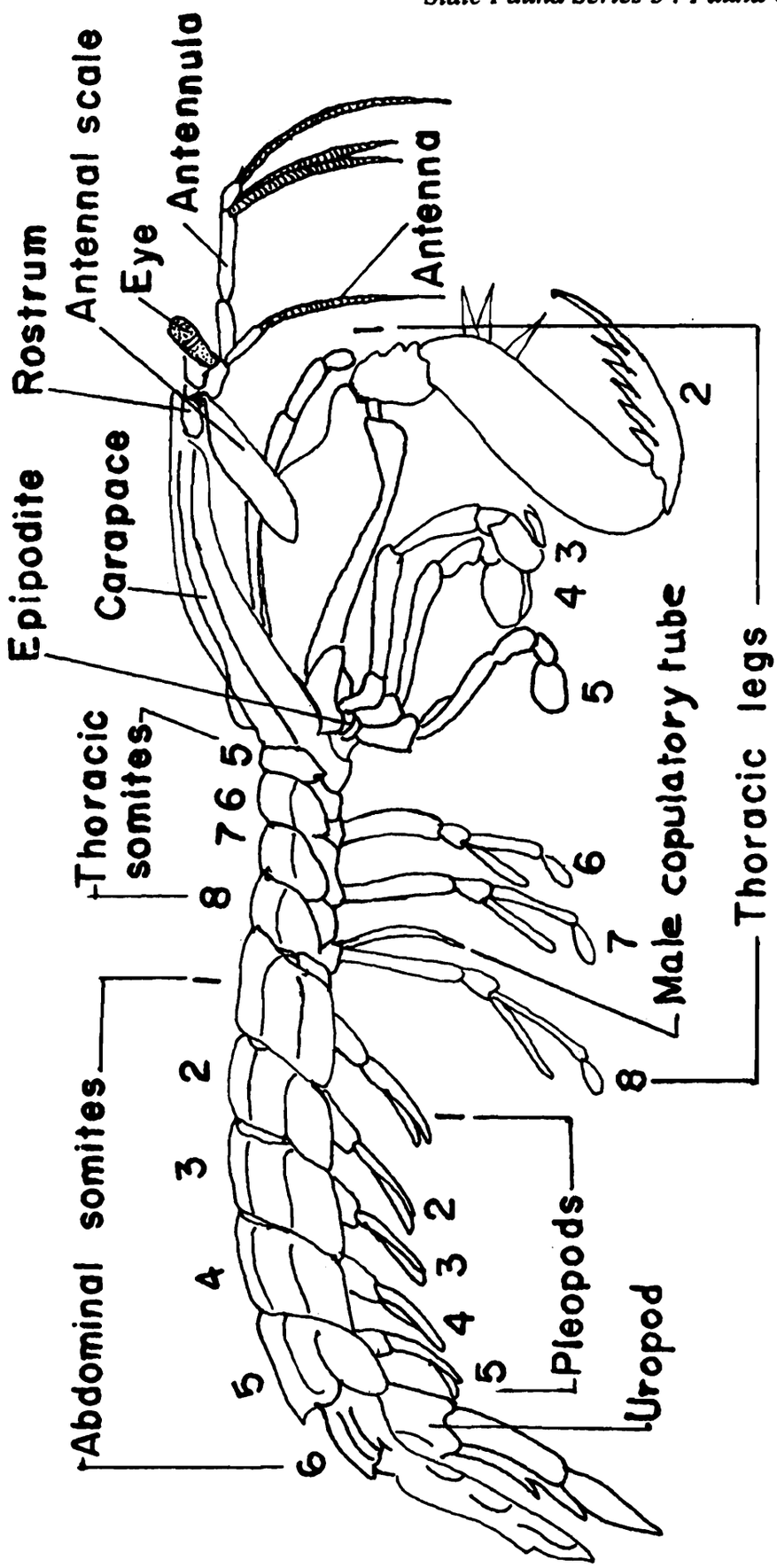

Fig. 1. Diagrametic sketch of a Squllid showing general morphology.

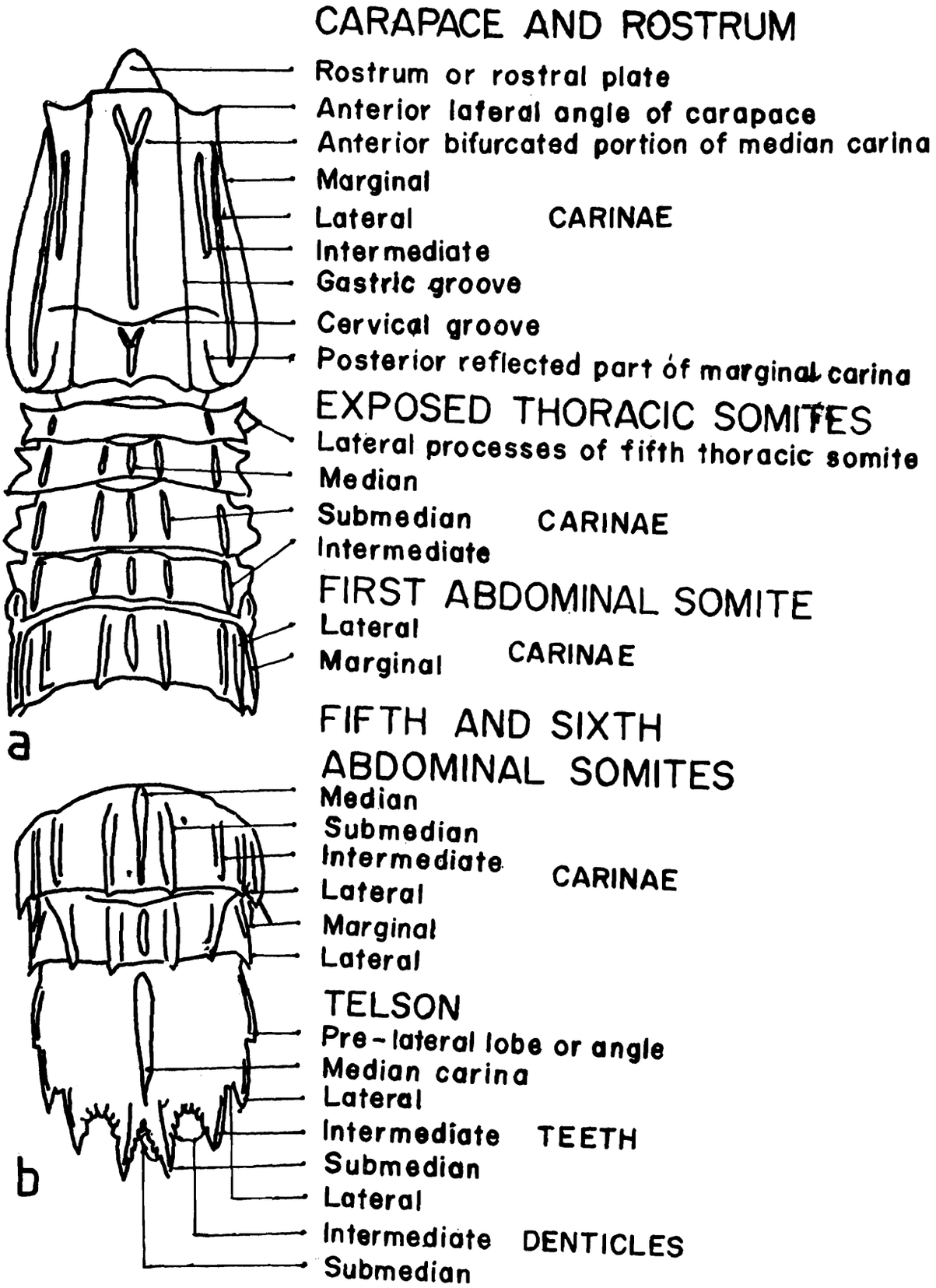

Fig. 2. Diagramatic sketch of a Squillid illustrating carinal terminology. (a) anterior portion of body, showing Rostrum, Carapace, exposed thoracic and first abdominal somites. (b) Last two abdominal somites and telson.

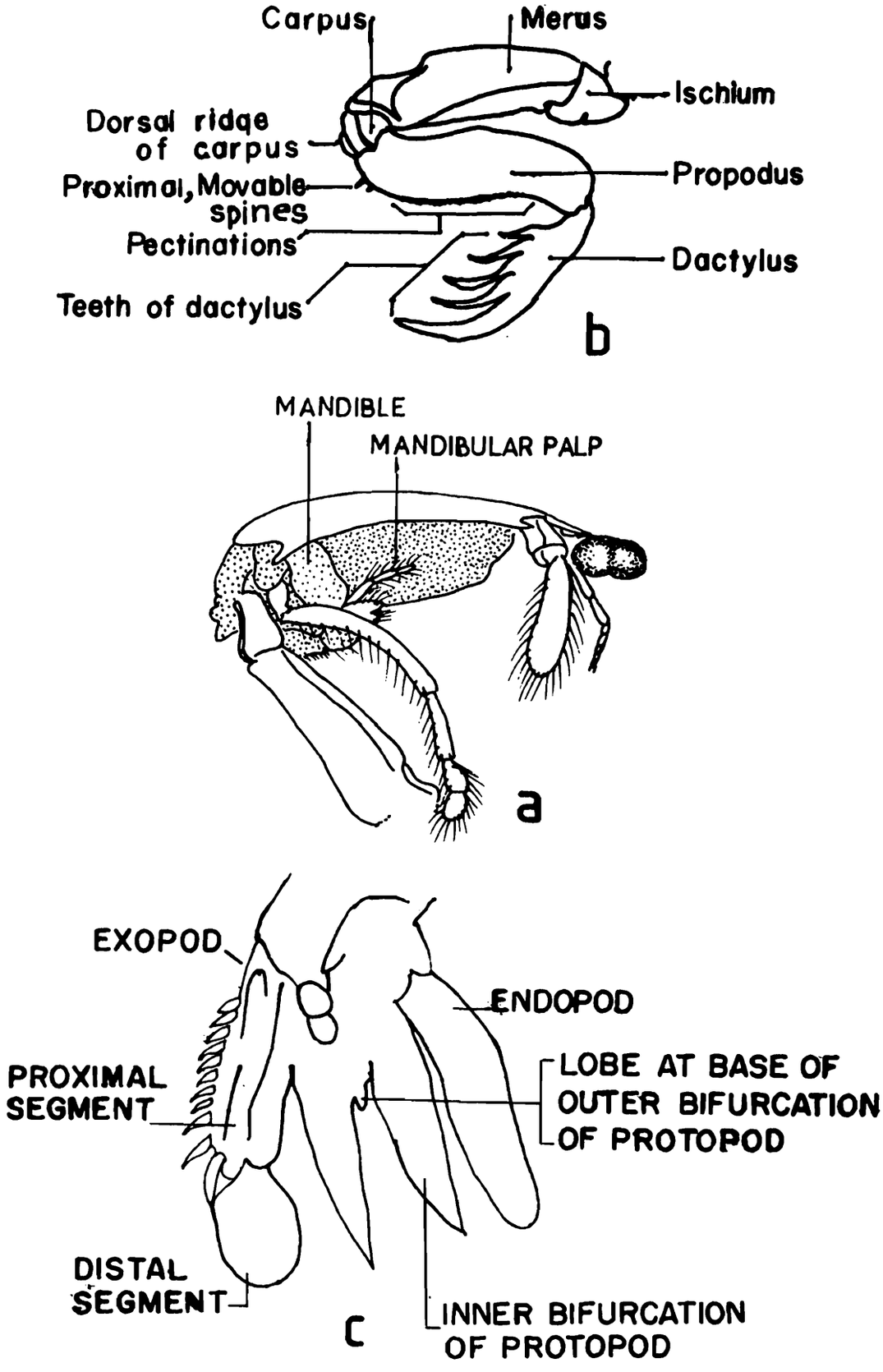

Fig. 3. Diagramatic sketch of important body parts of a Squillid depicting terms used in the next. (a) anterior part of body showing mandible and mandibular palp. (b) Raptorial claw. (c) Uropod.

LIST OF STOMATOPODA OF WEST BENGAL

Superfamily SQUILLOIDEA Latraille, 1803

Family HARPIOSQUILLIDAE Manning, 1980

1.	*Harpiosquilla annandalei* (Kemp, 1911)	Chopra (1934)
2.	*Harpiosuilla harpax* (de Haan, 1844)	Tiwari and Biswas (1952)
3.	*Harpiosquilla raphidea* (Fabricius, 1798)	Kamp (1913), Chopra (1934)

Family SQUILLIDAE Latreille, 1803

4.	*Alimopsis supplex* (Wood-Mason, 1875)	New record
5.	*Carinosquilla multicarinata* (White, 1848)	New record
6.	*Clorida decorata* Wood-Mason, 1875	Chopra (1934)
7.	*Clorida latreillei* Eydoux and Soulevat, 1841	Kemp (1913), Chopra (1934), Wood-Mason (1895)
8.	*Dictyosquilla foveolata* (Wood-Mason, 1895)	New record
9.	*Cloridopsis bengalensis* (Tiwari and Biswas, 1952)	Tiwari and Biswas (1952) Tiwari and Ghosh (1975)
10.	*Cloridopsis immaculata* (Kemp, 1913)	Kemp (1913)
11.	*Cloridopsis scorpio* (Latreille, 1825)	New record
12.	*Oratosquilla inornata* (Tate, 1883)	Chopra (1934)
13.	*Oratosquilla perpensa* (Kemp, 1911)	Kemp (1913)
14.	*Oratosquilla woodmasoni* (Kemp, 1911)	Kemp (1913), Chopra (1934)
15.	*Oratosquilla interrupta* (Kemp, 1911)	Kemp (1913), Chopra (1934)
16.	*Oratosquilla nepa* (Latreille, 1825)	Kemp (1913), Chopra (1934)
17.	*Oratosquilla holoschista* (Kemp, 1911)	Kemp (1913), Chopra (1934)
18.	*Squilloides qillesi* (Kemp, 1911)	Chopra (1934)

Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910

Family LYSIOSQUILLIDAE Giesbrecht, 1910

19.	*Lysiosquilla tredecimdentata* Holthuis, 1944	Chopra (1934)

Family NANNOSQUILLIDAE Manning, 1980

20.	*Acanthosquilla acanthocarpus* (Miers, 1880)	Chopra (1934)
21.	*Acanthosquilla dighaensis,*	New species
22.	*Acanthosquilla multifasciata* (Wood-Mason, 1895)	New record

SYSYEMATIC ACCOUNT

Key to Superfamilies

1. Propodi of posterior three maxillipeds broad, beaded or ribbed ventrally. Telson without distinct median carina. ..... Lysiosquilloidea

   Propodi of posterior three maxillipeds slender, not beaded or ribbed ventrally. Telson with distinct median carina ..... Squilloidea

Superfamily SQUILLOIDEA Latreille, 1803

The superfamily *Squillidea* includes two families Harpiosquillidae and Squillidae both of which are represented in the present study by a total of eight genera and 18 species.

Key to families

1. Posterolateral margin of Carapace with deep excavation; propodus of raptorial claw with erect spine on opposable margin ..... Harpiosquillidae

   Posterolateral margin of carapace without deep excavation; propodus of raptorial claw pectinate on opposable margin ..... Squillidae

Family HARPIOSQUILLIDAE Manning, 1980

The family includes only the type genus, *Harpiosquilla* which is represented in the present study by three species.

1. Genus ***Harpiosquilla*** Holthuis, 1964

The genus includes the largest known stomatopods, measuring up to 335mm and their distribution is restricted to the Into-West Pacific region. Of the six species of *Harpiosquilla* Known from the Indian Waters, three are so far reported from the state of West Bengal.

Key to species of ***Harpiosquilla***

1. Rostrum with apical projection; antennular peduncle shorter than carapace 2

   Rostrum without apical projection; antennular peduncle longer than carapace ..... *H. annandalei*

2. 5th theracic smite with lateral spines ..... *H. raphidea*

   5th thoracic smite without lateral spines ..... *H. harpax*

1. ***Harpiosquilla annandalei*** (Kemp)

1911. *Squilla annandalei* Kemp, *Rec.Indian Mus.* 6 : 99.

1913. *Squilla annandalei* : Kemp, *Mem. Indian Mus.*, 4 : 92.

1934. *Squilla annandalei* : Chopra, *Rec. Indian Mus;* 36 : 27 fig.2

1969. *Harpiosquilla annandalei* : Manning *Smithson. Contr. Zool.*, No.36 : 6 figs.1-3.

Material examined : 1 *fem.* (TL 96mm); Sandheads, mouth of river Hooghly; Lady Fraser, 22.3.1923; Reg. No. C1656/1 (Reported by Chopra, 1934).

Description : Rostrum as long as broad, apex rounded. Outer margin of dactylus of raptorial claw lacking angular projection in adult males. 5th thoracic somite with lateral spine. Ventral keel on eighth thoracic somite sharp. Abdominal carinae spine as follows: submendian 5-6; intermediate 1-6, lateral 1-6, marginal 1-5. Telson denticles: 5-7, 10-11, 1. Colour: second abdominal somite with a median dark transverse band. Telson with a proximal pair of dark circles.

Distribution : India : West Bengal-24-Parganas(S). Elsewhere : Indo-West Pacific from Persian Gulf to Japan.

Remarks : Rostrum with a rounded apex, absence of angular projection on the outer margin of dactylus of raptorial claw in adult males, a sharp ventral Keel on the 8th thoracic somite and a pair of proximal dark circules on telson distinguish *H. annandalei* appears to be a less abundant species than *H. harpax* and *H. raphidea.*

2. ***Harpiosquilla harpax*** (de Haan)

1844. *Squilla harpax* de Haan, *Faun. Japan Crust,* : 222, Pl. 51, Fig.1.

1952. *Squilla harpax* : Tiwari and Biswas, *Rec. Indian Mus.,* 49 (3-4) : 358, figs. 3b.d.f.

1969. *Harpiosquilla harpax* : Manning, *Smithson Contr. Zool.* No.36 : 25, figs. 28-38.

Material examined : 1 *fem.* (TL 161 mm); Sandheads; 18.27 meter; Lt. Chas H. Potten; Nov-Dec. 1940; Reg. No. C3028/1. 1 *fem.* (TL 112 mm); Sandheads. (Reported by Chopra, 1934).

Description : Rostrum longer than broad, *apical* projection slender. Outer margin of dactylus of raptorial claw with angular projection in adult males. 5th thoracic somite laterally rounded. Ventral Keel on 8th thoraric somite rounded. Abdominal carinae spined as follows: submedian 6, intermediate (1) 2-6, lateral 1-6, marginal 1-5. Telson denticles: 4-6, 10-12 (14), 1.

Distribution : India : West Bengal-24-Parganas (S); Andaman Island; Tamilnadu; Maharashtra and Goa. ELSEWHERE : Indo-West Pacific from South Africa to Japan.

Remarks : *H. harpax* can be easily distinguished from *H. raphidea* in the absence of a lateral spine on the 5th theracic somite and from *H. annandalie* in having a medially projected rostrum. Manning (1969 : 27) in his revision of the genus dealt with colour markings.

3. ***Harpiosquilla raphidea*** (Frbricius)

1798. *Squilla raphidea* Fabricius, *Ent. Syst. Supp.* 416.

1969. *Harpiosquilla raphidea* : Manning, *Smithson contr. Zool.,* No.36 : 9, figs. 4-9.

Material examined : 3 Males (TL 120-235 mm) : Ganga Sagar, South 24-Parganas; K. N. Reddy, 23.12.1978. 1 (M) (TL 182 mm), 1 *fem.* (TL 206 mm); Kakdweep, South 24-Parganas; S. Barua; 16.8.1979. 1 (M) (TL 282 mm), 1 (E) (TL 143 mm); Bakkhali, South 24-Parganas; K. N. Reddy; 21.12.1978. (M) (TL 90-211 mm), 2 (F) (TL 95-120 mm); Frasergunje, South 24-Parganas; K. V. Surya Rao; 9.12.1965. 2 (M) (TL 145-173), 2 (F) (TL 145-172 mm); Digha Beach, Medinipur District; K. K. Tiwari; 2.3.1979, 3(M) (TL 96-135 mm), 2 (F) (TL 108-110 mm): Digha Beach, Medinipur District; D.R.K. Sastry; 20.2.88. 1 (F) (TL 130 mm): Junput, Medinipur District; K. V. Rama Rao; 8.3.1966.

Description : Rostrum longer than broad, with a slender apical projection. Outer margin of dactylus of raptorial claw with sharp angular projection in adult males. 5th thoracic somite with a sharp lateral spine. Ventral keel on 8th thoracic somite rounded. Abdominal carinae spined as follows: submedian 6, intermediate 1-6, lateral 1-6, marginal 1-5. Telson denticles-4-5, 8, 1.

Colour : Last three thoracic and first five abdominal somites each with a dark posterior line. Uropodal exopod with dark patch on the distal half. For detail colour description see Manning (1969 : 11-12).

Distribution : India : West Bengal-24-Parganas(S); Orissa and Maharashtra. Elsewhere : East coast of South Africa to Indonesia.

Remarks : *H. raphidea* is the largest known stomatopod and occurs more widely and abundantly along the West Bengal coast than the other two members of the genus. *H. raphidea* can be separated from *H. anandalei* in having a slender anterior projection on the dactylus of raptorial claw in adult males and a sharp spine on the lateral margin of the 5th thoracic somite.

Family SQUILLIDAE Latreille, 1903

The family squillidae includes the largest number of genera and species. 15 species under 7 genera are represented along the West Bengal coast.

Key to genera

1. Eye large; cornea strongly bilobed, broader than stalk 2
   Eye small; cornea feebly bilobed, slightly broader than stalk 5
2. Lateral process of 5th thoracic somite bilobed 3
   Lateral process of 5th thoracic somite not bilobed ..... **Squilloides**
3. Lateral process of 6th and 7th thoracic somites bilobed 4
   Lateral processes of 6th and 7th thoracic somites not bilobed ..... **Alimopsis**
4. Carapace, abdomen and telson with numerous longitudinal carinae ..... **Carinosquilla**
   Carapace, abdomen and telson with normal compliment of carinae ..... **Oratosquilla**
5. Ocular scales separate, submedian teeth of telson with fixed apices 6
   Ocular scales medially fused, submedian teeth of telson with movable apices ..... **Clorida**
6. Dactylus of raptorial claw with 5-6 teeth, body with normal compliment of carinae ..... **Cloridopsis**
   Dactylus of raptorial claw with 6 teeth, body covered with irregular mesh-like reticulations ..... **Dictyosquilla**

2. Genus *Alimopsis* Manning, 1977

Manning (1977) created the genus *Aliomopsis* to accommodate *Alima supplex* (Wood-Mason, 1875) mainly based on the presence of mandibular palp and median carinae on the 1-5th abdominal somites.

The genus is new to West Bengal fauna and is represented herein by a single species, *Alimopsis Supplex.*

4. ***Alimopsis supplex*** (Wood-Mason)

1895. *Squilla supplex* Wood-Mason, *Proc.As.Soc.Bengal* : 232.

1913. *Squilla supplex* : Kemp, *Mem. Indian Mus.*, 4 : 82, pl.6, fig.69.

1968a. *Alima supplex* : Manning, *Bull.mar.sci.Gulf-caribb,* 18 : 136.

1977. *Alimopsis supplex* : Manning, *Proc. Biol. Soc. Wash.* 90(2) : 421.

Material examined : 1 *m.* (TL 64 mm) : Jambudwip, Sundarban, S. 24-Parganas; H. C. Ghosh; 11.2.1980.

Description : Rostrum with short carina. Mandibular palp present. Carapace with long anterolateral spines. Dactylus of raptorial claw with 5 teeth, outer margin with a small bulge basally. 5th thoracic somite laterally bilobed, anterior lobe produced into an anteriorly directed spine; 6th and 7th single lobed and lateraly rounded. Abdominal carinae spined as follows: Submedian 5-6, intermediate 5-6, lateral 2-6, marginal 1-5; Ist to 5th abdominal somites with distinct median carinae. Median carinae of telson with strong posterior spine, submedian teeth immovable. Uropodal protopod with a small lobe in the middle of the longer arm.

Distribution : India : West Bengal-24-Parganas(S); Tamilnadu and Maharashtra. The species is endemic to the Indian waters and is reported herein for the first time from West Bengal.

Remarks : The presence of an anteriorly positioned carina on the rostrum, mandibular palp and median carinae on the 1-5th abdominal somites distinguish *A. supplex.*

3. Genus ***Carinosquilla*** Manning, 1968

The genus is new to Indian waters and is represented herein by a single species from West Bengal.

5. ***Carinosquilla multicarinata*** (white)

1848. *Squilla multicarinata* White, *Proc. Zool. Soc.* 144, figs.1, 1a.

1913. *Squilla multicarinata* : Kemp, *Mem. Indian Mus.* 4 : 86, pl.6, figs.73-76.

1968a. *Carinosquilla multicarinata* : Manning, *Bull. mar. Sci. Gulf-Caribb.* 18(1) : 136.

Material examined : 1 *m.* (TL 79 mm); Sundarban, S. 24-Parganas; R. S. Pillai; 12.7.1977.

Description : Rostrum elongate, 5 longitudinal carinae present, median and marginals entire. Dactylus with 5-teeth. Mandibular palp present. Carapace with short anterolateral spines, numerous longitudinal carinae present, median carina anteriorly bifurcated. 5th to 7th thoracic somites bilobed, anterior lobe of 5th ends in an enteriorly directed spine; 5th somite with transverse carinae, 6th - 8th with longitudinal carinae, mostly ending in posterior spines. All six abdominal somites lined with longitudinal carinae, mostly ending in posterior spines. Telson with several longitudinal carinae; median strong with a sharp posterior spine. Proxomal sagment of uropodal expod with four entire longitudinal carinae, outer margin with 9 movable spines; distal segment with two raised longitudinal carinae; bifurcated process of uropodal protopod with 8 teeth on inner margin of longer arm; uropodal endopod with deep median groove.

Colour : Faded in the present specimen. However, Kamp (1913) noted dusky patches on the 2nd and 5th abdominal semites, black suffusion on the distal end of the uropodal endopod and basal segment of uropodal exopod and jet black distal segment of uropodal exopod.

Distribution : India : West Bengal - 24 Parganas (S). Elsewhere : Burma to Japan.

The specimen is reported herein fo the first time from Indian waters.

Remarks : Jet black distal segment of the uropodal exopod, dusky patches on uropodal endopod and dorsal surface of 2nd and 5th abdominal somites and presence of numerous carinae on dorsal surface of body are characteristic *C. multicarinata* distinguishing it from other two Indo-West Pacific members of the genus.

4. Genus *Clorida* Eydoux and Souleyet, 1842

The genus *Clorida* is represented by two species from West Bengal.

Key to species of *Clorida*

1. Lateral spine on 5th thoracic somite anteriorly directed; submedian carinae on first five abdominal somites strongly divergent ..... *C. decorata*

   Lateral spine on 5th thoracic somite laterally directed; submedian carinae on first five abdominal somites Parallel ..... *C. latreillei*

6. *Clorida decorata* Wood-Mason

1875. *Clorida decorata* Wood-Mason, *Proc. As. Soc. Bengal* : 231

1913. *Squilla decorata* : Kemp, *Mem. Indian. Mus.* 4 : 27, pl. 1. figs. 13-16.

1968a. *Clorida decorata* : Manning, *Bull. Mar. Sci. Gulf-Caribb,* 18 (1) : 123.

Material examined : 2 Females (TL 75 and 83 mm); Bakkhali, S. 24 Parganas; B.P. Halder; 5.3.1988. 1 (F) (TL 59 mm); Frazergunge, S. 24 Parganas; K. V. Surya Rao; 9.12.1965.

Description : Eye very small, cornea bilobed, stalk greatly expanded. Ocular scales entire broader at base, distal margin with sharp lateral projections. Rostrum broader at base, apex rounded. Mandibular palp present. Carapace strongly narrowed anteriorly, anterolateral angles with short inwardly curved spines. Dactylus of raptirial claw with 5 teeth, terminal teeth strongly curved inwards, outer margin with strong angular projection. Lateral processes of thoracic somites lobed, 5th produced into anteriorly directed spines. Abdominal carinae spined as follows : submedian 6, intermediate 4-6, lateral 5-6, marginal 3-5; submedian carinae on 1-5 abdominal somites strongly divergent. Telson broader than long, median carina strong, dorsal and ventral surfaces covered with tubercles. Bifurcated process of uropodal protopod with a broad rounded lobe on outer margin and fixed spines on innter margin of longer arm.

Distribution : India : West Bengal - 24 Parganas (S) and Andaman Island. Elsewhere : Burma and Thailand.

Remarks : The present specimens agree well with earlier descriptions and constitute the second record of the species from West Bengal.

7. *Clorida latreillei* Eydoux and Souleyet

1841. *Clorida latreille* Eydoux and souleyet, Voy de la'Bonite' Zool. 1. Crust. : 265, Pl. 5, figs. 2-5

1913. *Squilla latreille* : Kemp, *Mem. Indian Mus* : 4 : 24, pl. 1, figs. 1-4.

1968a. *Clorida laterillei* : Manning, *Bull. mar. sci. Gulfcaribb,* 18 (1) : 123.

Material examined : 1 (F) (TL 40 mm); Jambudwip, Sundarban, S. 24 Parganas; H. C. Ghosh; 10.12.1980.

Description : Eyes very small, cornea bilobed, stalk greatly expanded. Ocular scales medially fused, anterolaterally blunt. Roastrum triangular, broader at base, narrowed anteriorly to a rounded apex. Mandibular palp present. Carapace broader at base, narrowed anteriorly, anterolateral angles with sharp outwardly directed spines. Dactylus of raptorial claw with 4 teeth, outer margin with angular projection. Thoracic somites single lobed, 5th with laterally directed spines. Abdominal carinae spines as follows : submedian 6, intermediate 5-6, lateral 5-6, marginal 1-5. Telson broader than long, dorsal surface with irregular ridges. Bifurcated process of uropodal protopod with a rounded lobe on outer margin and 5 fixed spiens on inner margin of longer arm.

Distribution : West Bengal : 24 Parganas (S); Orissa; Andhra Pradesh; Tamil Nadu and Maharashtra. Elsewhere : Scattered localities between Red Sea and Japan.

Remarks : The present specimen agree well with Kemp's (1913) description of *C. latreillei* from the study area. The presence of laterally directed spines on the 5th thoraric somite, 5 fixed spines on inner margin of longer arm of the uropodal protopod will distinguish *C. latreillei* from *C. decorata.*

5. Genus *Dictyosquilla* Manning, 1968

The genus includes only the type species, *D. foveolata* and is reported herein for the first time from Indian waters.

8. *Dictyosquilla foveolata* (Wood Mason)

1895. *Squilla foveolata* Wood-Mason, *Figs. and Desc. of nine Squillidae,* 1895 : 2, pl. 2, fig. 1

1913. *Squilla foveolata* : Kemp, *Mem. Indian Mus.*, 4 : 58, pl. 4, figs. 48.

1968a. *Dictyosquilla foveolata* : Manning, *Bull. mar. sci. Gulf-caribb,* 18 (1) : 132.

Material examined : 1 *fem.* (TL 80 mm); Sandheads, Hooghly river mouth; P. V. Lady Fraser; 11.1.1924; Reg. No. 42451/1.

Description : Entire dorsal surface of body covered with irregular mesh-like reticulation. Eyes small, cornea bilobed, stalk dialated on inner margin. Rostrum as broad as long, median carina sharp, lateral margins upturned. Carapace broader at base, anterolateral angles with short spies, median carina anteriorly bifurcated. Dactylus of raptorial claow with 6 teeth. 5th to 7th thoracic sometimes laterally bilobed; anterior lobe of 5th thoracic somite produced into an anteriorly directed spine and posterior lobe a laterally directed spine. Abdominal carinae spined as follows: submedian 4-6, intermediate 4-6, lateral 3-6, marginal 1-5. Telson longer than broad, submedian teeth with fixed apices, median carina sharp, a chain of tubercles run down the median from either side and merge under its posterior spine; several oblique row of pits lines the rosterior margin. Basal prolongation of uropodal protopod serrate on inner margin of longer spine and lobe on outer margin rounded.

Distribution : India : West Bengal 24 Parganas (S). Elsewhere : Scattered localities between Burma and Hongkong. This is the first records of the genus feom the Indian waters.

Remarks : Chopra (1934) in his report on the stomatopods collected by the Bengal pilot service off the mouth of the river Hooghly did not include *D. foveolata.* In the course of the present study a

fem. specimen of the species collected by P.V. Lady Fraser with registration No. C 4245/1 was found amongs the named collection. The specimens has been thoroughly compared with Wood-Mason's (1895) and Kem's (1913) material from Hongkong and Burma. The specimen is somewhat fragile and the lateral teeth and denticles are broken. From its so far limited distribution it appears to be a rare species.

The Clorida like eyes, sharp teeth on telson and mesh-like reticulation over the dorsal surface of body are the distinctive features of this species.

6. Genus *Cloridopsis* Menning, 1968

The genus *Cloridopsis* is represented in the present study by three species as keyed below :

Key To Species of ***Cloridopsis***

1. Raptorial dactylus with 5-teeth.....2
   Raptorial dactylus with 6-teeth..... *C. bengalensis*
2. Lateral process of 5th thoracic somits with a large black spot, apex of rostral plate narrow.....
   .....*C. scorpio*
3. Lateral process of 5th throacic somite without a large black spot, apex of rostral plate broad.....
   ..... *C. immaculate*

9. *Cloridopsis bengalensis* (Tiwari and Biswas)

1952. *Squilla bengalensis* Tiwari and Biswas, *Rec. Indian Mus.*, 49 : 352.

1968a. *Cloridopsis bengalensis* : Manning, *Bull. mar. Sci. Gulf-Caribb.* 18 (1) : 128.

1975. *Cloridopsis bengalensis* : Tiwari and Ghosh, *Proc. Zool. Soc. Calcutta,* 26 : 33, fig. 1a,b,c,d.

Material examined : 1 *fem.* (TL 90 mm); Junput, Medinipur District; K. N. Reddy; 7.8.1978. 1 *fem.* (TL 85 mm); Digha beach, Medinipur district; K. N. Reddy; 6.8.1976. 1 *fem.* (TL 69 mm); Gosaba, Sundarbans; N. C. Gayen; 17.9.1983. 1 *m.* (TL 122 mm); Jharkhali, Sundarbans; B. P. Halder, 22.5.1985.

Description : Eyes small, cornea bilobed, set obliquely on stalk. Rostrum slightly longer than broad, median carina present, anterior margin rounded. Anterolateral spines of carapace with a rounded ventral lobe; median carina entire.Raptorial dactylus with 6 teeth. Lateral processes of 5th to 7th thoraic somites single lobed, lobe on 5th broad based and produced into an anteriorly directed spine; those on 6th and 7th rounded; lateral process of 8th bilobed. Last three thoracic somites armed with distinct medin and intermediate cardinae. Abdominal carinae spined as follows : submedin 6, intermediate 5-6, lateral 2-6, marginal 1-5. Telson broader the long, with three pairs of marginal teeth, prelateral lobes present; telson denticles large and rounded.

Distribution : India : West Bengal - 24 Parganas (S) and Medinipur District; Orissa and Andhra Pradesh. Elsewhere : Outside India the species is so far reported from Thailand (Naiyanotr, 1980).

Remarks : Tiwari and Biswas (1952) described the species based on two *m.* specimens from Lower Bengal. Later Tiwari and Ghosh (1975) redescribed the species based on more material from West Bengal, Orissa and Andhra Pradesh including *fem.* specimens. The adult males of the species differ from adult females in a number of characters. For detail description and *m.-fem.* differentiation see Tiwari and Ghosh (1975).

10. *Cloridopsis immaculata* (Kemp)

1913. *Squilla scorpio* var. *immaculata* Kemp, *Mem. Indian. Mus.* 4 : 45

1968. *Cloridopsis immaculata* : Tirmizi and Manning, *Proc. U.S. natn. Mus.*, 125 (no. 3666) : 37, figs. 14f, g.

Material examined : Sundarban, S. 24 Parganas 1 (M) (TL 30 mm), 1 (F) (TL 37 mm); Canning; B. Sinha; 20.1.81, 1 (M) (TL 76 mm), 1 (F) (TL 70 mm); Sajnakhali; B. P. Halder; 12.1.84. 2 (M) (TL 51 and 58 mm), 3 (M) (TL 53 63 mm) : Gosaba; H. C. Ghosh; 1981. 1 (F) (TL 60 mm); Jhingakhali; S. Biswas; 13.9.1983, 1 (M) (TL 70 mm), 2 (F) (TL 59-70 mm); Chota Mollakhali; B. P. Halder; 13.1.1984. 15 (M) (TL 60-80 mm), 9 (F) (TL 62-75 mm) : Matla river; T. Roy 12.3.1985. 1 (M) (TL 80 mm); Gosaba, B. P. Halder; 22.5.85. 1 (M) (TL 80 mm); Raimangal river. B. P. Halder; 8.9.84.

Description : Eyes small, corner bilobed and broader than long. Rostrum with median carina. Carapace with distinct median carina, anterolateral angles with slender spines, posterolaterally rounded. Lateral processes of exposed thoracic somites single lobed, 5th produced into a broad based anteriorly directed spine. Dactylus of raptorial claw with 5 teeth, outer margin feebly sinuous. Telson broader than long, denticles large and rounded.

Colour : Last three thoracic and first five abdominal somites with dark posterior lines. Second to fifth abdominal somites with dark patches medially. Proximal segment of wropodal exopod with a dark patches.

Distribution : India : West Bengal 24 Parganas (S) and Orissa. Elsewhere : Karachi; Arakan Coast; Singapore and Thailand.

Remarks : *C. immaculata* can be distinguished from *C. scorpio* in the presence of a longer rostrum with broader apex and absence of a conspicuous black spot on the lateral process of the 5th thoracic somite and from *C. bengalensis* in having 5 teeth on the dactylus of raptorial claw. From past and present records the species appears to be very common in back water zones of deltic West Bengal.

11. *Cloridopsis scorpio* (Latreille)

1825. *Squilla scorpio* Latreille, *Encycl. Method,* 10 : 472

1913. *Squilla scorpio* : Kemp, *Mem. Indian Mus.*, 4 : 42

1968. *Cloridopsis scorpio* : Manning, *Bull. mar. sci. Gulf. Caribb.*, 18 (1) : 128

Material examined : 1 (M) (TL 41 mm); Frazerguj, Sundarban; B. Prasad; 14.12.1917.

Description : Eyes small, cornea bilobed, set obliquely on stalk. Rostrum as long as broad, median carina on posterior half. Carapace narrowed anteriorly, anterolateral margins with slender spine, each spine bears a ventral lobe. Dactylus of raptorial claw with 5 teth, Outer margin sinuous, proximal notch present. Lateral process of 5th theracic somite single, broad, produced into an anteriorly directed spine; lateral processes of next two somits single, lobed, posteriorlaterally rounded. Abdominal carinae spined as follows : Submedian 6, intermediate 5-6, marginal 2-5. Telson broader than long, 3 pairs of marginal teeth present, denticles large and rounded 2,4,1. Lobe on outer margin of inner spine of basal prolongation of uropod large and rounded.

Colour : Lateral processes of 5th thoracic somite with distinct large black spot; last three thoracic and all abdominal somites with dark posterior line. The second abdominal somite with a median rectangular black patch. Proximal segment of uropodal exopod with dark patch.

Distribution : India : West Bengal 24 Parganas (S); Orissa; Tamil Nadu; Pondicherry and Maharashtra. Elsewhere : Widely distributed in the Indo - West Pacific region.

Remarks : The only *m.* specimen examined here agrees well with description in literature. The presence of a large black patch on the lateral process of the 5th thoracic somite is the characteristic feature of *S. scorpio.*

7. Genus ***Oratosquilla*** Manning, 1968

The genus *Oratosquilla* contains the largest number of species of stomatopods and as many as six species are represented in this study from West Bengal alone.

Key to species of ***Oratosquilla***

1. Dorsal ridge of carpus of claw uninterrupted 2

   Dorsal ridge of capus of claw with 2-3 tubercles 3

2. Rostal plate slender, longer than broad ..... *O. inornata*

   Rostral plate short, broader than long ..... *O. perpensa*

3. Median carina of carapace uninterrupted at base of bifurcation 4

   Median carina of carapace interrupted at base of bifurcation 5

4. Portion of median carina of carapace between cervical groove and anterior bifurcation simple; submedian carinae of 4th abdominal somite armed posteriorly ..... *O. nepa*

   Portion of median carina of carapace between cervical groove and anterior bifurcation bicarinate; submedian carinae of 4th abdominal somite unarmed posteriorly ..... *O. holoschista*

5. Anterior bifurcation of median carina of carapace not well marked, arma of bifurcation lined with dark spots; submedian carinae on 5th abdominal somite slightly divergent *O. Woodmasoni*

   Anterior bifurcation of median carina of carapace well defined; arms of bifurcation not lined with dark spots; submedian carinae of 5th abdominal somites parallel ..... *O. interrupta*

12. ***Oratosquilla inornata*** (Tate)

1883. *Squilla inornata* Tate, *Trans. Roy. Soc. S. Aust.*, 6 : 51, pl. 2, figs. 3a, b, c.

1934. *Squilla oratoria* var. *inornata;* Chopra, *Rec. Indian Mus.*, 36 : 24.

1968a. *Oratosquilla inornata* : Manning, *Bull. mar. Sci. Gulf-Caribb.* 18 (1) : 135.

1978a. *Oratosquilla inornata* : Manning, *Smithson, Contr. Zool.* No. 272 : 17, figs. 8,9.

Material examined : 1 (F) (TL 45 mm) : Sandheads, south of river Hooghly : Lady Frazer; 1928; Reg. No. 4012/1 (Reported by Chopra, 1934).

Description : Body size moderate. Eyes large, cornea bilobed set obliquely on stalk. Rostral plate elongate, longer than broad, apex truncate. Median carina of carapace interrupted at base of bifurcation, lines of bifucation lined with dark spots. Carapace narrowed anteriorly, anterolateral spines strong. Intermediate carinae of 5th thoracic somite short and irregular. Dactylus of raptorial claw with 6 teeth, outer margin sinuous; dorsal ridge of carpus of claw undivided. Lateral processes

of 5th to 7th thoracic somites bilobed; anterior lobe of 5th an anteriorly directed spine. Abdominal carinae spined as follows : Submedian 5-6, intermediate 4-6, lateral 3-6, marginal 1-5. Telson flattened, little longer than broad; danticles large and rounded : 4,7,8,1. Proximal segment of uropodal exopod with 9 movable spines on outer margin; lobes on outer margin of inner arm of basal prolongation of uropod rounded, margin concave.

Colour : Dorsal surface pitted with dark chromatophores. Anterior bifurcation of median carina of carapace lined with dark spots. Last three thoracic and all abdominal somites with dark posterior lines.

Distribution : India : West Bengal - 24 Parganas (S). Elsewhere : East and South Australia (Manning, 1978a).

Remarks : Chopra (1934) reported two *fem.* specimens (TL 45 and 52 mm) collected by 'Lady Fraser' from Sandheads in 1928. Of these only one *fem.* (TL 45 mm) with the missing dactylus is availabel for this study. Manning (1978a) has given detail account of this species from Australia to which this specimen agree fairly well. Pitted dorsal surface of the body, an elongate rostal plate with flattened apex and the erect and projecting lobes between the spines of the basal prolongation of uropod will distinguish *O. inorata* from other members of the genus.

13. *Oratosquilla perpensa* (Kemp)

1911. *Squilla oratoria* Var. *Perpensa* Kemp, *Rec. Indian Mus.* 6 : 98

1913. *Squilla oratoria* Var. *Perpensa* Kemp, *Mem. Indian Mus,* 4 : 70 Pl. 5, figs. 57-59.

1978a. *Oratosquilla perpensa* : Manning, *Smithson. Contr. Zool.* No. 272 : 21, fig. 11.

Material examined : 1 (F) (TL 57 mm) : Sandheads, Hooghl Delta; A. J. Milner; Reg. No. 6729/10 (Paralectotype). 1 (F) (TL 60 mm); Sandheads, Hooghly Delta; A. J. Milner; Reg. No. 5769/9 (Paralectotype). (Reported by Kamp, 1911 and 1913).

Description : Body size moderate. Eyes moderate to small, cornea bilobed, set obliquely on stalk. Rostal plate short, little broader than long. Anterolateral spines of carapace strong, median carina interrupted at base of bifurcation. Dactylus of raptorial claw with 6 teeth, outer margin strongly sinuous; dorsal ridge of carpus of claw undivided. Anterior lobe of lateral process of 5th thoracic somite produced into an anterolaterally directed slender spine. Abdominal carinae spined as follows : submedian 5-6, intermediate 4-6, lateral 3-6, marginal 1-5. Telson flattened, little longer than broad, denticles large and rounded : 4, 6-7, 1. Proximal segment of uropodal exopod with 9 movable spines on outer margin. Lobe on outer margin of inner spine of basal prolongation of uropod erect, apex rounded. Ventral surface of telson with long postanal keel.

Colour : Colour in one of the two specimens examined is completely bleached and the other shows colour markings as follows : Body dusky with concentration of chromatophoras here and there. Last three thoracic and all abdominal somites with dark posterior lines. Distal segment of uropodal expod including parts of proximal suffused with dark. Bases of marginal teeth of telson also dark.

Distribution : India : West Bengal 24 Parganas (S) and Tamil Nadu. Elsewhere : Burma to Hongkong.

Remarks : *O. perpensa* looks very similar to *O. inornata* but can be separated from the later on the basis of the following characters : in *O. perpensa* the rostral plate is short and little broadr than long, in *O. inortata* it is slender and little longer than broad; the arms of anterior bifurcation of

median carina of carapace more sharp and distict in *O. perpensa* than in *O. inornata* and the anterior lobe of the lateral process of 5th thoracic somite is more truncate in *O. inornata* than in *O. perpensa.*

14. ***Oratosquilla woodmasoni*** (Kemp)

1911. *Squilla woodmasoni* Kemp. *Rec. Indian Mus.*, 6(2) : 99

1913. *Squilla woodmasoni* Kemp, *Mem. Indian. Mus.*, 4 : 74, pl. 5 figs. 63 65.

1978a. *Oratosquilla woodmasoni* : Manning, *Smithson. Contr. Zool.* No. 272 : 36, figs. 21a-f.

Material examined : 7 (M) (TL 66 92 mm), 5 (F) (TL 71 85) Sagar Island, Sundarbans, S. 24 Parganass; H. C. Ghosh; 23.12.1978

Description : Eyes large, cornea bilobed, set obliquely on stalk. Rostal plate broader than long, anterior margin truncate, median carina absent. Anterolateral spines of carapace short, anterior bifurcation indicated by dark dots. Dactylus of raptorial claw with 6 teeth, outer margin sinuous; dorsal ridge of carpus of claw with 2-3 tubercles. Lateral processed of 5th - 7th thoracic somite bilobed; submedian and intermediate carinae of exposed thracic somites inconspicuous. Submedian carinae of 5th abdominal somite slightly divergent; abdominal carinae spined as follows : submedian 5-6, intermediate 4-6, lateral 2-6, marginal 1-5. Telson broader than logn, median carina with sharp posterior spine; denticles large and rounded. 2-4, 9-10, 1. Uropodal exopod with 9 movable spines on outer margin of proximal segment; lobes on outer margin of inner spine of basal prolongation with rounded apex.

Colour : Dorsal surface with scattered dark-brown chromatophores. Posterior margin of thoracic and abdominal somites dark.

Distribution : India : West Bengal 24 Parganas (S); Tamil Nadu and Pondicherry. Elsewhere : Indo-West Pacific.

Remarks : Indistinct bifurcated processes of the median carina of carapaces, presence of two tubercles on the dorsal ridge of carpas of reptorial claw will distinguish *O. woodmasoni* from other from ohter members of the genus from West Bengal.

15. ***Oratosquilla interrupta*** (Kemp)

1911. *Squilla interrupta* Kemp, *Rec. Indian Mus.*, 6 : 98

1913. *Squilla interrupta* Kemp, *Mem. Indian Mus.*, 4 : 72, pl. 5 figs. 60-62.

1968. *Oratosquilla interrupta* : Tirmizi and Manning, *Proc. U.S.Nat.Mus.*, 125 : 41, fig. 16

Material examined : 2 (MM) (TL 85 and 92 mm), 10 (FF) (TL 83-116); Digha beach, District Medinipur; D.R.K. Sastry; 19.2.1988. 3 (MM) (TL 73-89), 4 (FF) (TL 82-87); Jambudwip, Sundarbans, S. 24. Parganas; H. C. Ghosh; 11.12.1980. 4 (MM) (TL 69-80), 4 (FF) (TL 75-118); bakkhali, S. 24 Parganas; H. C. Ghosh; 10.12.1980. 2 (FF) (TL 80 and 96 mm); Ganga Sagar, S. 24 Parganas; H. C. Ghosh; 13.12.1980.

Description : Eyes large, cornea bilobed, set obliquely on stalk. Rostral apex truncate, lateral margins upturned. Anterior bifurcation of median carina of carapace interrupted at base. Dactylus of raptorial claw with 6 teeth, outer margin sinuous, dorsal, ridge of carpus of claw with two tubercles. Lateral processes of 5th 7th thoracic somites bilobed; anterior lobe of 5th produced into an anteriorly directed spine. Abdominal carinae spined as follows : submedian 5 6, intermediated 4 6, lateral 3 6, mrginal 1 5. Telson broad, with three pairs of sharp marginal teeth, pre-lateral lobes present. Uropodal exopod with 8 9 movable spines on outer margin of proximal segment; lobe on

outer margin of inner spine of basal prolongation of uropodal protopod rounded and outer margin convex.

Distribution : India : West Bengal 24 Parganas (S) and Medinipur District; Orissa; Andhra Pradesh and Maharashtra. Elsewhere : Indo West Pacific.

Remarks : The specimens agree well with description in literature. Interruption at base of bifurcation of median carina of carapace and a rounded lobe with convex apex on the outer margin of basal prolongation of uropodal protopod will distinguish this species from other members of the genus from W. Bengal.

16. ***Oratosquilla nepa*** (Latreille)

1825. *Squilla nepa* Latreille, *Encycl. Method.*, 10 : 471.

1913. *Squilla nepa* : Kemp, *Mem. Indian Mus.*, 4 : 60, pl. 5, fig. 49

1968. *Oratosquilla nepa* : Tirmizi and Manning, *Proc. U.S. nat. Mus.*, 125 (3666) : 39, fig. 15.

Material examined : 1 (F) (TL 49 MM); Jambudwip, Sundarban, S. 24 Parganas; H. C. Ghosh; 10.12.1980.

Description : Eyes small, cornea bilobed, set almost transversely on stalk. Rostral plate subquadrate, apex rounded, margins upturned. Anterior bifurcation of median carina of carapace uninterrupted, anterolatral angles with strong spines extending beyond rostral base. Dactylus of raptorial claw with 6 teeth, outer margin sinuous. Anterior lobe of lateral process of 5th thoraic somite produced into a slender anteriorly directed spine. Abdominal carinae spined as follows : submedian 4-6, intermediate 3-6, latral 2-6, marginal 1-5. Telson as broad as long, with three pairs of marginal teeth; denticles large and rounded. Uropodal exopod with 9 movable spines on outer margin of proximal segment.

Colour : Faded. However, the 2nd and 5th abdominal somites bear dark patches.

Distribution : India : West Bengal 24 Parganas (S); Orissa; Andhra Pradesh; Tamil Nadu; Kerala and Maharashtra. Elsewhere : Indo-West Pacific.

Remarks : Small eyes, long and uninterrupted median carina of carapace will distinguish the species from all other members of the genus from W. Bengal.

17. ***Oratosquilla holoschista*** (Kemp)

1911. *Squilla holoschista* Kemp, *Rec. Indian Mus.*, 6 : 97

1913. *Squilla holoschista* Kemp, *Mem. Indian Mus.*, 4 : 64, pl. 4, figs. 50 53

1971. *Oratesquilla holoschista* : Manning, *Smithson. Contr. Zool.* No. 71 : 63 (Key)

Material examined : 1 (M) (TL 64 mm), 2 (FF) (TL 75 mm); Sandheads, mouth of river Hooghly; P. V. Lady Fraser; August September 1927; Reg. No. C 4231/1. (Reported by Chopra, 1934).

Description : Eyes small, cornea bilobed, set almost transversely on stalk. Rostral plate tapering to a rounded apex. Anterior bifurcation of median carina of carapace uninterrupted; a portion between cervical groove and anterior bifurcation finely bicarinate; anterolaterals angles with strong spines. Abdominal crinae spined as follows : submedian 5-6, intermediate 4-6, lateral 2-6, marginal 1-5. Telson as broad as long, with three pairs of marginal teeth; prelateral lobes present; denticles large and rounded. Outer margin of proximal segment of Uropodal exopod with 9 movable spines.

Colour : Dorsal aspects of rostrum and carapace suffused with dark brown chromatophores. Proximal segment of uropodal exopod distally black.

Distribution : India : West Bengal 24 Parganas (S); Orissa; Andhra Pradesh; Tamil Nadu and Kerala. Elsewhere : Indo-Malayan water.

Remarks : *O. holoschista* is very closely allied to *O. nepa.* The bicarinate nature of the anterior median bifurcation of carapace and absence of posterior spines on the submedian carinae of 4th abdominal somite will distinguish *O. holoschista* from *O. nepa.*

8. Genus *Squilloides* Manning, 1968

Manning (1968a) created the Genus Squilloides to contain four specimen of which only Squilloides qilessi has so far been reported from West Bengal.

18. *Squilloides qilesi* (Kemp)

1911. *Squilla qilesi Kemp, Rec.* Indian Mus., 6 : 95

1913. *Squilla qilesi Kemp, Mem.* Indian Mus., 4 : 39, pl. 2, figs. 25 27.

1934. *Squilla qilesi :* Chopra, Rec. Indian Mus., 36 : 22, figs. 1a, b.

1968a. *Squilloides qilesi* : Manning, Bull. mar. sci., Gulf-carrib, 18 (1) : 131

Material examined : 1 (M) (TL 66 mm), 1 (F) (TL 68 mm); Sandheads, off the mouth of the river Hooghly; Lady Fraser; Feb. March, 1928 : Reg. No. C 1655/1 (Reported by Chopra, 1934)

Description : Dorsal surface of body smooth. Cornea bilobed, wider than stalk. Ocular scales separate. Antennular scales produced into a pair of anteriorly directed robust spines. Mandibular palp present, three segmented. Rostrum elongate, longer than broad, apex rounded. Carapce narrowed anteriorly; anterolateral angles with strong spines; median carina absent, lateral carinae only on the posterior margin. Dactylus of raptorial claw with 6 teeth, outer margin with angular projection. Lateral processes of 5th 7th thoracic somites single lobed, 5th produced into an anterolaterally directed spine; submedian carinae present only on the last three thoracic somites. Abdominal carinae spined as follows : submedian 6, intermediate 3-6, lateral 3-6, marginal 2-5. Telson broader than long, median carina sharp; denticles large and rounded. Proximal segmetn of uropodal exopod with 8 movable spines on outer margin, distal segment with a median groove; inner spine of uropodal protopod much longer than outer, inner margin serrated; lobes on ohter margin of longer spine small; endopod slender.

Distribution : India; West Bengal 24 Parganas (S) and Tamil Nadu. Elsewhere : North east Arabian Sea and Bay of Bengal.

Remarks : Squilloides qillesi shows sexual dimorphism in the characters of the raptorial claw and telson, as follows : 1) The distal end of propodus of raptorial claw broader in the *m.* than in the *fem.*; 3) the median carina of telson is more inflated and the distal margin more swollen in the *m.* than in the *fem.*.

The prosence of submedian carinae on the last two thoracic and all abdominal somites, presence of series of serration on the inner spine of bifurcated process of uropod, absence of intermediate carinae on carapace and presence of a three segmented mandibula palp will distinguish this species from rest of the members of the genus.

Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910

This superfamily contains three families of which two are represented in the present study as keyed below.

Key to families

1. Proximal end of uropodal endopod with strong fold on outer margin.....*Nannosquillidae*

   Proximal end of uropodal endopod without fold on outer margin ..... *Lysiosquillidae*

Family LYSIOSQUILLIDAE. Giesbrecht, 1910

Of the two genera of Lysiosquillidae, Lysiosquilla and Heterosquilloides known from the Indian waters only the former is represented in the present study by a single species, L. tredecimdentata.

9. Genus ***Lysioquilla*** Dana, 1852

1964. *Lysiosquilla tredacimdentata* Holthuis

1934. *Lysiosquilla maculata* : Chopra, Rec. Indian Mus., 36 : 28

1941. *Lysiosquilla maculata* var. tredecimdenta Holthuis, Temminekia, 6 : 273, fig. 6

1978b. *Lysiosquilla tredecimdentata* : Manning, Smithson. Contr. Zool. No. 259 : 13, fig. 13.

Material examined : 2 (MM) (TL 117 and 142 mm) : Sandheads, mouth of river Hooghly; Lady Fraser, April - May, 1932; Reg. No. C2448/1 (Reported by Chopra, 1934 as Lysiosqulla maculata).

Description : Body size mediam to large. Eyes large, cornea bilobed, set obliquely on stalk. Antennal scals slender. Rostrum cordiform, with anteromedian carina. Dactylus of reptorial claw large, with 9-10 teeth. Carapace smooth, antero and posterolaterally rounded. Ventral keel on 8th thoracic somite produced into a posteriorly directed spine. Abdominal somites smooth. Telsom much broader then long, with low triangular median boss, posterolateral margin with 4 fixed projection.

Distribution : India : West Bengal 24 Parganas (S); Tamil Nadu and Andamans. Elsewhere : Madagascar in the Western Indian Ocean to Bay of Bengal.

Remarks : Broad dark bands on the body and slender antennal scales are the characteristics of L. tredecimdentata. The present material from Sandheads were reported by Chopra (1934) as L. maculata. Manning (1978b) in his revision of the Indo West Pacific species of Lysiosquilla reidentified Chopra's (1934) material of L. maculata as L. tredecimdentata.

Family MANNOSQUILLIDAE Manning, 1980

Manning (1980) created this family to contain ten genera of which only the genus Acanthosquilla is represented in the study area by three species.

10. Genus ***Acanthosquilla*** Manning, 1963

The genus Acanthosquilla is represented in the present study by three species including a new species described herein.

Key to species of ***Acanthosquilla***

1. Telson with 2 pairs of fixed marginal teeth on telson 2
   Telson with 4 pairs of fixed marginal teeth on telson ..... ***A. dighaensis***, n. sp
2. Dactylus of raptorial claw with 5 teeth. Submedian denticles of telson arranged in a transverse row ..... ***A. multifasciata***
   Dactylus of raptorial claw with 6 teeth. Submedian denticles of telson arranged in a curved row ..... ***A. acanthocarpus***

20. ***Acanthosquilla acanthocarpur*** (Miers)

1880. *Lysiosquilla acanthocarpur* Miers, Ann. Mag. Nat. Hist. (5) 5 : 725, pl. 1. figs. 7-9.

1968b. *Acanthosquilla acanthocarpus* : Manning, Smith contr. zool. No. 3641, 124 : 33.

Material examined : 1 (F) (TL 81 mm); Sandheads, mouth of river Hooghly; Lady Fraser; April May, 1932; Reg. No. C 1657/1 (Reported by Chopra (1934).

Description : Eyes small, cornea globular. Rostrum longer than broad, with slender apical spine; lateral margins feebly sinuous. Dactylus of raptorial claw with 6-teeth, outer margin with two unequal lobes. Exposed thorcic and abdominal segments smooth. Telson broader than logn, with 2-pairs of fixed marginal teeth; submedian denticles 10, arranged in a curved row; fan-shaped row of 5 spines present above posterior margin. Uropodal exopod with 7 movable spines on outer margin of proxomal segmetn; endopod with strong fold on outer margin.

Colour : Rostrum pitted with dark dots. Carapace with three dark transverse bands. Exoposed thoracic and all abdominal segments with dark and broad median bands. Posterior margin of telson with a dark patch on eitherside of midline.

Distribution : India : West Bengal : 24 Parganas (S); Tamil Nadu and Maharashtra. Elsewhere : Indo-West Pacific.

Remarks : A. acanthocarpus is very similar in appearance with A. multifasciata. The presence of 6 teeth on the dectylus of raptorial claw and the arrangement of submedian denticles of telson in a curved row will readily distinguish A. acanthocarpus from the later species. Kemp (1913) noted 5-6 teeth on the dactylus of raptorial claw of A. acanthocarpus in specimens from other parts of India and Tirmizi and Manning (1968) noted 8 teeth in a *fem.* specimen from Karachi whereas Chopra's (1934) *fem.* specimen from the sandheads bears 6 teeth.

21. ***Acanthosquilla dighaensis***, new species
(Figures 4 and 5)

Material examined : Holotype : *m.* (TL 78 mm); off Digha, Medinipur District, West Bengal; A. K. Barua; 1987; Reg. No. ZSI C 4198/2.

Paratype : *m.* (70 mm); off Digha; Medinipur District, West Bengal; A. K. Barua; 1987; Reg. No. ZSI C 4199/2.

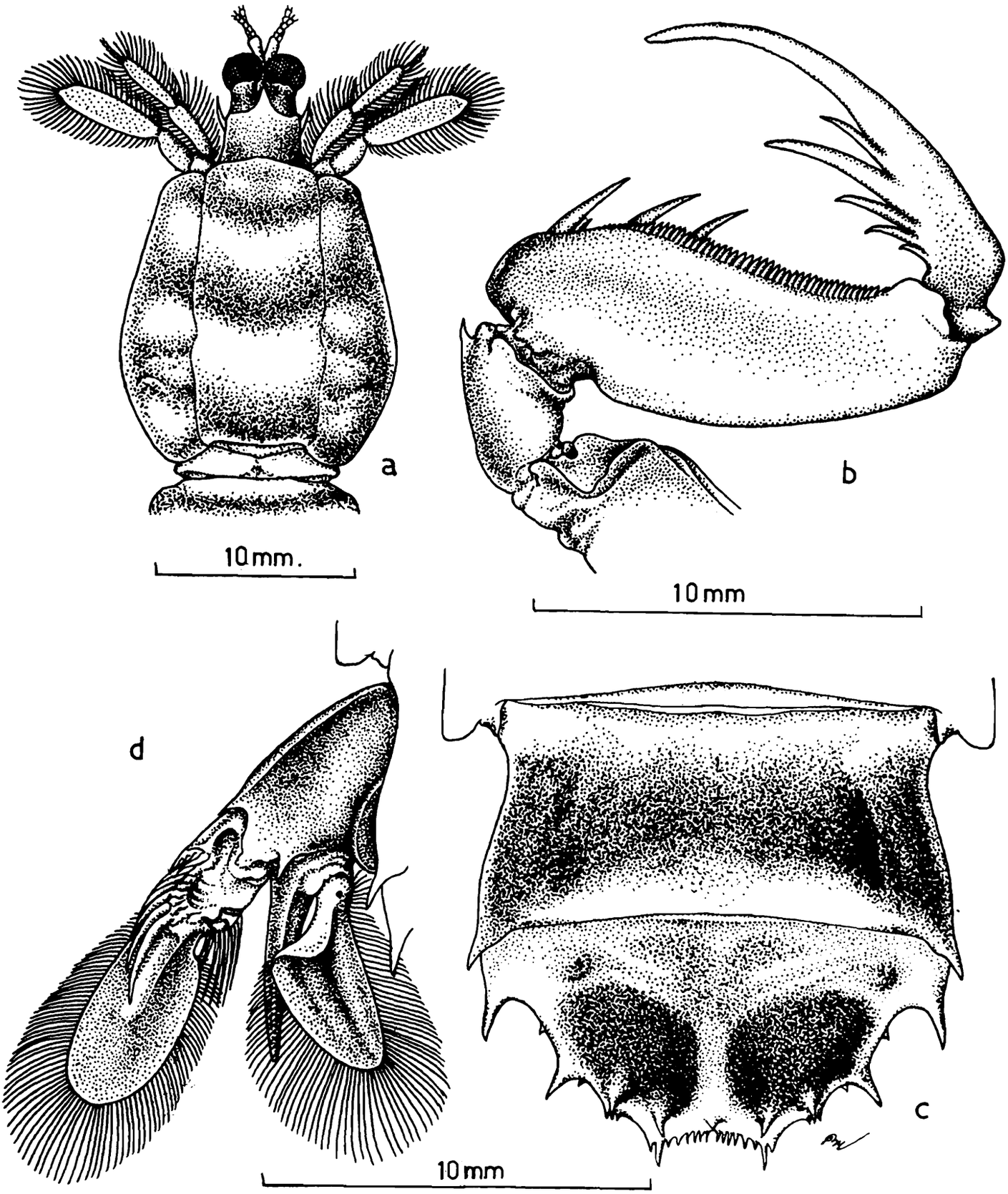

Fig. 4. *Acanthosquilla dighaensis*, new species, Holotype (*m.*); TL 78.0 mm, (a) anterior portion of body; (b) Raptorial claw; (c) Telson with 6th abdominal somite; (d) Uropod.

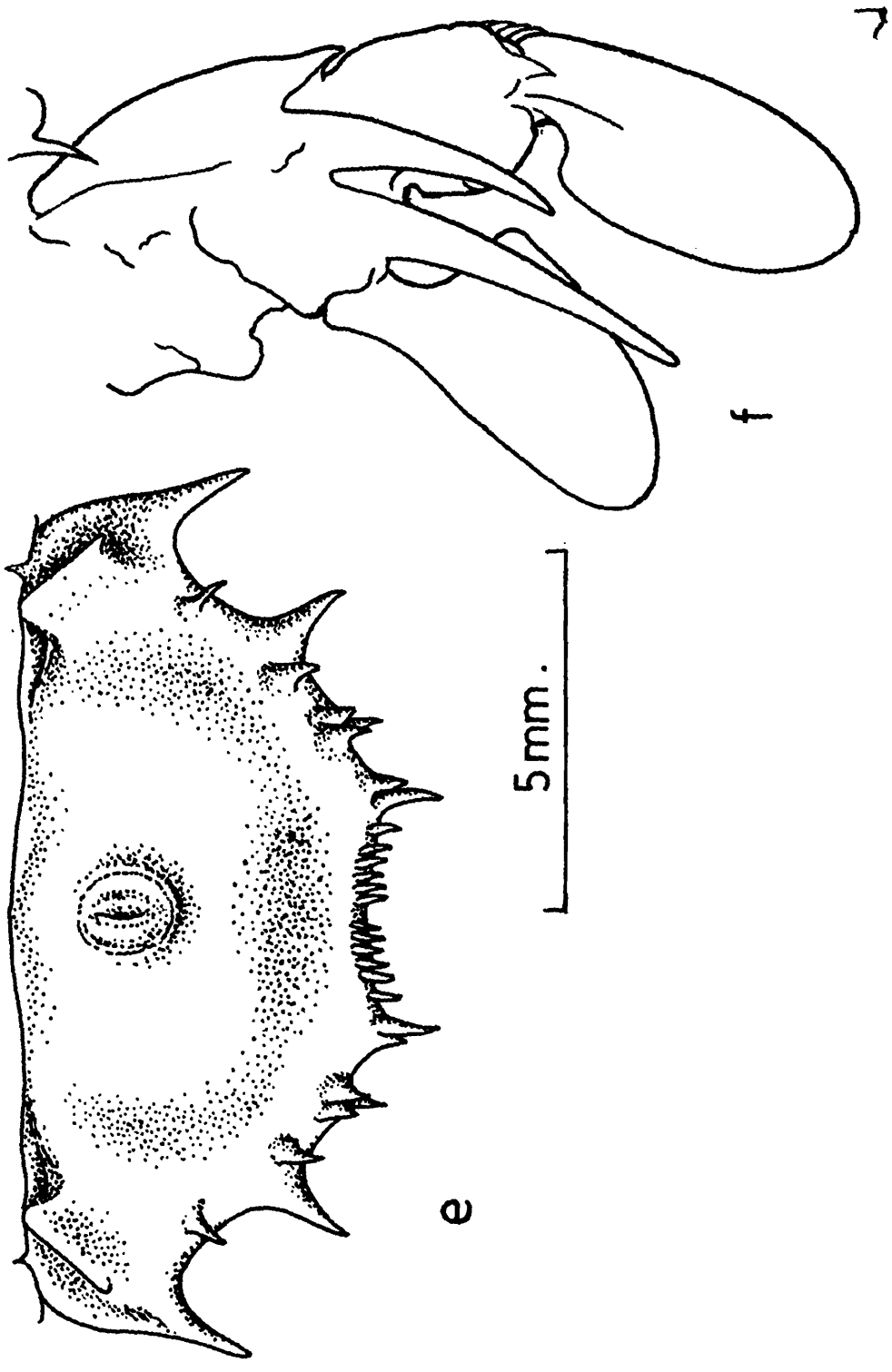

Fig. 5. *Acanthosquilla dighaensis*, new species, Holotype (m.); TL 78.0 mm, (e) Telson, ventral view; (f) Uropod, ventral view.

Description : Eyes small, extending to second segment of antennular peduncle; cornea subglobular, slightly wider than stalk and set obliquely; ocular scales small, bases fused and apices divergent. Antennular peduncle short, less than half the carapace length, dorsal processes of antennular somites visible on either side of rostrum as anterolaterally directed strong spiens. Antennal peduncle with 1 dorsal and 1 ventral papillae; antennal scales short, less than half the carapace length. Rostrum as long as wide, median spine short and stout, lateral margins parallel, anterolateral angles rounded. Carapace smooth, only gastric groove distinctly marked, not narrowed anteriorly, antero and posterolateral angles broadly rounded. Dactylus of raptorial claw with 6 teeth, outer margin with two projections basally : distal large and angular and the proximal smaller and narrowly angled; propodus with 4 proximal movable spines and normal pectination, dorsal ridge of carpus terminating in a slender spine. Mandibular palp present, three segmented. Exposed thoracic somites smooth, broad and lateral margins subtruncate. Abdominal somites broad, smooth and only the 6th with slender posterolateral spines. Telson broader than long with a dorsal fan of 5 spines above posterior margin, marginal teeth consisting of 1 movable submedian and 4 fixed teeth on either side of midline; submedian denticles 12, arranged in semi circle; intermediate, lateral and marginal with 1 denticle each. Uropodal exopod with 8 movable spines on outer margin of Proximal segment - distalmost extending to middle of distal segment; uropodal endopod with a strong triangular fold on proximal margin; inner spine of basal prolongation of uropodal protopod longer than outer.

Colour : Rostrum pitted with scattered dark sports. Carapace with three dark and broad transverse bands. Last 3 thoracic and all abdominal somites with dark and broad transverse bands. Telson with a pair of broad dark patch near posterior margin. Inner half of distal segment of uropodal exopod and the entire endopod suffused with dark.

Measurement : Holotype (M) : Total length : 78.0 mm; length 14.5 mm, width 15.0 mm; Rostrum : Length 4.0 mm, width 4.0 mm; cornea width 12.6 mm; Antennular peduncle length : 5.0 mm; antennal scale length 6.3 mm; Telson : length 6.2 mm, width 11.7 mm. Paratype : 1 (M) : Total length : 70.0 mm; carapace : length 12.5 mm; width 12.6 mm; width 12.6 mm; Rostrum : Length 3.5 mm; width 3.6 mm; cornea width 2.5 mm; Antennular peduncle length : 4.5 mm; Antennal scale length 5.0 mm; Telson : Length 6.0 mm, width 11.5 mm. Affinities : The new species, A. dighaensis belongs to a group three other member of the genus viz. A. tigrina (Nobili, 1903) A. vicina (Nobili, 1904) and A. humesi Manning 1968b all having 4 pairs of immovable marginal teeth an telson of which only the last one has so far been reported from India (Ghosh, 1984). The new species can be distinguished from A. vicina in lacking a trispinous rostrum and from *A. tigrina* in the absence of posterior ventral spines on the 6th abdominal somite and from both in having only 6 teeth on the dactylus of raptorial claw instead of 10-11 teeth in the other two species.

A. dighaensis is closer to *A. humesi* in the structure of the rostrum and fewer number of teeth on the dactylus of raptorial claw. However, the new species differs substantially from A. humesi and the main points of differences between the two are as follows : in *A. dighaensis* the lateral margins of the rostrum are parallel, the submedian denticles of telson are set in semi circle and the outer margins of Proximal segment of uropodal exopod bears 8 movable spines whereas in *A. humesi* the lateral margins of rostrum are narrowed anteriorly, the submendian denticles of telson are set in a transverse row and the outer margin of Proxomal segment of uropodal exopod bears 7 teeth.

22. ***Acanthosquilla multifasciata*** (Wood-Mason)

1895. *Lysiosquilla multifasciata* Wood-Mason, Figs. and Desc. nine aquillidae 1895 : 1, pl. 1, fig. 4-7

1963. *Acanthosquilla multifasciata* : Manning, Bull. mar. sci., Gulf-Caribb, 13 (2) : 319.

Material examined : 1 (M) (TL 62 mm); Sundarban, S. 24 Parganas : R. S. Pillai :- (Raptorial claw missing). 1 (M) (TL 60 mm) : Digha beach Medinipur District; D. R. K. Sastry : 21.2.1988.

Description : Eyes small, cornea subglobular. Antennal scales short, antennal propods with 1 - dorsal and 1 ventral papilla. Rostrum subquadrate with slender apical spine. Carapace smooth, gastric groove distinct. Dactylus of raptorial claw with 5 teeth, outer margin with two basal lobes. Telson broader than long, with 2 pairs of fixed marginal teeth, submedian denticles 12, movable and arranged in a transverse row; dorsal surface with a fan shaped row of five spines above posterior margin. Proximal segment of uropodal exopod with 7 movable spies on outer margin; endopod with strong fold on outer margin.

Colour : Of the two specimens examined colour in one is completely faded. Colour markings noticed in the other specimen are as follows : Rostrum pitted with dark dots. Carapace bears three transverse, dark bands. Exposed thoracic and all abdominal segments with dark broad transverse bands. Telson with a pair of dark bands below anterior margin. Uropodal endopod pitted with dark dots.

Distribution : India : West Bengal - 24 Parganas (S) and Medinipur District; Tamil Nadu, Andaman Island and Maharashtra. Elsewhere : Red Sea to Japan.

Remarks : The distinguishing features of A. multifasciata from A. acanthocarpus and A. dighaensis, new species has been discussed along with the later species. The species is reported herein from West Bengal Bengal for the first time.

GENERAL REMARKS

West Bengal has a coastline of 210 km. extending over the districts of Medinipur and South 24 Parganas. The material for this study also includes species reported by Kemp (1913). Wood-Mason (1895) and Chopra (1934) from Sandheads off the Hooghly river mouth.

The coastal Medinipur area, beside having a few patches of muddy shores - exposed during low tides has a long sandy shoreline opening directly to the sea. Beside the new species, Acanthosquilla dighaensis, 4 other species Harpiosquilla raphidea, Cloridopis bengalensis, Oratosquilla interrupta and Acanthosquilla multifasciata are reported herein from this zone for the first time though they are known to occur also in the Sunderbans.

The coastal area of South 24 Parganas is dominated by Sundarbans a well known ecosystem dominated by Mangroves in the Gangetic delta. The back water environments of Sundarbans comprises a number of lowlying islands and mangrove swamps intersected form north to south by several rivers, canals and creeks. The salinity of water of this entire zone is maintained by daily tidal bores from the Bay of Bengal. The muddy bottoms of these waters bodies together withrich micro-nutrients and moderately saline water provides an ideal breeding ground for several crustacean species including stomatopods. 11 species are included in this report from the Sundarbans of which Alima supplex, Carinosquilla multicarinata and Acanthosquilla multifasciata are new to West Bengal.

The Sandhead is part of the open sea with an average depth of 36 meters. The salinity of water is higher than the other two zones and the bottom consist of mud or sand mixed with mud. This report includes 14 species from the sandheads of which only Dictyiosquilla foveolata represent the first record of the genus and species from the Indian waters while the rest are already known from this area.

The entire West Bengal coast lacks rocks and coral beds and as such species associated with such habitats (and belonging to the families - Gonodactyolidae, Protosquillidae and Pseudosquillidae) are totally absent.

More common forms of stomatopods are caught in huge numbers in fishing nets from coastal inshore and back water zones of West Bengal espeically during the local fishing season extending from October to March along with other fishwaste. Though stomatopods are not relished as human diet they are, however, sundried and marketed as poultry feeds.

SUMMARY

The present study is based on named and unnamed material of stomatopods housed in the Zoological Survey of India from the coastal waters of West Bengal and also from available literature. All the 16 species reported earlier were collected from offshore areas in and around the sandheads. The present report includes 6 additional species from the shallow back water zones of Sundarban and Medinipur District of which 5 are new records and 1 new to science. A brief taxonomic account of all the 22 species has been provided.

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FRESH WATER BRYOZOA

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INTRODUCTION

Fresh water bryozoa belongs to smaller coelomate groups comprising five families of the phylum Bryozoa with relatively simple body organisation. They live in the aquatic environment of ponds, water reservoirs, lakes, streams and adhering to the surface of the substratum i.e., aquatic weeds, logs, stones, bricks, etc. They live together in the form a colony, usually yellowish brown, pinkish brown, dark brown, reddish brown, green or black in colour.

Literature of the fresh water bryozoa of India reveals that very little attention has been paid to this group. Only Annandale (1911) has dealt with the group covering the whole India. Others like Roonwal (1969) made a collection of bryozoans from Rajasthan which was worked out by Rao (1976) whereas Rao (1972) made a taxonomic review of bryozoans from Narmada system, Rao *et al.* (1962) provided an account of bryozoans from Vindhyan region. As a result of these works, seventeen species have so far been recorded from India, out of which nine species are reported from West Bengal.

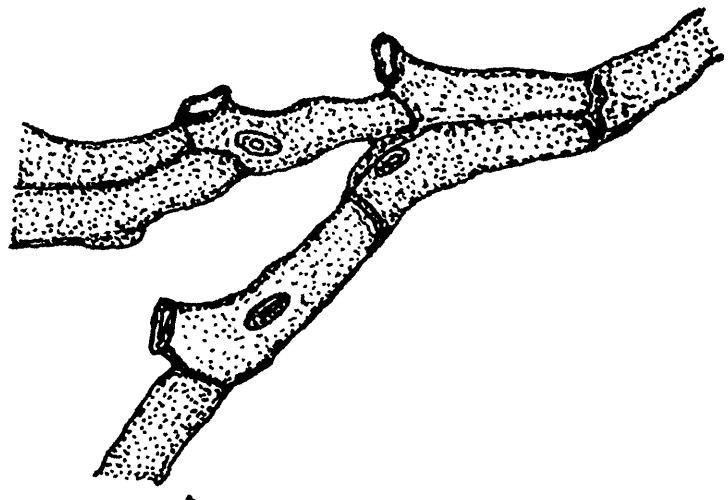
The present work is an attempt to study the systematics of the group of the state. Material for the study was collected through field surveys from all the districts of West Bengal at various seasons of the year between April, 1986 and March, 1988. The material so far collected is represented by eight species under four genera and two families, none of them is new to science but all the species show new locality records. The present paper deals with the synonymy (original and latest ones), diagnostic characters, distribution together with key to identification of nine species. In addition to this, a general account of morphology and terminology as well as methods of narcotization and preservation, and tables (I and II) showing districtwise and statewise distribution of the species, have also been included.

MORPHOLOGY AND TERMINOLOGY

Polypide : It is an organ connected directly and indirectly with nutrition and a part of the muscular system and also retractile in nature.

Zooecium : It is a living cage in which polypide is enclosed. The shape and structure varies greatly in different groups in its simplest form it is a cylindrical tube of living matter which secrets an outer horny or gelatinous covering. It possess an apical aperture "orifice" through which certain parts of polypide can always be extruded or withdrawn into it along with a portion of the former. Zooecia of a colony may be separated but are contiguous with walls in contact or in common.

Lophophore or Tentacular crown : It consists of a body wall extension being subdivided distally into a single row of ciliated tentacles. All parts of the lophophore are hollow, having a continuous coelomic cavity. It is circular or horse shoe-shaped surrounding the mouth.



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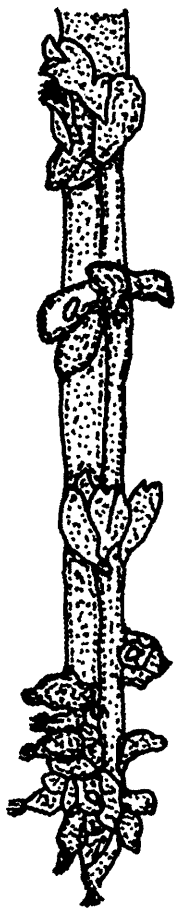

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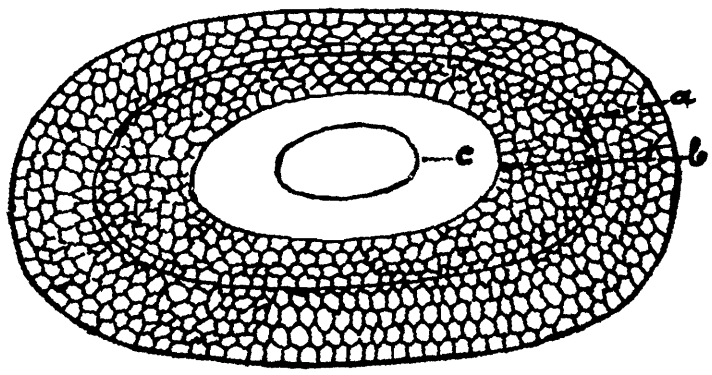

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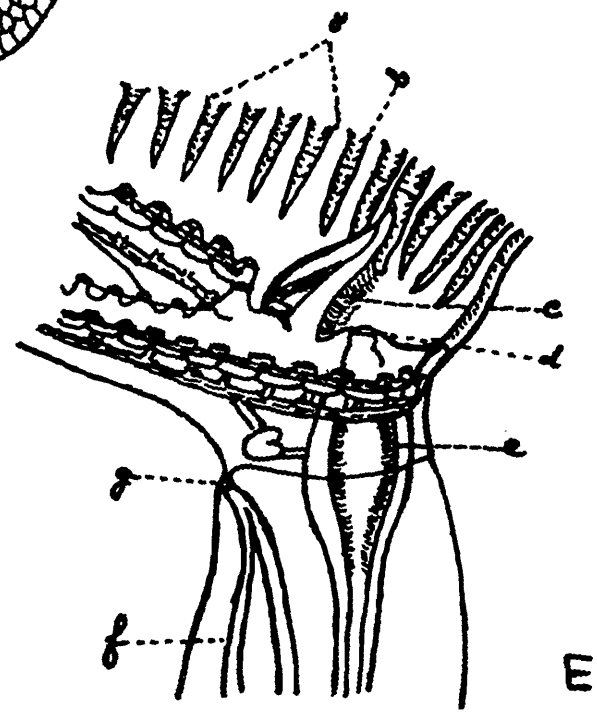

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Text-fig. (A-C) Portions of Colony - A. Plumatella fruticosa; B. Hislopia lacustris; C. Stolella indica.

D. Outlines of free statoblasts of Plumatella (enlarged); a = Outline of capsule; b = limit of swim-ring on ventral surface; c = limit of swim-ring on dorsal surface.

E. The lophophore of Plumatellidae; a = tentacles; b = velum; c = epistome; d = mouth; e = oesophagus; f = intestine; g = anus.

Tentacles : They serve as organs for capture of prey but are not highly contractile and not provided with nettle cells but are covered with cilia. In extruded stage they form a conspicuous calix-like crown to the zooecium but in retracted condition they are closely packed together and lie parallel to one another.

Mouth : It is a hole situated in the midst of the tentacles and leads directly into a funnel-shaped oesophagus.

Statoblast : It is flattened and has a circular, oval or approximately oval outline. It consists essentially masses of cells enclosed in a capsule with thick horny walls. This capsule is surrounded by a "swim-ring" composed of mass of horny walled chambers filled with air. Sometimes margin of the "swim-ring" bears peculiar hooked processes.

NARCOTISATION AND PRESERVATION

The living specimens are placed in a glass tube nearly filled with clean water and allowed to expand their tentacles. 2% aqueous solution of cocaine, 2-3 drops at a time, are gradually dropped in the water containing fully expanded specimens and the process is to be continued until tentacular movement ceases. Then commercial formaldehyde solution is to be added drop by dorp. The material is to be kept as it is for half an hour. For anatomical investigation the material is to be washed thoroughly with tap water and treated with different alcoholic grade (up to 90%). For museum purpose the material is to be kept permanently in 8% formalin.

Statoblast : It is the asexual reproductive body and to be treated with strong nitric acid for a few minutes. Then acid is to be removed from the statoblast with water, and the material after passing through different alcoholic grade and oil of cloves is to be mounted on a slide with a small quantity of canada balsum under a cover slip, taking care that the statoblast lie parallel to the latter.

SYSTEMATIC ACCOUNT

A. Class GYMNOLAEMATA

Order CTENOSTOMATA

I. Family PALUDICELLIDAE

1. Genus ***Victorella*** Kent

(1) *Victorella bengalensis* Annandale

II. Family HISLOPIIDAE

2. Genus ***Hislopia*** Carter

(2) *Hislopia lacustris* Carter

(3) *Hislopia moniliformis* Annandale

B. Class PHYLACTOLAEMATA

III. Family PLUMATELLIDAE

3. Genus ***Plumatella*** Lamarck

   (4) *Plumatella diffusa* Leidy

   (5) *Plumatella emarginata* Allman

   (6) *Plumatella fruticosa* Allman

   (7) *Plumatella javanica* Kraepelin

4. Genus ***Hyalinella*** Jullien

   (8) *Hyalinella punctata* (Hancock)

5. Genus ***Stolella*** (Annandale)

   (9) *Stolella indica* Annandale

KEY TO CLASSES

Polypides with epistome projecting upwards and forwards within the circle of tentacles..... anus; zooecia not distinct from one another..... Phylactolaemata

Polypides without epistome; zooecia distinctly separated from one another by transverse perforated plates..... Gymnolaemata

A. Class Gymnolaemata

Polypides without epistome; zooecia distinctly separated from one another by transverse perforated plates; majority of zooecia in each zoarium more or less flattened but some of them often modified to form "vibracula" and "avicularia" In some zooecia provided with a collar-like membrane; and usually more or less tubular; in some zooecia provided neither with a lip nor with a collar-like membrane, tubular and usually with circular orifices.

Order Ctenostomata

Zooecium simple, flexible, uncalcified and composed of chitinous cuticle, usually more or less tubular in shape and provided with a collar-like membrane; orifice lacking a closing-apparatus; heterozooids other than kenozooids in the form of stolons and rhizoids lacking.

KEY TO FAMILIES

1. Zoarium recumbent or erect, and formed typically either of zooecia arising directly in cruciform formation from one another, or of zooecia joined together in similar formation with the intervention of tubules arising from their own bases; zooecia tubular and with a terminal or sub-terminal orifice, angulate or subangulate in shape ..... Paludicellidae

2. Zoarium recumbent, often forming an almost uniform layer on solid subjects; zooecia flattened, adherent; with dorsal orifice, square or subquadrate ..... Hislopiidae

I. Family PALUDICELLIDAE

Diagnosis : Zoarium recumbent or erect, and formed either in cruciform formation of zooecia or joined together in similar formation with intervention of tubules arising from their own bases; orifice of zooecia appears to form four flaps or valves; tentacles 8 in most species, but 16 in *Paludicella.*

Remarks : In this family only Victorella is recorded from West Bengal.

1. Genus *Victorella* Kent

1870. *Victorella* Kent, *Quat. Jl. Micros. Sci.*, **10** : 34.

1911. *Victorella* : Annandale, *The Fauna British India* : 194.

Diagnosis : Zoarium consists primarily of a number of erect or semi-erect tubular zooecia joined together at base in a cruciform manner by slender tubules; adventitious buds and tubules produced, often in large numbers, round the terminal region of zooecia, and these buds often separated from their parent zooecium by a tubule of considerable length, and rooted among other zooecia at a distance from their point of origin; regular arrangement of zooecia difficult to recognise in the tangled mass thus formed; terminal upturned part of zooecia increases rapidly, while horizontal basal part remains almost stationary and finally appears as a mere swelling at base of an almost vertical tube, in which polypide contained; adventitious buds and tubules arranged more or less regularly round terminal part; parietal muscles absent; polypide with 8 slender tentacles, thickly covered with short hairs.

Habitat : Members of this genus although are found in freshwater, occurs more commonly in brackish water and also known to exist in littoral zone of the sea.

1. *Victorella bengalensis* Annandale

1907. *Victorella pavida* Annandale (nec Kent), *Rec. Ind. Mus.* **1** : 200, fig. 1-4.

1911. *Victorella bengalensis* Annandale, *The Fauna British India* : 195.

Diagnosis : Mature zoarium resembling a thick fur, hairs of which represented by elongate, erect, slender tubules (zooecia), arrangement of the whole very irregular and complicated; base of zoarium often consisting of an irregular membrane formed of matted tubules, being agglutinated together by a gummy secretion; zooecia when young practically recumbent, each being of an ovoid form and having a stout, distinctly quadrate orificial tubule projecting upwards and slightly forwards near anterior margin of dorsal surface; a single tubule at this stage often of great relative length, given off near orifice, bearing a bud at its free extremity; buds produced near the tip in considerable profusion and afterwards produce grand daughter and great-grand daughter buds, often connected together by short tubules; polypide with 8 slender tentacles, thickly covered with short hairs; resting buds somewhat variable in shape but always flat with irregular cylindrical or subcylindrical projections round the margin, where horny coat thinner than on the upper surface which is either smooth or longitudinally ridged.

Habitat : V. bengalensis usually found coating on roots and stems of aquatic vegetation that grows in and near brackishwater, and on sticks that have fallen into water. It also spreads over surface of bricks and sometimes they grow on living shell of common mollusc *Melania tuberculata.*

Distribution : India : West Bengal : Calcutta, Ganges delta, Salt lake; Tamil Nadu.

II. Family HISLOPIIDAE

Diagnosis : Zoarium recumbent, often forming an almost uniform layer on solid subjects; zooecia flattened, adherent with dorsal orifice, either surrounded by a chitinous rim or situated at tip of an erect chitinous tubule; parietal muscles absent.

Remarks : In this family only *Hislopia* is recorded from West Bengal.

2. Genus ***Hislopia*** Carter

1858. *Hislopia* Carter, *Ann. Nat. Hist.* (3)**1** : 169.

1976. *Hislopia* : Rao, *Rec. zool. Surv. India,* **69** : 331.

Diagnosis : Zoarium consisting primarily of a main axis running in a straight line, with lateral branches pointing forwards and outwards, zooecia arising directly one from anothr having an orifice surrounded by a chitinous rim; polypide with 12 to 20 tentacles; funiculus rudimentary or absent.

Key To Species

1. Zooecia irregularly oval, posterior extremity being often narrower than anterior..... ..... *H. lacustris* Carter
2. Zooecia almost circular but truncate or concave anteriorly and posteriorly ....*H. moniliformis* Annandale

2. ***Hislopia lacustris*** Carter

858. *Hislopia lacustris* Carter, Ann. Mag. Nat. Hist., (3) **1** : 169.

1976. *Hislopia lacustris* : Rao, *Rec. zool. Surv. India,* **69** : 331.

Material : (1) Bankura Dist. - 1 Colony, Aral Bansi, 27,xi.1986; 5 colonies, Jamuna Bandh, Vishnupur, 28.xi.1986; 10 colonies, Saltora, 29.xi.1986; 10 colonies, Susunia, 2.xii.1986; coll. T. K. Samanta.

(2) Barddhaman Dist. - 1 colony, Andalgram, 3.xii.1986; 5 colonies, Galsi, 6.xii.1986; 5 colonies, Tarabag Sayer, 8.xii.1986; 10 colonies, Krishnasayer, 8.xii.1986; coll. T. K. Samanta.

(3) Hugli Dist. 5 colonies, Chinsurah, 12.xii.1986; coll. T. K. Samanta.

(4) Malda Dist. - 5 colonies, Vaishnavnagar, 12.xi.1987; 5 colonies, Patalchandi, 12.xi.1987; 5 colonies, Bamongola, 13.xi.1987; 7 colonies, Gajal, 14.xi.1987; 10 colonies, Manikchak, 15.xi.1987; coll. T. K. Samanta.

(5) Medinipur Dist. - 8 colonies, Swetpura, 26.iii.1986; 6 colonies, Garbeta, 27.iii.1986; 5 colonies, Ghatal, 28.iii.1986; Coll. T. K. Samanta.

Diagnosis : Zoarium forms a flat, more or less solid layer and closely adherent to foreign objects with radiating branches at edges but forms narrow, closely-compressed masses when growing on slender twigs or stems of water plants; zooecium never grows over another and variable in shape, irregularly oval, posterior extremity being often narrower than anterior while triangular or almost square shaped zooecia often observed; orifice on a slight eminence nearer anterior than the posterior margin of dorsal surface and surrounded by a strong chitinous rim, square or subquadrate in shape; zooecium usually surrounded by a chitinous margin; polypide with 12 to 20 tentacles, but usually 16 in number.

Habitat : Attached to slender twigs, stems of water plants.

Distribution : India : West Bengal - Bankura, Barddhaman, Calcutta, Hugli, Malda, Medinipur; Madhya Pradesh; Maharashtra; Orissa; Tamil Nadu; Uttar Pradesh.

Outside India : Africa; Europe, West Germany, Russia, Japan; Burma; America.

Remarks : The material conforms in general with the specimens identified and recorded by Annandale (1911) from Calcutta. Overgrowth of colonies was observed in the material studied as well as reported by Rao (1976) but Annandale (1911) reported "one zooecium, however, never grows over another" Present survey indicates that besides Calcutta it occurs in several districts of West Bengal.

3. ***Hislopia moniliformis*** Annandale

1907. *Hislopia lacustris* sub. sp. *moniliformis* Annandale *J. Asiat. Soc. Bengal,* **11** (2) : 83-97.

1976. *Hislopia moniliformis* : Rao. *Rec. zool. Surv. India,* **69** : 332.

Material : (1) Howrah Dist. - 2 Colonies, Bagnan, 7.iv.1986, T. K. Samanta.

(2) Medinipur Dist. - 8 Colonies, Belda, 25.iii.1986; 1 Colony, Garbeta, 28.iii.1986; Coll: T. K. Samanta.

Diagnosis : Zooecia almost circular but truncate or concave anteriorly and posteriorly forming linear series with few lateral branches.

Habitat : Attached more commonly to the leaves of *Vallisneria spiralis* but occasionally found on the shell of *Vivipara bengalensis.*

Distribution : India : West Bengal - Calcutta, Howrah, Medinipur and Murshidabad districts; Madhya Pradesh; Maharashtra; Kashmir.

Outside India : Germany; Burma.

Remarks : H. moniliformis occurs sparingly as compared with the cosmopolitan *H. lacustris.* Annandale (1911) reported this species from lower Bengal only, but now it is known from other parts of West Bengal.

B. Class PHYLACTOLAEMATA

Zooecia never distinct from one another and their orifices circular; polypide possess a leaf-like ciliated organ, epistome, arising within the lophophore between mouth and anus and projecting upwards and forwards over mouth; lophophore either horseshoe-shaped or circular; tentacles webbed at base; statoblast, a peculiar reproductive body, present.

III. Family PLUMATELLIDAE

Diagnosis : Lophophore horseshoe-shaped; ectocyst well developed but not specialised to form an organ of progression; statoblasts provided with "swim-ring" having chitinous chambers containing air.

Remarks : The material studied possessed statoblast without marginal processes.

KEY TO GENERA

1. Zooecia flat, embedded in a gelatinous investment ..... ***Hyalinella*** Jullien
– Zooecia cylindrical, not embedded in a gelatinous investment 2
2. Zooecia arising directly from one another; no stolen ..... ***Plumatella*** Lamarck
– Zooecia arising singly or in groups from an adherent stolon ..... ***Stolella*** Annandale

3. Genus *Plumatella* Lamarck

1816. *Plumatella* Lamarck, *Animan sansvert* (ed. Ire) **2** : 106.

1976. *Plumatella* : Rao, *Rec. zool. Surv. India,* **69** : 334.

Diagnosis : Zoarium dendritic, recumbent, erect or partly recumbent and partly erect; zooecia tubular, not confined in a gelatinous syoecium; ectocyst usually horny; statoblasts of two kinds : free and stationery; polypide with less than 65 tentacles.

KEY TO SPECIES

1. Ectocyst by no means, of a uniform pale colour; zooecia straight, curved or sinuous, elongate, cylindrical but never emarginate or furrowed ..... *P. fruticosa* Allman
– Ectocyst rigid; zooecia emarginate and furrowed 2
2. Ectocyst pigmented 3
– Ectocyst colourless ..... *P. javanica* Kraepelin
3. Zooecia straight or slightly curved or sinuous ..... *P. emarginate* Allman
– Zooecia distinctly L-shaped ..... *P. diffusa* Leidy

4. *Plumatella diffusa* Leidy

1852. *Plumatella diffusa* Leidy, *P. Ac. Philad.,* **5** : 261.

1911. *Plumatella diffusa* : Annandale, *The Fauna. British India,* p. 223.

Material : (1) Bankura Dist. 5 Colonies, Aral Bansi, 27.xi.1986, coll : T. K. Samanta.

(2) Barddhaman Dist. - 3 colonies, Andalgram, 3.xii.1986; 3 Colonies, Katwa, 5.xii.1986; 2 colonies, Galsi, 6.xii.1986; coll. T. K. Samanta.

(3) Jalpaiguri Dist.- 4 colonies, Lataguri, 11.iv.1987, coll. J. Pattanayek.

(4) Malda Dist. - 15 Colonies, Vaishnavnagar, 12.xi.1987, coll. T. K. Samanta.

(5) Medinipur Dist. - 4 colonies, Keranitolla, 26.iii.1986, coll. T. K. Samanta.

(6) Murshidabad Dist. 2 colonies, Farakka, 22.ix.1983, coll. T. K. Samanta.

(7) Purulia Dist. 4 colonies, Bagmundi, 3.iv.1986, coll. T. K. Samanta.

(8) West Dinajpur Dist. 10 colonies, Karandighi, 6.iv.1987, coll. T. K. Samanta.

Diagnosis : Zoarium covers a considerable area on flat surfaces and sometimes found crowded together on the stems of plants; upright branches occur rarely and never consist of more than three zooecia; zooecia distinctly L-shaped, long limb usually adherent; zooecia cylindrical and as a rule obscurely emerginate and furrowed; ectocyst stiff, never deeply pigmented, free statoblasts produced in very great profusion and vary considerably as regards size and outline while fixed statoblasts resembling those of *P. emarginata;* capsule large, its sides convex outwards and the extremity more or less broadly rounded; polypide shorter and stouter than that of *P. emarginata.*

Habitat : Floating objects i.e., stems of certain water-plants, stones, bricks at the edge of ponds.

Distribution : India : West Bengal - Bankura, Barddhaman, Calcutta, Jalpaiguri, Malda, Medinipur, Murshidabad, Purulia and West Dinajpur districts; E. Himalayas; Punjab; Sikkim.

Outside India : Europe, Pakistan; Bangladesh; North-America.

Remarks : *P. diffusa* in Lower Bengal is a clod weather species.It is remarkable for the enormous number of gemmules it produces. Annandale (1911) reported it from Calcutta and neighbourhood, but now it is known from several other districts of West Bengal.

5. ***Plumatella emarginata*** Allman

1844. *Plumatella emarginata* Allman, *Ann. Mag. nat. Hist. Ser.*, **1**, 13 : 320.

1976. *Plumatella emarginata* : Rao, Rec. zool. Surv. India, **69** : 334.

Material : (1) Birbhum Dist. - 5 colonies, Sainthia, 28.ix.1983, coll. T. K. Samanta.

(2) Malda Dist. - 2 colonies, Gajal, 14.xi.1987, coll. T. K. Samanta.

(3) Murshidabad Dist. - 3 colonies, Jangipur, 24.ix.1983, coll. T. K. Samanta.

(4) Nadia Dist. - 8 colonies, Nabadweep, 17.ix.1983, coll. T. K. Samanta.

(5) West Dinajpur Dist. - 2 colonies, Karandighi, 6.iv.1987, coll. T. K. Samanta.

Diagnosis : Zoarium-dichotomously branched and sometimes entirely recumbent; zooecia almost equal in width throughout, slender, and moderately elongate when recumbent; ectocyst stiff, emarginate at tip and more or less distinctly furrowed on the dorsal surface; free statoblasts elongate and truncate or sub-truncate at the extremeties, sides being as a rule straight and parallel; capsule relatively much broader than the swim-ring; fixed statoblasts oval shaped, usually found in old colonies; polypide about 40 tentacles.

Habitat : Stones, bricks and stems of water-plants in pond.

Distribution : India : West Bengal - Birbhum, Calcutta, Malda, Murshidabad, Nadia and West-Dinajpur districts; Madhya Pradesh; Tamil Nadu.

Outside India : Africa; Europe; Southern Asia; Australia; North America.

Remarks : Although it is essentially a cold weather species in Calcutta, but sometimes found in a living condition during the "rains" Annandale (1911) reported this species from Calcutta only but now, it is known from several districts of West Bengal.

6. ***Plumatella fruticosa*** Allman

1844. *Plumatella fruticosa* Allman, *Ann. Mag. nat. Hist. Ser.* **1**, 13 : 328.

1976. *Plumatella fruticosa* : Rao, *Rec. zool. Surv. India,* **69** : 338.

Material : (1) Birbhum Dist. - 11 Colonies, Bolepur, 29.ix.1983, coll. T. K. Samanta.

(2) Koch-Behar Dist. - 1 colony, Toofanganj, 18.iv.1987, coll. T. K. Samanta.

(3) Murshidabad Dist. - 1 colonly, Farakka, 22.ix.1983; 3 colonies, Kandi, 23.ix.1983, coll. T. K. Samanta.

(4) Nadia Dist. 5 Colonies, Krishnanagar, 16.ix.83, coll. T. K. Samanta.

Diagnosis : Zoarium in the typical form loose in appearance and ectocyst by no means rigid; branching lateral and as a rule occurs chiefly on one side of a main branch or trunk; zooecia cylindrical and bear a simple keel on their dorsal surface; never emarginate or furrowed; ectocyst thin, colour usually uniform pale pinkish brown and fading little towards the tip of the zooecium; both free and stationary statoblasts formed, but stationary statoblasts rare in occurrence; free statoblasts very elongate; capsule relatively large, resembling swim-ring in outline and its sides distinctly convex and ends rounded; polypide about 40 to 50 tentacles and not festooned at base.

Habitat : The stems of aquatic plants, floating seeds and logs, stones and bricks in the pond.

Distribution : India : West Bengal - Birbhum, Koch-Behar, Ganges delta, Murshidabad and Nadia districts; Himalayan region; Kerala; Maharashtra; Orissa; Rajasthan.

Outside India : Africa; Europe, Pakistan; Bangladesh; N. America.

Remarks : *P. fruticosa* in lower Bengal is a cold weather species. Annandale (1911) reported this species from Calcutta and Gangetic delta, but now it is known from several other districts of West Bengal.

7. ***Plumatella javanica*** **Kr**aepelin

1906. *Plumatella javanica* Kraepelin, *Mitt. Nat. Mus. Hamburg,* **23** : 123.

1976. *Plumatella javanica* : Rao, *Rec. zool. Surv. India,* **69** : 339.

Material : (1) Hugli Dist. 4 colonies, Janai Road, 11.xii.1986, coll. T. K. Samanta.

(2) Howrah Dist. 4 colonies, Domjur, 5.iv.1986; 4 colonies, Mourigram, 6.iv.1986; 1 colony, Amta, 6.iv.1986; coll. T. K. Samanta.

Diagnosis : Zoarium always entirely recumbent having lateral and irregular branches; zooecia slender, long, strongly emarginate and furrowed; ectocyst hyaline and colourless; free statoblasts with rounded extremities and sides slightly or distinctly convex; variable in length, either distinctly elongate or elongate only to a moderate degree; capsule relatively large, and free portion of the swim-ring not much broader at the ends than at the sides; fixed statoblasts elongate and surrounded by an irregularly-shaped chitinous membrane.

Habitat : Leaves of water-lilies, floating seeds and sticks, submerged leaves of *Pandani* and stems of water-plants in the pond.

Distribution : India : West Bengal Calcutta, Darjeeling, Hugli, Howrah and Murshidabad districts; Kerala; Madhya Pradesh; Tamil Nadu.

Outside India : Europe, China, Japan; Java; North America.

Remarks : The transparent glassy ectocyst and strong furrowed keel are very characteristic of this species. Annandale (1911) reported this species from Berhampore, Calcutta, Darjeeling and Murshidabad districts, but now it is known from other parts of West Bengal.

4. Genus ***Hyalinella*** Jullien

1885. *Hyalinella* Jullien, *Bull. Soc. zool. France,* **10** : 133.

1976. *Hyalinella* : Rao, *Rec. zool. Surv. India,* **69** : 340.

Diagnosis : Zoarium entirely recumbent and often appears to form an almost uniform flat layer instead of a dendritic body; orifice of the zooecium prominent; ectocyst almost gelatinous in nature, soft, swollen and contractile, and capable of transverse wrinkling all over the zooecium which never emarginate.

8. ***Hyalinella punctata*** (Hancock) Plumatella

1850. *Hyalinella punctata* Hancock, *Ann. Mag. Nat. Hist. Ser.* II, **5** : 173.

1976. *Hyalinella punctata* : Rao, *Rec. zool. Surv. India,* **69** : 340.

Material : (1) Bankura Dist. 5 colonies, Joyrambati, 1.xii.1986; 5 colonies, Susunia, 2.xii.1986; coll. T. K. Samanta.

(2) Jalpaiguri Dist. - 3 colonies, New Alipurduar, 17.iv.1987; coll. J. Pattanayek.

(3) Malda Dist. - 6 colonies, Bamongola, 13.xi.1987; coll. T. K. Samanta; 2 colonies, Chachal, 14.xi.1987; coll. T. K. Samanta.

(4) Medinipur Dist. - 5 colonies, Contai, 25.iii.1986; 5 colonies, Gope Garan, 26.iii.1986; 4 colonies, Dharma, 26.iii.1986; 5 colonies, Garbeta, 27.iii.1986; 5 colonies, Ghatal, 28.iii.1986; 5 colonies, Kolaghat, 29.iii.1986; 5 colonies, Gopiballavpur, 30.iii.1986; coll. T. K. Samanta.

(5) Murshidabad Dist. - 22 colonies, Kandi, 23.ix.1983; 10 colonies, Jangipur, 24.ix.1983; coll. T. K. Samanta.

(6) Purulia Dist. - 5 colonies, Saheb Bandh, 1.iv.1986; 4 colonies, Manbazar, 2.iv.1986; 4 colonies, Bagmundi, 3.iv.1986; 8 colonies, Raghunathpur, 4.iv.1986; coll. T. K. Samanta.

Diagnosis : Zoarium entirely recumbent and often appears to form an almost uniform flat layer instead of a dendritic body; zooecia greatly swollen with colourless or faintly brown gelatinous ectocyst and neither emarginate nor furrowed; stationary statoblasts absent; free statoblasts variable and often asymmetrical in outline, but free portion of swim-ring always of nearly equal diameter all round the periphery and the capsule relatively large. Polypide comparatively short and stout, and having 20 to 30 tentacles.

Habitat : Submerged bricks, woods, stones, leaves and stems of water plants in the pond and also the tips of creepers falling into water in the pond.

Distribution : India : West Bengal - Bankura, Calcutta, Jalpaiguri, Malda, Medinipur, Murshidabad and Purulia districts; Madhya Pradesh; Rajasthan.

Outside India : Europe; North America.

Remarks : In West Bengal *H. punctata* flourishes both during the "rains" and in winter. Annandale (1911) reported this species from Calcutta and its adjoining areas but now it is known from several other parts of West Bengal.

5. Genus ***Stolella*** Annandale

1909. *Stolella,* Annandale, *Rec. Ind. Mus.,* **3** : 279.

1976. *Stolella:* Rao, *Rec. zool. Surv. India,* **69** : 341.

Diagnosis : Zoarium consisting of groups of zooecia joined together by an adherent rhizome; gelatinous investment absent; zooecia with fixed as well as free statoblast.

Adult zooecia resembling those of *Plumatella* except in being sometimes more or less upright.

9. ***Stolella indica*** Annandale

1909. *Stolella indica* Annandale, *Rec. Ind. Mus.*, **3** : 279.

1976. *Stolella indica* : Rao, *Rec. zool. Surv. India*, **69** : 341.

Material : (1) Bankura Dist. - 5 colonies, Saltora, 29.xi.1986; 10 colonies, Bheduasole, 30.xi.1986; 1 colony, Susunia, 2.xii.1986; coll. T. K. Samanta.

(2) Birbhum Dist. 10 colonies, Sainthia, 28.ix.1983; 1 colony, Bolpur, 29.ix.1983; coll. T. K. Samanta.

(3) Barddhaman Dist. - 10 colonies, Raina, 7.xii.1986.

(4) Hugli Dist. 2 colonies, Kamarpukur, 1.xii.1986; coll. T. K. Samanta.

(5) Howrah Dist. - 3 colonies, Shyampur, 7.iv.1986; coll. T. K. Samanta.

(6) Nadia Dist. - 12 colonies, Durgapur village, 16.ix.1983; 2 colonies, Nabadweep, 17.ix.1983; 8 colonies, Krishnanagar, 18.ix.1983: 10 colonies, Plassey, 25.ix.1983; coll. T. K. Samanta.

(7) Purulia Dist. - 6 colonies, Bagmundi, 3.iv.1986, coll. T. K. Samanta.

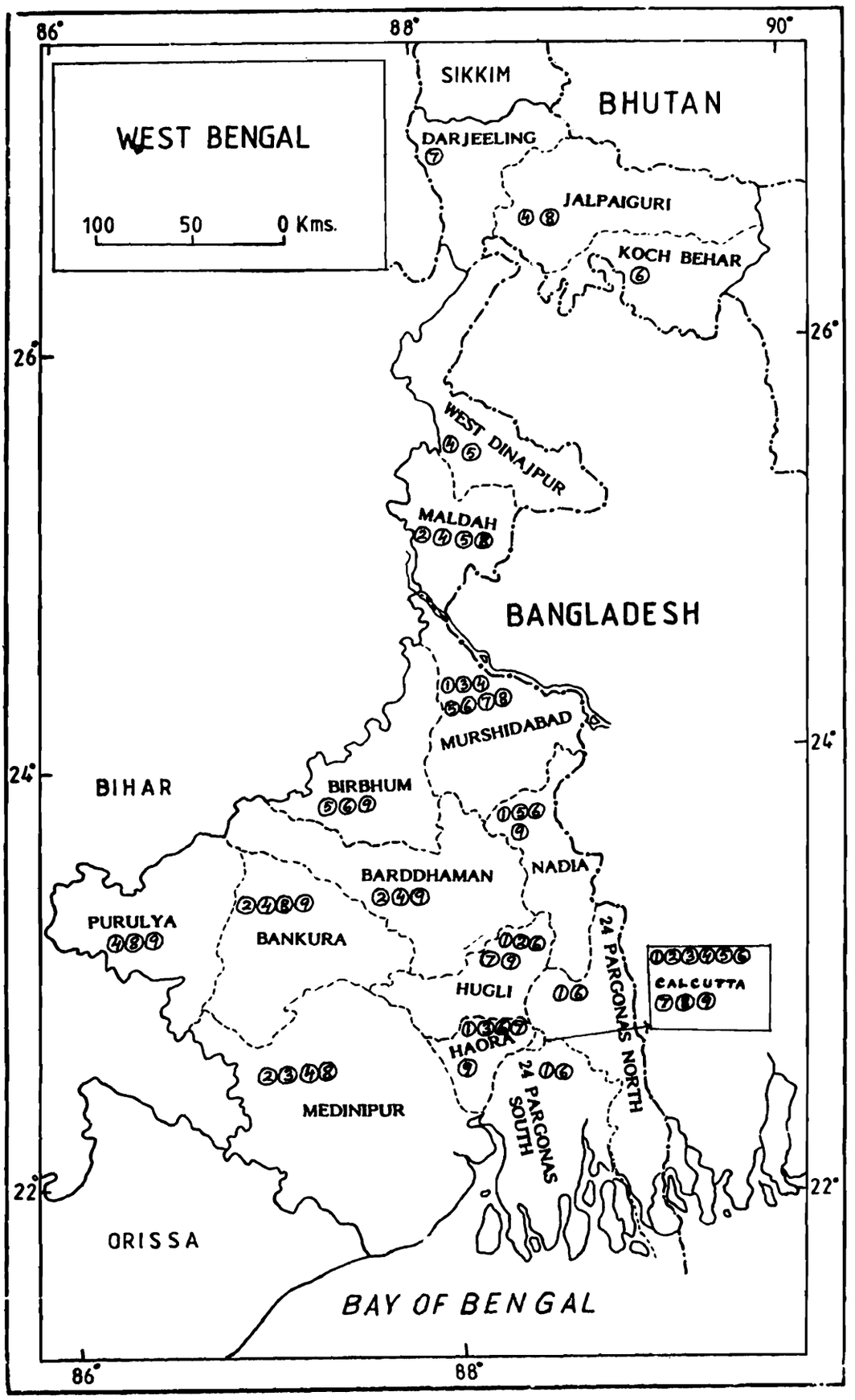
Diagnosis : Zoarium adherent and linear having neither lateral nor vertical branches; zooecia short and slender, erect, distinctly emarginate and furrowed; ectocyst soft, colourless and transparent but minutely roughened on the surface; both free and fixed statoblasts present and both variable in form, the latter varying in outline from circular to broadly oval; tentacles 30 to 35; rather short and stout, sometimes being slightly expanded at the tips.

Habitat : Roots of duckweed, stems of water plants, submerged rocks, dead leaves, sticks and barks in the pond.

Distribution : India : West Bengal - Bankura, Birbhum, Barddhaman, Calcutta, Hugli, Howrah, Nadia and Purulia districts; Indo-gangetic plain; Madhya Pradesh.

Outside India : North America.

Remarks : *Stolella indica* flourishes during rains. Annandale (1911) reported this species from Calcutta and its neighbourhood only, but now it is known from several districts of southern Bengal.



Serial Nos. 1-9 denotes the serial number of species.

TABLE 1

Districtwise distribution of fresh-water oligochaetes of West Bengal

Sl. No.	Name of the Species / Names of the District	Bankura	Birbhum	Bardhaman	Calcutta	Kochbihar	Darjeeling	Hugli	Howrah	Jalpaiguri	Malda	Medinipur	Murshidabad	Nadia	North 24 Parganas	Purulia	South 24 Parganas	West Dinajpur
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	*Victorella bengalensis* Annandale				+			+	+			+	+	+	+		+	
2.	*Hislopia lacustris Carter*	+		+	+			+			+	+						
3.	*Histopia moniliformis* Annandale				+				+			+	+					
4.	*Plumatella diffusa* Leidy	+		+	+		+			+	+	+	+			+		+
5.	*Plumatella emarginata* Allman		+		+						+	+	+					+
6.	*Plumatella fruticosa* Allman		+		+	+	+	+	+			+	+	+	+		+	
7.	*Plumatella javanica* Kraepelin				+		+	+	+				+					
8.	*Hyalinella punctata* (Hancock)	+			+					+	+	+	+			+		
9.	*Stolella indica* Annandale	+	+	+	+			+	+		+	+	+	+	+	+	+	

TABLE 2

Fresh-water Bryozoa of West Bengal - distribution in other states of India

Sl. No.	Names of States / Name of Species	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Gujarat	Himachal Pradesh	Karnataka	Kashmir	Kerala	Madhya Pradesh	Maharashtra	Manipur	Meghalaya	Mizoram	Orissa	Punjab	Rajasthan	Sikkim	Tamil Nadu	Tripura	Uttar Pradesh
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.	*Victorella bengalensis* Annandale																			+		
2.	*Hislopia lacustris* Carter										+	+				+				+		+
3.	*Hislopia moniliformis* Annandale								+		+	+										
4.	*Plumatella diffusa* Leidy		+	+									+	+	+		+		+		+	
5.	*Plumatella emarginata* Allman										+									+		
6.	*Plumatella fruticosa* Allman		+	+			+		+	+		+	+	+	+	+	+	+	+		+	+
7.	*Plumatella javanica* Kraepelin									+	+									+		
8.	*Hyalinella punctata* (Hancock)										+							+				
9.	*Stolella indica* Annandale			+		+		+			+						+					+

SUMMARY

The paper deals with a systematic account of 9 species under 5 genera, 3 families and two classes of fresh water Bryozoa hitherto known from West Bengal. Each of the species is provided with a synonymy, diagnostic characters, habitat and distribution. It also furnishes the keys to families, genera and species for their easy identification. A general account on morphology and terminology, and narcotisation and preservation have also been included.

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I am grateful to the Director, Zoological Survey of India, Calcutta, for kindly providing me with all sorts of facilities during the present investigation. I am indebted to Dr. A. K. Ghosh, Scientist 'SF' for his initiative and interest during the entire period of studies and for his valuable suggestions in connection with the preparation of this account. I am also thankful to Shri B. P. Halder, Assistant Zoologist, for his constant encouragement.

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ECHINODERMATA

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The coastal region of West Bengal comprising of only the South 24-Parganas and Midnapore Districts, is influenced by the large inflow of freshwater from the Hooghly River. Echinoderms being strictly marine inhabitants with limited tolerance to low salinities, are represented by only a few species along the coast of West Bengal, of which some are found only in subtidal depths away from the shore line. Reporting on the material collected by the R.I.M.S. *INVESTIGATOR*, A. H. Clark (1912, 1912a, 1932) recorded no crinoids from the West Bengal coast. Koehler (1910, 1922) reported only one species of asteroidea, *Astropecten euryacanthus* and two species of Echinoidea, *Clypeaster rarispinus* and *Echinodiscus auritus*, while Koehler and Vaney (1908) reported three species of Holothurioidea, *Stolus rapax*, *Thorsonia investigatoris* and *Acaudina molpadioides*, totalling to six species, all from the Hooghly River Mouth. The present study deals with 21 species of echinoderms thus adding 15 species to the fauna of West Bengal, including five species new to the Indian Coast.

Echinodermata known from West Bengal

ASTEROIDEA

Order PLATYASTERIDA

Family LUIDIIDAE

1. *Luidia hardwicki* (Gray)

Order PAXILLOSIDA

Family ASTROPECTINIDAE

2. *Astropecten euryacanthus* Luetken
3. *Astropecten indicus* Doederlein

Family GONIOPECTINIDAE

*4. *Goniopecten* sp.

Order VALVATIDA

Family GONIASTERIDAE

5. Goniodiscaster vallei (Koehler)
6. Stellaster equestris (Retzius)

OPHIUROIDEA

Order OPHIURIDA

Family AMPHIURIDAE

*7. *Amphioplus (Lymanella) hastatus* (Ljungman)

*8. *Amphioplus (Lymanella)* sp. near *laevis* (Lyman)

*9. *Amphiura (Ophiopeltis) tenuis* (H. L. Clark)

Family OPHIACTIDAE

*10. *Ophiactis delagoa* Balinsky

11. *Ophiactis modesta* Brock

Family OPHIOTRICHIDAE

12. *Macrophiothrix longipeda* (Lamarck)

13. *Ophiocnemis marmorata* (Lamarck)

ECHINOIDEA

Order DIADEMATOIDA

Family DIADEMATIDAE

14. *Chaetodiadema granulatum* Mortensen

Order TEMNOPLEUROIDA

Family TEMNOPLEURIDAE

15. *Temnopleurus toreumaticus* (Leske)

Order CLYPEASTEROIDA

Family CLYPEASTERIDAE

16. *Clypeaster rarispinus* de Meijere

Family LAGANIDAE

17. *Laganum decagonale* (de Blainville)

Family ASTRICLYPEIDAE

18. *Echinodiscus auritus* Leske

HOLOTHURIOIDEA

Order DENDROCHIROTIDA

Family CUCUMARIIDAE

19. *Stolus rapax* (Koehler and Vaney)

20. *Thorsonia investigatoris* (Koehler and Vaney)

Order MOLPADIDA

Family CAUDINIDAE

21. *Acaudina molpadioides* (Semper)

---

* species new to Indian coast

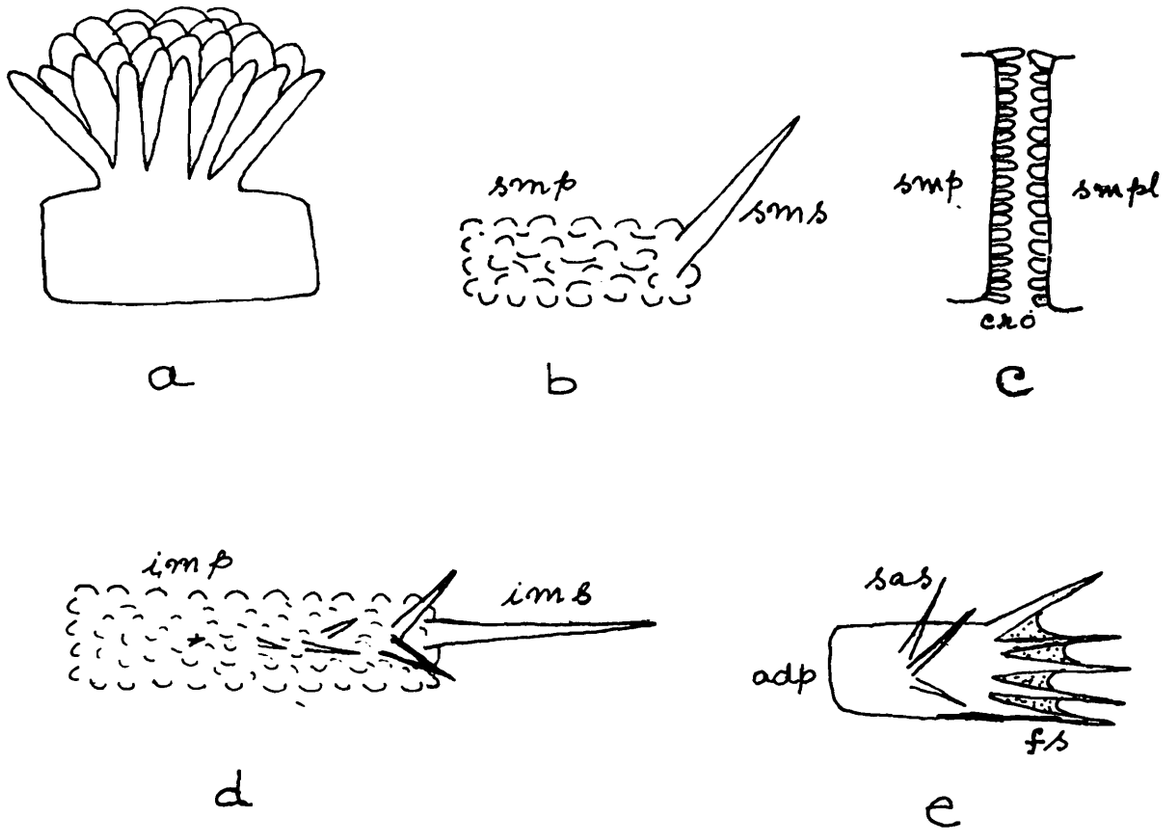
EXPLANATION OF MORPHOLOGICAL TERMS

Asteroidea (Text fig. 1) : *R* - major radius, from the centre of the disc to the tip of the arm; r - minor radius, from the centre of the disc to the interradial edge; *abactinal plates* plates on the upper side; *superomarginal plates* - plates bordering the arms on the abactinal side; *inferomarginal plates* - plates bordering the arms on the lower side; *adambulacral plates* plates bordering the ambulacral grooves; *paxillae* modified abactinal plates with a crown of spinelets; *furrow spines* spines on the margin of the adambulacral plates projecting into the ambulacral groove; *subambulacral spines* - spines on the actinal surface of the adambulacral plates; *actinal intermediate plates* - plates in the actinal interradial areas separating the oral and adambulacral plates from the inferomarginal plates; *cribriform organs* vertical series of plates in the furrows between successive marginal plates; *fascioles* furrows between adjacent marginal plates leading to the ambulacral groove on actinal side.

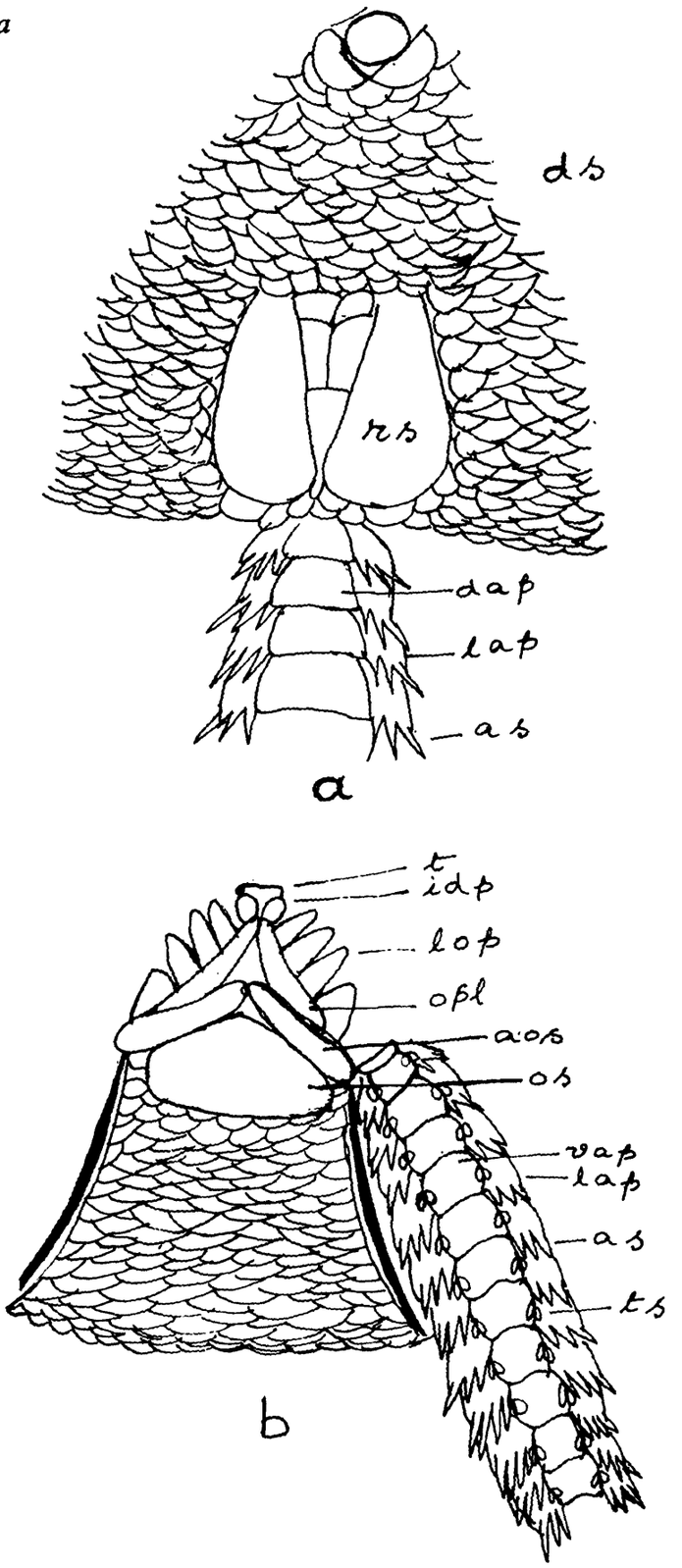
Ophiuroidea (Text fig. 2) : *disc* the central circular body from which the serpentine arms extend; *radial shields* - pairs of large scales on the upper side of the disc at the base of each arm; *arm plates* - plates on the dorsal, ventral and lateral aspects of arms; *arm spines* spines on the lateral arm plates; *oral shield* - large median plate in the ventral interradius in the distal part of the jaw apparatus; *adoral shields* - plates on either side of the oral shields; *oral plates* - a pair of plates projecting into the mouth opening; *infradental papillae* small rounded or conical structures at the tip of the jaw and below the coloumn of teeth; *lateral oral papillae* usually flat scale-like structures on the sides of the jaw.

Echinoidea (Text fig. 3) : *apical system* the compact unit of genital and ocular plates at the centre of the aboral side, includes also the anus in the regular echinoids; *ambulacra* the double series of plates with pore pairs; *interambulacra* the double series of plates without pore pairs and alternating with the ambulacra; *tubercles* button-like structures on the test plates; (*crenulate* with ridges on the base, *perforate* with a hole in the knob); *ambitus* - the widest circular area of the test in regular echinoids; *lunules* perforations in the posterior region of the test in certain members of the family Astriclypeidae.

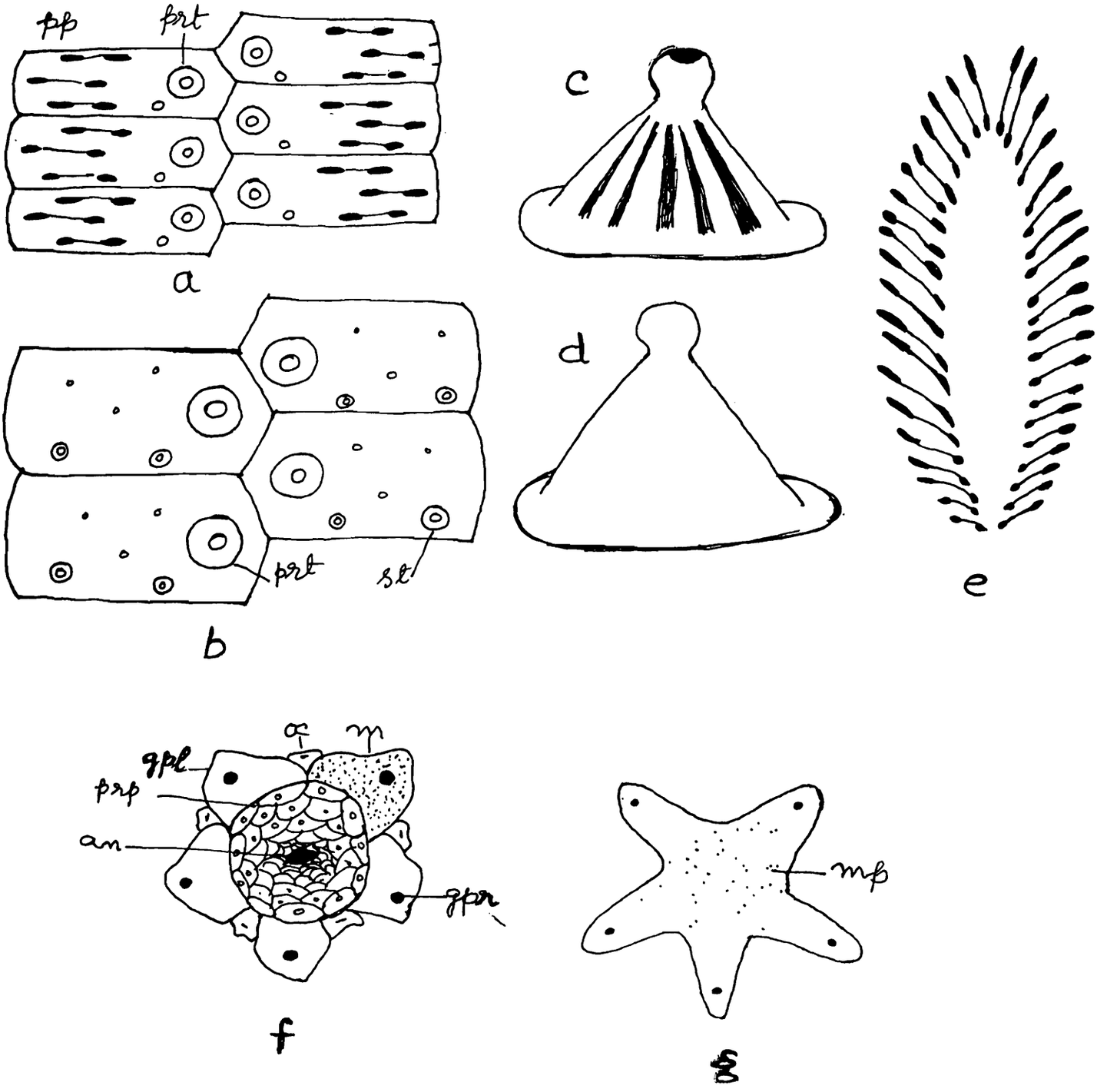
Holothurioidea (Text fig. 4) : *calcareous ring* - an internal ring of usually five radial and five interradial plates surrounding the pharynx; *spicules* - microscopic calcareous skeletal bodies embedded in the skin and tubefeet; *buttons* plate-like flat spicules with perforations; *tables* spicules consisting of perforated disc with interconnected vertical pillars forming a spire; *pedicels* locomotory tube feet of the ventral side with well developed terminal disc; *papillae* non-locomotory tube feet of the dorsal side without a terminal disc; *tentacles* highly modified tube feet surrounding the mouth.



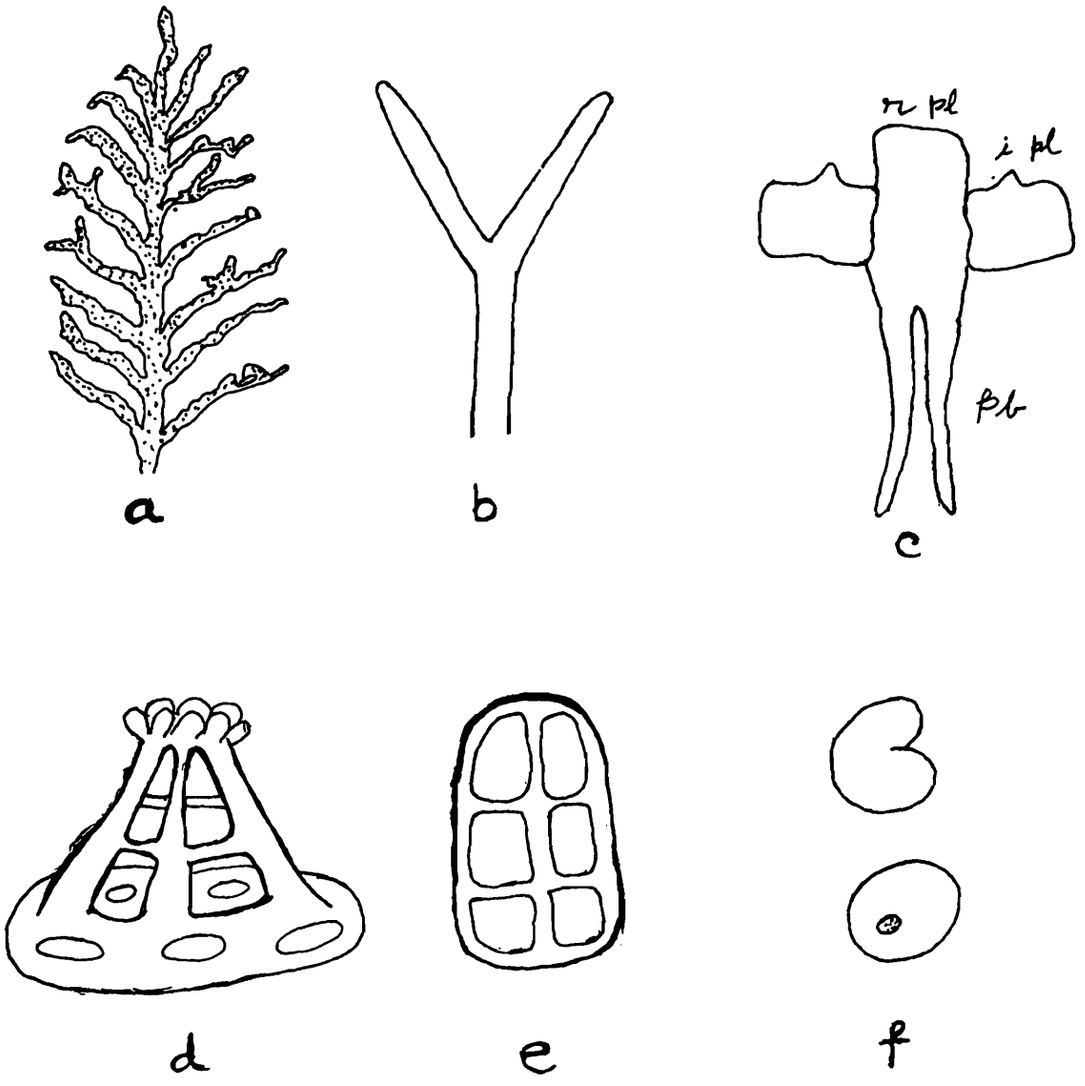
Text-figure 1. Asteroidea : a. paxilla, b. superomarginal plate, c. cribriform organ in the furrow between two adjacent superomarginal plates, d. inferomarginal plate, e. adambulacral plate, *adp* adambulacral plate; *cro* cribriform organ; *fs* - furrow spines; *imp* - inferomarginal plate; *ims* inferomarginal spine; *sas* subambulacral spines; *smp* - superomarginal plate; *sms* superomarginal spine (diagramatic, not to scale)



Text-figure 2. Ophiuroidea : a. part of disc and arm in dorsal view, b. oral and interbrachial region with an arm in ventral view, *aos* adoral shield; *as* arm spines; *dap* dorsal arm plate; *ds* disc scales; *idp* infradental papillae; *lap* lateral arm plate; *lop* lateral oral papillae; *opl* oral plate; *os* oral shield; *rs* radial shield; *t* tooth; *ts* tentacle scales; *vap* ventral arm plate (diagramatic, not to scale)



Text-figure 3. Echinoidea : a. ambulacral plates; b. interambulacral plates; c. perforate and crenulate primary tubercle; d. imperforate and noncrenulate primary tubercle; e. petaloid; f. apical system of a regular echinoid; g. apical system of an irregular echinoid *an* anus; *gpl* genital plate; *gpr* - gonopore; *m* - madreporite; *mp* - madreporic pores; *oc* ocular plate; *pp* - ambulacral pore pairs; *prp* - periproct; *prt* - primary tubercle; *st* - secondary tubercle. (diagramatic, not to scale)



Text-figure 4. Holothurioidea : a. arborescent tentalce; b. digitate tentacle; c. part of calcareous ring; d-f. spicules - table (d), button (e) and dough nut-shaped bodies (f). *ipl* interradial plate; *pb* posterior bifurcation; *rpl* radial plate (diagramatic, not to scale)

ASTEROIDEA

Key to the families of Asteroidea known from West Bengal :

1. Tubefeet without a terminal disc; abactinal plates with paxillae 2

   Tubefeet with a terminal disc; abactinal plates granule covered ..... GONIASTERIDAE

2. Superomarginal plates paxilliform, not distinct from the abactinal plates ..... LUIDIIDAE

   Superomarginal plates distinct from the abactinal plates 3

3. Marginal, adambulacral and actinal plates with webbed spinelets on the margins; cribriform organs and specialised fascioles present; actinal intermediates in two series; adambulacral plates with only furrow spines, no subambulacral spines ..... GONIOPECTINIDAE

   No webbed spinelets along the margins of marginal, adambulacral and actinal plates; cribriform organs and fascioles absent; adambulacrals with both furrow and subambulacral spines ..... ASTROPECTINIDAE

Family LUIDIIDAE Verrill

The family is characterised by the aborted superomarginal plates represented by paxillae; distinct inferomarginal plates; and tubefeet tapering to a pointed tip without a sucking disc. The family is represented by a single genus.

Genus *Luidia* Forbes

The genus is characterised by five or more arms; abactinal paxillae usually in regular series; superomarginal plates paxilliform; and tubefeet without a terminal disc. The genus is represented by a single species.

1. *Luidia hardwicki* (Gray)
(Pl I, fig. 1)

1840. *Petalaster hardwicki* Gray, *Ann. Mag. nat. Hist.*, 6: 183

1971. *Luidia hardwicki* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 30 and 44

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - One specimen, P. V. *LADY FRASER*, Feb. - Mar., 1928; R = 30 mm; R = 6r.

Description : Arms five, equal, breadth 6 mm at the base, tapering to a narrow tip. Abactinal paxillae closely packed on the disc and midradial region of arms, in 5-7 longitudinal series also forming transverse rows laterally on the arms. Superomarginal plates paxiliform, not distinct. Inferomarginal plates with a single spine at the margin, and several spinelets on the actinal surface. Oral plates with 4-5 bivalved pedicellariae on the margin and 8-10 pointed spinelets on the actinal surface. Adambulacral plates with a single furrow spine and 5-6 larger subambulacral spines.

Distribution : Persian Gulf and western Indian Ocean to northern Australia and South China Sea. India : Maharashtra, Tamilnadu and West Bengal South 24-Parganas District.

Family ASTROPECTINIDAE Gray

The family is characterised by distinct superomarginal and inferomarginal plates; single series of actinal intermediate plates; paxilliform abactinal plates and tubefeet tapering to a pointed tip without a terminal disc. The family is represented by a single genus.

Genus *Astropecten* Gray

The genus is characterised by distinct superomarginal and inferomarginal plates; marginal and actinal plates lacking webbed spinelets along the margins; and inferomarginal plates touching the adambulacral plates for the greatest part. The genus is represented by two species which can be distinguished as follows.

Actinal plates three or more on either side in each interradius; inferomarginal plates with rounded scale-like spinelets on the actinal surface..... *Astropecten euryacanthus*

Actinal plates only two on either side in each interradius; inferomarginal plates with pointed or blunt spinelets on the actinal surface..... *Astropecten indicus*

2. *Astropecten euryacanthus* Luetken
(Pl I, figs. 6, 7)

1872. *Astropecten euryacanthus* Luetken, *Vidensk. Meddr dansk naturh.* Foren., **1871**: 231

1910. *Astropecten nobilis* Koehler, *Echinoderma of the Indian Museum*, part VI : 51

1971. *Astropecten euryacanthus* : Clark and Rowe, *Monograph of shallow-water Indo west Pacific echinoderms*, 30 and 44

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth Two specimens, 24.iv.1924 and P. V. *LADY FRASER*, June-July, 1927; Bakkhali Five specimens, B. P. Haldar, 2.iv.1987; Midnapore District : Digha One specimen, D. R. K. Sastry, 21.ii.1988; R = 38-90 mm; R = 4 r

Description : Arms five, equal, broad at the base (R = 3 br) tapering to a pointed tip. Abactinal paxillae large, closely packed on the disc and midradial region of the arms, in transverse series of about eight paxillae laterally on arms. Superomarginal plates broader than long with only minute scaly covering, no superomarginal spines. Inferomarginal plates with a flat blunt spine at the margin, a very short spine below it, and rounded scale-like spinelets on the actinal surface. Actinal intermediate plates three or four on either side of each interradius. Adambulacral plates with three furrow spines and four or five subambulacral spines the distal of the inner two larger and stouter. Madreporite small, close to interradial margin.

Distribution : Bay of Bengal. India : Nicobars and West Bengal South 24-Paraganas and Midnapore Districts.

3. *Astropecten indicus* Doederlein
(Pl I, figs. 2-5)

1888. *Astropecten indicus* Doederlein, *Zool. Jb. syst. Bd.*, 3: 828

1971. *Astropecten indicus* : Clark and Rowe, *Monograph of shallow-water Indo west Pacific echinoderms*, 30 and 45

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - Two specimens, S. P. V. *ANDREW*; Matla River Eight specimens, R. A. Khan, 7,8.iii.1989; Sagar Island, Hooghly River Mouth One specimen, A. Misra, 5.viii.1974; Midnapore District : Digha - 41 specimens, 15.iv.1960; K. V. Rama Rao, 11.ii.1966; A. Misra, 12.ii.1978; D. R. K. Sastry, 19.ii.1988; R = 20.50 mm; R=3.5r

Description : Arms five, equal, tapering to a narrow tip. Paxillae small, closely packed on the disc and arms, not forming regular series, paxillar area 60-70 per cent of the arm breadth. Superomarginal plates narrow and high at the interradii, gradually becoming wider than long; a small tubercle-like spine on the inner margin of the proximal 7-8 superomarginal plates, a second series at the outer margin from the third or fourth superomarginal, smaller or altogether absent on the distal plates. Inferomarginal plates with a strong pointed spine at the margin, a smaller spine and a pair of subequal spines below it and pointed or blunt spinelets on the actinal surface, the middle series across the plate somewhat larger and pointed. Actinal intermediate plates two pairs in each interradius. Adambulacral plates with three furrow spines and five or six subambulacral spines in two series, the distal of the inner two is larger. Madreporite small, nearer to the interradial margin.

Distribution : Persian Gulf to East Indies. India : Kerala; Tamilnadu; Andhra Pradesh; Orissa and West Bengal South 24-Parganas and Midnapore Districts.

Family GONIOPECTINIDAE Verrill

The family is characterised by specialised fascioles or cribriform organs between the marginal plates; actinal plates in double transverse series; fasciolar channels roofed by webbed spinelets; and adambulacral plates with only furrow spines and no subambulacral spines. The family is represented by a single genus.

Genus *Goniopecten* Perrier

The genus is characterised by cribriforn organs consisting of discrete spinelets covered by a single webbed series on the transverse margin of the plate; and no odd interradial marginal plate, the fimbriate channel from the mouth plate leading to the median interradial cribriform organ. The genus is represented by a single species.

4. *Goniopecten* sp.
(Pl II, figs. 1, 2)

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - One specimen, S. P. V. *ANDREW*; R = 60 mm; R = 5r

Description : Arms five, equal, long, narrow, breadth 13 mm at the base, tapering to a pointed tip. Paxillae larger on the disc and midradial region of arms, decreasing in size towards the centre of the disc and laterally and distally on arms, paxillar area about half the arm width at the base; paxillae with a group of up to 10 short spinelets at the centre surrounded by 6-20 spinelets slightly webbed at the base. Superomarginal plates broader than long, higher at the interradii, small rounded tubercles on the surface and webbed spinelets along the margins overlying the column of spinelets forming the cribriform organ along the sides between successive plates; no superomarginal spine; no odd superomarginal plate in the interradii. Inferomarginal plates with spaced rounded tubercles on the surface and webbed spinelets along the margins overlying the fascioles or cribriform organs; a single flat inferomarginal spine; no odd inferomarginal plate in the interradii. Actinal plates in two series, the inner series with 7-9 plates extending to the fifth inferomarginal plate and the outer series

with 3-4 plates hardly reaching the second inferomarginal plate; a series of webbed spinelets along the margins overlying the fasciolar channels and occasionally a few small scattered low tubercles on the actinal surface. Adambulacral plates very narrow and diagonally alligned proximally, gradually becoming wider and perpendicular to the furrow; only 6-8 furrow spines, no subambulacral spines; margins with webbed spinelets.

Remarks : No member of the family has hitherto been reported from the Indian waters. The present specimen appears to be closer to the type species, *G. demonstrans* Perrier, differing from the Philippine species, *G. asiaticus* Fisher, in having only the inferomarginal spines, no superomarginal spines; marginal plates slender and closer; superomarginal plates of the two sides of the arm not meeting distally; and adambulacral plates with only furrow spines and no subambulacral spines.

Family GONIASTERIDAE Forbes

The family is characterised by large, massive disc; abactinal plates of varied form covered by skin or granules or both; large conspicuous marginal plates; actinal plates in several series; and tube feet with a large sucking disc at the tip. The family is represented by two genera which can be distinguished as follows.

Abactinal plates stellate with large granule covering; no spines on marginal plates..... .....*Goniodiscaster*

Abactinal plates polygonal with thick membrane closely beset with very small granules; inferomarginal plates each with a spine..... *Stellaster*

Genus *Goniodiscaster* H. L. Clark

The genus is characterised by stellate abactinal plates; thick granule covering obscuring the outline of the plates; large actinal intermediate areas; split granule-like pedicellariae; absence of spines on the marginal, abactimal and actinal plates; and tubefeet with large sucking discs at the tip. The genus is represented by a single species.

5. *Goniodiscaster vallei* (Koehler)
(Pl. II, fig. 3)

1910. *Goniodiscus vallei* Koehler, *Echinoderma of the Indian Museum*, Part VI : 75

1971. *Goniodiscaster vallei* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 39 and 49

Material : Midnapore District : Digha - One specimen, D. R. K. Sastry, 21.ii.1988; R = 70 mm; R = 2r

Description : Arms five, equal, broad at the base, abruptly narrowing in the beginning and later gradually to a blunt tip. Abactinal plates with thick round granules and enlarged tubercles prominent on the carinal series of arms and disc. Papulae two or three per area. Superomarginal plates with granule covering, a single enlarged tubercle, no superomarginal spine. Inferomarginal plates and actinal plates with uniform granule covering, no enlarged tubercles. Pedicellariae absent on abactinal side; small and rounded, equal to the surrounding granules in size, appearing as split granules, more frequent near the adambularal plates on actinal side. Adambulacral plates with 7-8 furrow spines and 4-5 subambulacral spines.

Distribution : India : Orissa and West Bengal - Midnapore District.

Genus *Stellaster* Gray

The genus is characterised by hexagonal abactinal plates; abactinal membrane closely beset with very small granules; inferomarginal series of spines; and large actinal areas in the interradii. The genus is represented by a single species.

6. *Stellaster equestris* (Retzius)
(Pl. II, fig. 4)

1820. *Asterias equestris* Retzius, *Dissert. sp. Ast.*, 12

1971. *Stellaster equestris* : Clark and Rowe, *Monograph of shallow-water Indo west Pacific echinoderms*, 32 and 49

Remarks : The species is characterised by polygonal abactinal plates covered by minute granules invested in thick membrane; papular areas with single pores; arms broad at the base, abruptly narrowed and prolonged to a narrow tip; no superomarginal spines; a long inferomarginal spine; and adambulacral plates with furrow spines and distinct subambulacral spines.

Though no material of the species from West Bengal is represented in the present collection, the species is included since a specimen of the above species from Digha, South 24-Parganas District, was identified earlier by the author, for Prof. A. K. Barua, Bose Institute, Calcutta.

Distribution : East coast of Africa to Philippines and South China Sea. India : Tamilnadu; Andhra Pradesh; Orissa; Andamans; and West Bengal Midnapore District.

OPHIUROIDEA

Key to the families of Ophiuroidea known from West Bengal :

1. A pair of thick and conspicuous infradental papillae present below the lowest tooth ..... AMPHIURIDAE

   Infradental papillae absent or small and in a cluster 2

2. One or two lateral oral papillae present; infradental papillae absent or inconspicuously minute ..... OPHIACTIDAE

   No lateral oral papillae; infradental papillae in a cluster below the lowest tooth ..... OPHIOTRICHIDAE

Family AMPHIURIDAE Ljungman

The family is characterised by the presence of a pair of thick infradental papillae below the column of teeth. The family is represented by two genera which can be distinguished as follows.

Infradental and lateral oral papillae in a continuous series without a gap in between ..... *Amphioplus*

Lateral oral papillae separated from the infradental papillae by a wide gap ..... *Amphiura*

Genus *Amphioplus* Verrill

The genus is characterised by imbricating dorsal disc scales; and three or four oral papillae in a more or less continuous series. Only a single subgenus characterised by four oral papillae of which the third is larger than the fourth and three arm spines, is represented by two species, which can be distinguished as follows.

Distal margin of dorsal arm plates simply convex ..... *Amphioplus (Lymanella) hastatus*

Distal margin of dorsal arm plates trilobed..... *Amphioplus (Lymanella)* sp.

7. *Amphioplus (Lymanella) hastatus* (Ljungman)

(Pl. III, figs. 7,8)

1867. *Amphipholis hastatus* Ljungman, *Ofversk. vidensk Akad. Forh.*, **1866**: 313

1971. *Amphioplus (Lymanella) hastatus* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 80 and 102

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth One specimen, A. Milner, 18.x.1889; Disc diameter : 8 mm.

Description : Disc covered by small imbricating scales; central disc scales larger; radial shields large, longer than broad, about half the disc diameter in length; marginal scales narrow, sharply raised to from a distinct border. Ventral interradial areas with small imbricating scales. Oral shields longer than broad, pointed proximally, narrow and rounded distally; adoral shields meeting in front of the oral shields; oral plates with four oral papillae - one infradental and three lateral on each side the third larger than the fourth. Arms long; dorsal arm plates broader than long, distal margin convex; ventral arm plates broader than long; lateral arm plates with three pointed spines. Two tentacle scales.

Distribution : Arabian Sea. India : West Bengal South 24-Parganas District.

Remarks : The species differs from *A. (L.) depressus* Lyman known from the Bay of Bengal, in having larger central disc scales and longer radial shields.

8. *Amphioplus (Lymanella)* sp.

(Pl. II, figs. 5,6)

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - One specimen, P.V. *LADY FRASER*, 20.ii.1923; Disc diameter about 10mm.

Description : Disc completely lost. Oral shields longer than broad, pointed proximally and rounded distally; adoral shields meeting in front of the oral shields; oral plates with four oral papillae - one infradental and three lateral on each side - the third larger than the fourth. Arms long; dorsal arm plates broader than long, distal margin with a distinct median lobe; lateral arm plates with three pointed spines. Two tentacle scales.

Remarks : The specimen differs frm the earlier species in having stout and long arms; and trilobed distal margin of the dorsal arm plates. No species of the subgenus with trilobed distal margin of the dorsal arm plates has so far been known from the Indian coast. The long arms show more closeness with *A. (L.) laevis* (Lyman) than with *A. (L.) andreae* (Luetken).

Genus ***Amphiura*** Forbes

The genus is characterised by a single lateral oral papilla separated from the infradental papilla by a wide space; and naked disc scales. Only a single subgenus characterised by extremely long arms well over 10 times as long as the disc diameter, and disc scales only around the radial shields on dorsal side is represented by a single species.

9. ***Amphiura (Ophiopeltis) tenuis*** (H. L. Clark)

(Pl. III, figs 1,2)

1938. *Ophionephthys tenuis* H. L. Clark, *Mem. Mus. comp. Zool. Harv.*, **35**: 241

1971. *Amphiura (Ophiopeltis) tenuis* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 80 and 96.

1979. *Amphiura (Ophiopeltis) tenuis* : Baker, *N. Z. Jl Zool.*, **6**: 43.

Material : South 24-Parganas District : Jharkhali-one specimen, B. P. Halder, 24.ix.1984; Matla - Four specimens, R. A. Khan, 8.xi.1988 and 7.iii.1989; Disc diameter : 4-7 mm.

Description : Disc strongly excavated interradially, naked for the most par centrally and interradially on dorsal side and ventrally; disc scales very small, imbricating, in 2-3 rows around the radial shields; radial shields long and narrow, close together throughout their length. Ventral interradial disc completely naked; madreporite large and round, other oral shields broader than long, crescent shaped with concave proximal border and rounded extremities; adoral shields large, not meeting in front of the oral shields, with an acute projection over the oral plate, a thick projection into the oral slit and a lateral projection towards the first ventral arm plate; oral plates short and narrow; two infradental papillae at the tip of the jaw and one lateral papilla on each side located distally separated from the infradental papilla by a wide space, oral tentacle scale large, visible between the infradental and lateral papillae. Arms long, 15-20 times as long as the disc diameter; dorsal arm plates broader than long, almost conical with broad proximal margin and strongly convex distal margin, successive plates not in contact; ventral arm plates rectangular proximally, soon the proximal margin becoming acute and successive plates separated by the lateral arm plates; arm spines up to six proximally, flat, blunt, lowermost longest, distally reduced to three spines, the second from below flat, stout, with strong lateral denticles at the tip. No tentacle scale.

Distribution : Persian Gulf; Madagascar; Pakistan; Australia; and India : West Bengal - South 24-Parganas District.

Family OPHIACTIDAE Matsumoto

The family is characterised by reduced infradental papillae, usually absent; lateral papillae one or two on each side located distally far away from the tip of the oral plates and large square tipped teeth. The family is represented by a single genus.

Genus ***Ophiactis*** Luetken

The genus is characterised by distinct disc scales with scattered spines on the dorsal side; radial shields more or less separate; and one or two distally located lateral oral papillae. The genus is represented by two species which can be distinguished as follows.

Dorsal arm plates fan shaped with broad convex distal margin and narrow proximal border ....*Ophiactis delagoa*

Dorsal arm plates quadrangular, broader than long, distal margin concave in the middle .... *Ophiactis modesta*

10. *Ophiactis delagoa* Balinsky

1957. *Ophiactis delagoa* Balinsky, *Ann. Natal Mus.*, **14**: 12

1971. *Ophiactis delagoa* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 82 and 104

Material : South 24-Parganas District : Paremari, Matla-Five specimen, R. A. Khan, 9.xi.1988; Bakkhali - 17 specimens, G. C. Rao, 10,11.iv.1978; Sagar Island Two specimens, B. P. Haldar, 22.iii.1981; Midnapore District : Digha Seven specimens, D. R. K. Sastry, 21.ii.1988; Disc diameter : 2-5 mm.

Description : Disc with small scales, centrodorsal distinct; spinelets fewer, one each at the proximal end of radial shields and more at the interradial margin; radial shields large, longer than broad, broader distally, separated by short broad plates proximally and long narrow plates distally. Ventral interradial disc with small imbricating scales and a few spinelets near the margin; oral shields broader than long; adoral shields broader distally, meeting in front of the oral shields; oral plates short; teeth thick and squarish; a single lateral oral papilla located distally. Arms about four times as long as disc diameter; dorsal arm plates broader than long, fan-shaped with straight proximal border and convex distal margin; ventral arm plates rectangular at the base of the arm, gradually become pentagonal with acute proximal angle and separated by lateral arm plates,; arm spines four, rarely five, pointed, as long as or longer than the segment, the uppermost spine longest. Tentacle scale single.

Distribution : Inhaca (Mozambique) and India : West Bengal South 24-Parganas and Midnapore Districts.

Remarks : In some of the specimens from Digha there are more dorsal disc spines and the basal dorasl arm plates are slightly pentagonal in larger specimens.

11. *Ophiactis modesta* Brock

1889. *Ophiactis modesta* Brock, *Z. weiss, Zool.* **47**: 482

1981. *Ophiactis modesta* : Guille, *Mem. ORSTOM*, **91**: 439

Material : South 24-Parganas District : Port Canning, Matla One specimen, 9.i.1958; Matla 70 specimens, R. A. Khan, 6.iii.1989; Midnapore District : Digha one specimen, A. K. Dutta, 4.ix.1964; Disc diameter : 4-7 mm.

Description : Disc somewhat puffy at interradii in some of the specimens; dorsal disc scales larger and rounded at the centre, smaller and elongated distally with scattered pointed spinelets longer and numerous at the interradial periphery; radial shields longer than broad, broader and rounded distally, separated throughout their length, converging distally. Ventral interradial disc with smaller scales and shorter spinelets. Oral shields triangular, broader than long; adoral shields narrow proximally, closely approximating but not meeting in front of the oral shields, broader distally not

separating the first and second ventral arm plates; oral plates with thick square tipped teeth; lateral oral papilla single, thick, distally located. Arms five, equal, about four times as long as the disc diameter; dorsal arm plates broader than long, distal margin slightly concave in the middle; arm spines five, pointed, uppermost or second longest. Tentacle scale single, rounded.

Distribution : Arabian Sea to Hawaiian Islands. India : Tamilnadu; Andamans and West Bengal - South 24-Parganas and Midnapore Districts.

Remarks : The large series of specimens show variations with regard to the adoral shields - in some the adoral shields meet radially between the first and second ventral arm plates, and in some they only closely approximate but do not meet while in most others they are widely separate. Hence the character used by Clark and Rowe (1971) to separate the species *O. conferta* and *O. versicolor* from the other three species under 111, is not reliable. Though the upper spine, not the second, is longest, the specimens are identified with *O. modesta* because of straight lateral margins of the dorsal arm plates and their width not more than twice the length, rather than with *O. maculata* in which the dorsal arm plates are more than twice as broad as long and the lateral margins are rounded.

Family OPHIOTRICHIDAE Ljungman

The family is characterised by a cluster of infradental papillae below the lowest tooth; absence of lateral oral papillae; disc scales with thorny or granular covering; and thorny arm spines. The family is represented by two genera which can be distinguished as follows.

Radial shields naked, very large, about two thirds of the surface being occupied by them; rest of the area granule covered; ventral interradial disc skin covered ..... *Ophiocnemis*

Radial shields moderate in size, covered by rugose stumps; dorsal disc scales with thorny stumps; ventral interradial disc with scales bearing thorny stumps ..... *Macrophiothrix*

Genus *Macrophiothrix* H. L. Clark

The genus is characterised by extremely long arms; puffy interradial disc; disc scales with thorny stumps, spines or rugose granules; and dorsal arm plates broader than twice their length. The genus is represented by a single species.

12. *Macrophiothrix longipeda* (Lamarck)
(Pl. III, figs 3,4)

1816. *Ophiura longipeda* Lamarck, *Hist. nat. anim. s. vert.*, 2: 544

1971. *Macrophiothrix longipeda* : Clark and Rowe, *Monograph of shallow water Indo - west Pacific echinoderms*, 82 and 114

Material : Midnapore District : Digha - Five specimens, D.R.K. Sastry, 21.ii.1988; Disc diameter : 7-12 mm.

Description : Dorsal disc scales covered by thorny stumps; radial shields somewhat bare with a few rugose granules. Arms about 12 times as long as disc diameter; dorsal plates are irregularly broken, but outline of the plate is clear - the plates are more than twice as broad as long, distal margin wide with straight central and slightly slanting lateral areas, and acute anterolateral angles; arm spines 8-10, thorny, uppermost longest, lowest on the distal segments comb-like.

Distribution : East Coast of Africa to North Australia and South China Sea. India : Lakshadweep; Tamilnadu; Andamans; and West Bengal - Midnapore District.

Genus ***Ophiocnemis*** Mueller and Troschel

The genus is characterised by large naked radial shields; dorsal disc scales with granule covering; and skin covered ventral interradial areas without scales. The genus is represented by a single species.

13. ***Ophiocnemis marmorata*** (Lamarck)
(Pl. III, figs 5,6)

1816. *Ophiura marmorata* Lamarck, *Hist. nat. anim. s. vert.*, **2**: 543

1978. *Ophiocnemis marmorata* : Cherbonnier and Guille, *Faune de Madagascar*, **48**: 154

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - Four specimens, Br. Pilot J. Brunet (no date); A. Milner, 17.vi.1885 and 18.x.1889; Disc diameter : 7-15 mm.

Description : Disc dorsally covered by large naked radial shields leaving a small central region and narrow radiating areas covered by small round granulation. Ventral interradial disc with only thick skin, no scales. Arms about five times as long as the disc diameter, broad at the base, gradually narrowing distally; dorsal arm plates about three times as broad as long, keeled, distal margin wider, straight or slightly convex; ventral arm plates broader than long, distal and proximal margins concave; lateral arm plates with five blunt spines, middle one longest. Oral shields broader than long, pointed proximally; adoral shields ovate, slightly curved to meet in front of the oral shields; oral plates short; infradental papillae in a cluster at the tip of the jaw; no lateral oral papillae. Tentacles scale single, minute.

Distribution : East coast of Africa to South China Sea, Philippines and North Australia. India : Tamilnadu; Andamans; and West Bengal - South 24-Parganas District.

ECHINOIDEA

Key to the families of Echinoidea known from West Bengal

1. Anus within the apical system on the aboral side; test hemiglobular with flat oral side and high aboral side 2

   Anus in the posterior interambulacrum on the oral side; test flat on both oral and aboral sides. 3

2. Primary tubercles crenulate and perforate; primary spines very long, thorny, fragile, and hollow in the centre; test plates without pits.....DIADEMATIDAE

   Primary tubercles crenulate but not perforate; primary spines short, smooth, not fragile, no hollow in the centre; test plates with deep pits at the corners..... TEMNOPLEURIDAE

3. Ambulacral petals with alternating primary and demi plates; aboral miliary spines serrated and only slightly clavate at the tip .....CLYPEASTERIDAE

   Ambulacral petals with only primary plates, no demiplates; aboral miliaries with a crown or a glandular bag at the tip..... 4

4. Test without slits in the posterior ambulcara; a single interambulacral plate at the apical end; aboral miliaries with a crown at the tip .....LAGANIDAE

   Test with slits (lunules) in the posterior ambulacra; two interambulacral plates at the apial end; aboral miliaries with a glandular bag at the tip.....ASTRICLYPEIDAE

Family DIADEMATIDAE Gray

The family is characterised by perforate and usually crenulate primary tubercles; long, fragile, thorny, hollow spines; diadematoid ambulacral plates; and aulodont Aristotle's lantern. The family is represented by a single genus.

Genus *Chaetodiadema* Mortensen

The genus is characterised by somewhat flexible test; pore pairs below the ambitus widely spaced and not arranged in arcs; and primary tubercles abruptly reduced in size on the oral side. The genus is represented by a single species.

14. **Chaetodiadema granulatum** Mortensen

(Pl. IV, figs 1,2)

1903. *Chaetodiadema granulatum* Mortensen, *Vidensk. Meddr dansk naturh. Foren.*, **1903**: 1

1971. *Chaetodiadema granulatum* : Clark and Rowe, *Monograph of shallow-water Indo west Pacific echinoderms*, 140 and 152

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - Three specimens, P. V. *LADY FRASER*; (no date); Test diameter : 65-70 mm.

Description : Test circular in outline, flat and thin in the preserved condition, slightly high when alive. Interambulacral plates about four times as broad as long, with four primary tubercles at the ambitus, gradually narrowing towards apical and oral ends with fewer tubercles. Ambulacral areas relatively narrower, gradually widening from apical end to ambital region with pore pairs in arcs of three, abruptly narrowed on the oral side with the pore pairs widely spaced into a single series. Primary tubercles perforate and crenulate; primary spines light greenish, centre hollow. Apical system large; periproct largely membranous with small plates at the periphery.

Distribution : Red Sea and Maldives to North Australia, Philippines and South China Sea. India : Andhra Pradesh; Orissa; Andamans; and West Bengal - South 24-Parganas District.

Remarks : These specimens were identified by late Dr. Th. Mortensen as per the label written probably in his own hand.

Family TEMNOPLEURIDAE A. Agassiz

The family is characterised by imperforate and usually crenulate primary tubercles; test plates with deep pits or angular pores or the plates themselves highly sculptured; shallow gill-slits; and camarodont Aristotle's lantern. The family is represented by a single genus.

Genus *Temnopleurus* L. Agassiz

The genus is characterised by crenulate and imperforate tubercles; test plates with deep horizontal pits at the corners; and shallow gill-slits. The genus is represented by a single species.

15. *Temnopleurus toreumaticus* (Leske)

(Pl. IV, fig. 3)

1778. *Cidaris toreumaticus* Leske, *Add. ad. Klein*, 155

1971. *Temnopleurus toreumaticus* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 142 and 154

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth One specimen, A. Milner, 17.vi.1885; Midnapore District : Digha - 35 specimens, A. K. Dutta, 2.ix.1964; K. V. Rama Rao, 10.iii.1966; K. N. Reddy, 5.xi.1977; D. R. K. Sastry, 20,21.ii.1988; Test diameter : 6-14 mm.

Description : Test circular, flat on oral side and arched aborally. Test plates with deep transverse pits at the corners. Primary tubercles crenulate and imperforate. Primary spines banded with brownish red. Ambulacral plates each with a primary tubercle; pore pairs in arcs of three. Apical system small; periproct with several small plates; anus central.

Distribution : Red Sea and East coast of Africa to South Pacific Islands. India : Gujarat; Maharashtra; Tamilnadu; Andhra Pradesh; Orissa; Andamans; and West Bengal - South 24-Parganas and Midnapore Districts.

Family CLYPEASTERIDAE L. Agassiz

The family is characterised by flat test; ambulacra with well developed petals on aboral side; petals with alternating primary and demi plates; aboral miliaries serrated with a slightly clavate tip; and anus on the oral side in the posterior interambulacrum. The family is represented by a single genus.

Genus *Clypeaster* Lamarck

The genus is characterised by the anus in the posterior interambulacrum on the oral side. The genus is represented by a single species.

16. *Clypeaster rarispinus* de Meijere

(Pl. IV, fig. 4)

1903. *Clypeaster rarispinus* de Meijere, *Tjdschr. ned. dierk. Vereen.*, (2) **8** : 7

1971. *Clypeaster rarispinus* : Clark and Rowe, *Monogaph of shallow-water Indo west Pacific echinoderms*, 144 and 160

Material : South 24-Parganas District : Matla One specimen, Capt. J. H. Row; Length : 45 mm, Breadth : 42 mm.

Description : Test pentagonal, slightly longer than broad, corners rounded, margin slightly thick. Apical system slightly raised. Tubercles large, spaced, conspicuous. Petals well developed, petaloid area 0.56 of test length. Oral region deeply sunk, mouth central, oral furrow prominent up to the test margin. Periproct in the posterior interambulacrum on the oral side, very close to posterior margin of the test. Genital pores five.

Distribution : Red Sea and East coast of Africa to East Indies. India : Karnataka; Kerala; Lakshadweep; Tamilnadu; Andhra Pradesh; Orissa; and West Bengal South 24-Parganas District.

Family LAGANIDAE A. Agassiz

The family is characterised by flat test; well developed ambulacral petals on aboral side with all primary plates and no demi plates; anus in the posterior interambulacrum on oral side; and aboral miliary spines with a crown at the tip. The family is represented by a single genus.

Genus *Laganum* Link

The genus is characterised by five genital pores; and madreporic pores in a sinuous, sometimes branched grove or in pits. The genus is represented by a single species.

17. *Laganum decagonale* (de Blainville)
(Pl. IV, fig. 5)

1827. *Scutella decagonale* de Blainville, *Dict. Sci. Nat.*, **48**: 229

1971. *Laganum decagonale* : Clark and Rowe, *Monograph of shallow water Indo - west Pacific echinoderms*, 144 and 162

Material : South 24-Parganas District : Sandheads, Hooghly River Mouth - Two specimens, A. Milner, 17.vi.1885; Length : 22 and 30 mm.

Description : Test alsmost circular, as broad as long, thin, and flat. Apical system central, slightly raised. Petals well developed, petaloid area 0.41 of the test length. Peristome central, oral furrows distinct up to half the test radius. Periproct in the posterior interambulacrum on the oral side, nearer to the posterior margin. Madreporic pores in a sinuous groove at the centre of the apical system. Five genital pores.

Distribution : Arabian Sea to South China Sea; Philippines; and North Australia. India : Kerala; Tamilnadu; Orissa; and West Bengal - South 24-Parganas District.

Family ASTRICLYPEIDAE Stefanini

The family is characterised by flat test; well developed ambulacral petals; test perforated with lunules in the posterior region; interambulacra with a double series of plates at the apical end; and aboral miliary spines with a glandular bag at the tip. The family is represented by a single genus.

Genus *Echinodiscus* Leske

The genus is characterised by two lunules in the posterior paired ambulacra. The genus is represented by a single sepcies.

18. *Echinodiscus auritus* Leske
(Pl. IV, fig. 6)

1778. *Echinodiscus auritus* Leske, *Add. ad. Klein*, 138

1971. *Echinodiscus auritus* : Clark and Rowe, *Monograph of shallow water Indo - west Pacific echinoderms*, 144 and 162

Material : South 24-Parganas District : Eastern Channel, Hooghly River Mouth - One Speimen, *B. F. GOLDEN CROWN*, June, 1908; Length : 85 mm, Breadth : 90 mm (approx.).

Description : Test partly broken on the right side, broader than long, margin thin, slightly raised at the apical region. Ambulacral petals well developed. Peristome slightly anterior; priproct in the posterior interambulacrum on the oral side, much separated from the posterior margin of the test. Spines short, fine, closely packed in the ambulacral and interambulacral areas on the oral and aboral sides, oral ambulacral and interambulacral miliary spines not distinctly coloured. Two open lunules in the posterior paired ambulacra. Four genital pores.

Distribution : Red Sea and East coast of Africa to South China Sea; Philippines; and North Australia. India : Kerala; Tamilnadu; Andhra Pradesh; Orissa; Andamans; and West Bengal South 24-Parganas District.

HOLOTHURIOIDEA

Key to the families of Holothurioidea known from West Bengal

Tentacles 10, tree shaped, much branched; podia present ..... CUCUMARIIDAE

Tentacles 15, digitate; podia absent ..... CAUDINIDAE

Family CUCUMARIIDAE

The family is characterised by absence of imbricating plates; ten branched tentacles; tubefeet often restricted to radii. The family is represented by two genera which can be distinguished as follows.

Calcareous ring long, tubular, radial and interradial plates composed of a mosaic of pieces; spicules - small nodular buttons ..... *Stolus*

Calcareous ring stout and short, radial and interradial plates entire or of fewer pieces; spicules - tables and fusiform plates, no buttons ..... *Thorsonia*

Genus *Stolus* Selenka

The genus is characterised by ten tree-like branched tentacles; thick body wall without imbricating plates; long and tubular calcareous ring with radial and interradial plates composed of a mosaic of smaller plates; spicules - small nodular buttons. The genus is represented by a single species.

19. *Stolus rapax* (Koehler and Vaney)

1908. *Cucumaria rapax* Koehler and Vaney, *Echinoderma of the Indian Museum*, Part IV : 39

1971. *Stolus rapax* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 182

Remarks : The species is characterised by U-shaped body tapering towards both the anal and oral ends; ten much branched dendritic tentacles of which the ventral two are shorter; tubular calcareous ring with posterior bifurcation of the radial plates comprised of several small plates; spicules - small nodular buttons with few holes and large perforated plates.

Distribution : Known only from the Type Locality Hooghly River Mouth.

Genus ***Thorsonia*** Heding

The genus is characterised by U-shaped body tapering towards both the anal and oral ends; stout calcareous ring with short posterior bifurcations of the radial plates; spicules-tables with disc forming 2-5 lobes, spire composed of 2-4 pillars and absence of branched rods, buttons or basketss. The genus is represented by a single species.

20. ***Thorsonia investigatoris*** (Koehler and Vaney)

1908. *Cucumaria investigatoris* Koehler and Vaney, *Echinoderma of the Indian Museum*, Part IV : 36

1971. *Thorsonia investigatoris* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 182

Remarks : The species is characterised by U-shaped body tapering towards both the ends; ten branched dendritic tentacles; stout and short calcareous ring with the posterior bifurcation of the radial plates composed of small pieces; spicules large tables with 4-lobed disc and spire of 2-4 pillars; pedicels and papillae with small tables with two armed arched disc and tall spire.

Distribution : Known only from the Type locality Hooghly River Mouth; and Digha (Midnapore District) of the West Bengal coast, India.

Family CAUDINIDAE

The family is characterised by absence of tubefeet; fifteen digitate tentacles with only lateral digits, no terminal digit, spicules cups and perforated plates. The family is represented by a single genus.

Genus ***Acaudina*** H. L. Clark

The genus is characterised by tentacles with only one pair of lateral digits, no terminal digit; and spicules smooth or thick spinose plates with a few holes. The genus is represented by a single species.

21. ***Acaudina molpadioides*** (Semper)

1868. *Haplodactyla molpadioides* Semper, *Reisen Archip. Phillip. 2. Wissen. Resultate*, 41

1971. *Acaudina molpadioides* : Clark and Rowe, *Monograph of shallow water Indo west Pacific echinoderms*, 184 and 207

Remarks : The species is characterised by stout, sausage shaped body; fifteen digitate tentacles with only one pair of lateral digits, no terminal digit; podia absent; spicules - doughnut-like with a single perforation.

Distribution : Bay of Bengal; East Indies; Philippines and South China Sea. India : Tamilnadu; Andaman and Nicobar Islands; and West Bengal Hooghly River Mouth.

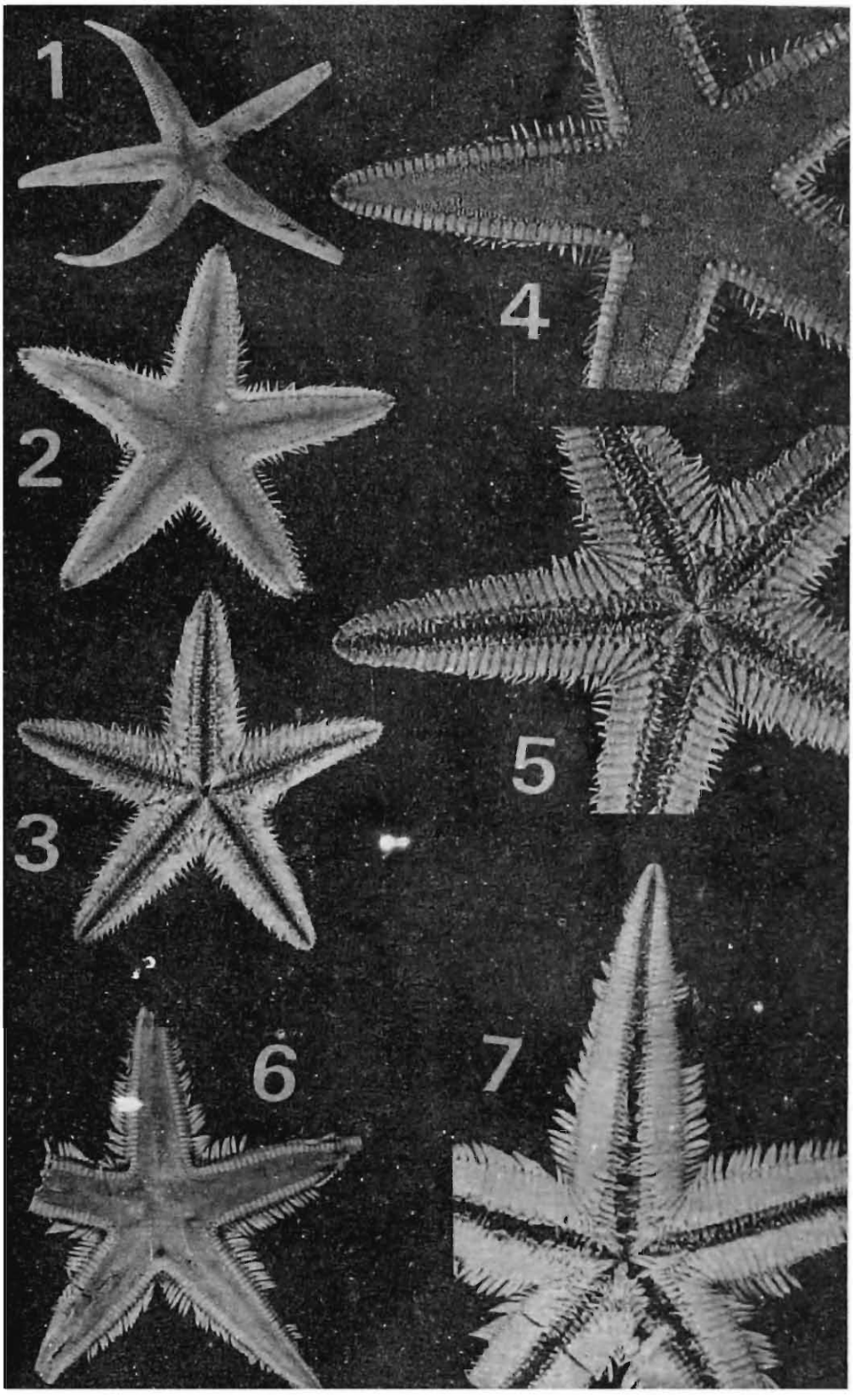


Plate I Fig 1. *Luidia hardwicki*, Sandheads. Figs 2 and 3. *Astropecten indicus*, Digha. Figs 4 and 5. *Astropecten indicus*, Sandheads. Figs 6 and 7. *Astropecten euryacanthus*, Bakkhali.

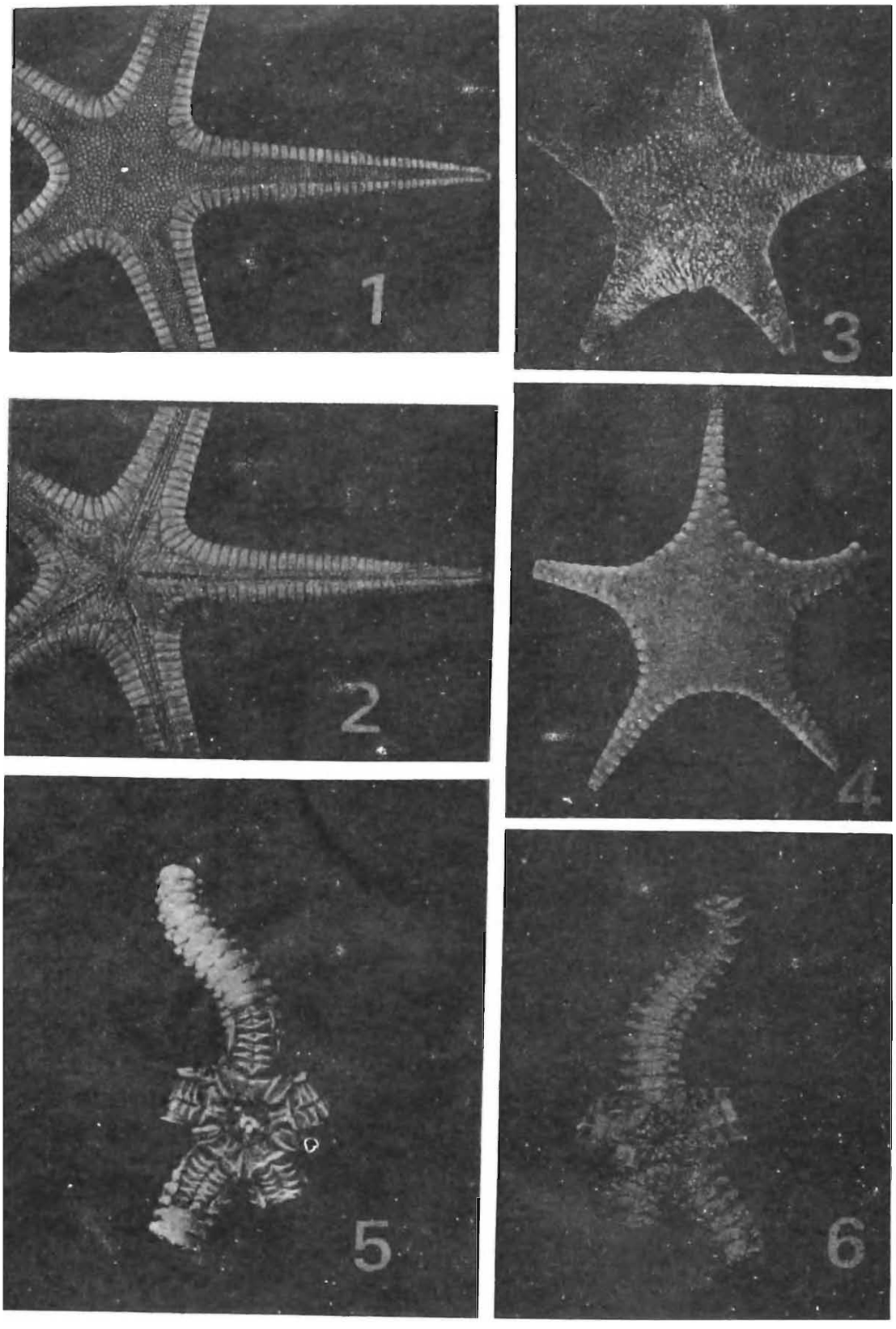


Plate II Fig 1 and 2. *Goniopecten sp. Sandheads.* Fig 3. *Goniodiscaster vallei*, Digha. Fig 4. ***Stellaster equestris***, Orissa. Figs 5 and 6. *Amphioplus* (*Lymanella*) sp.

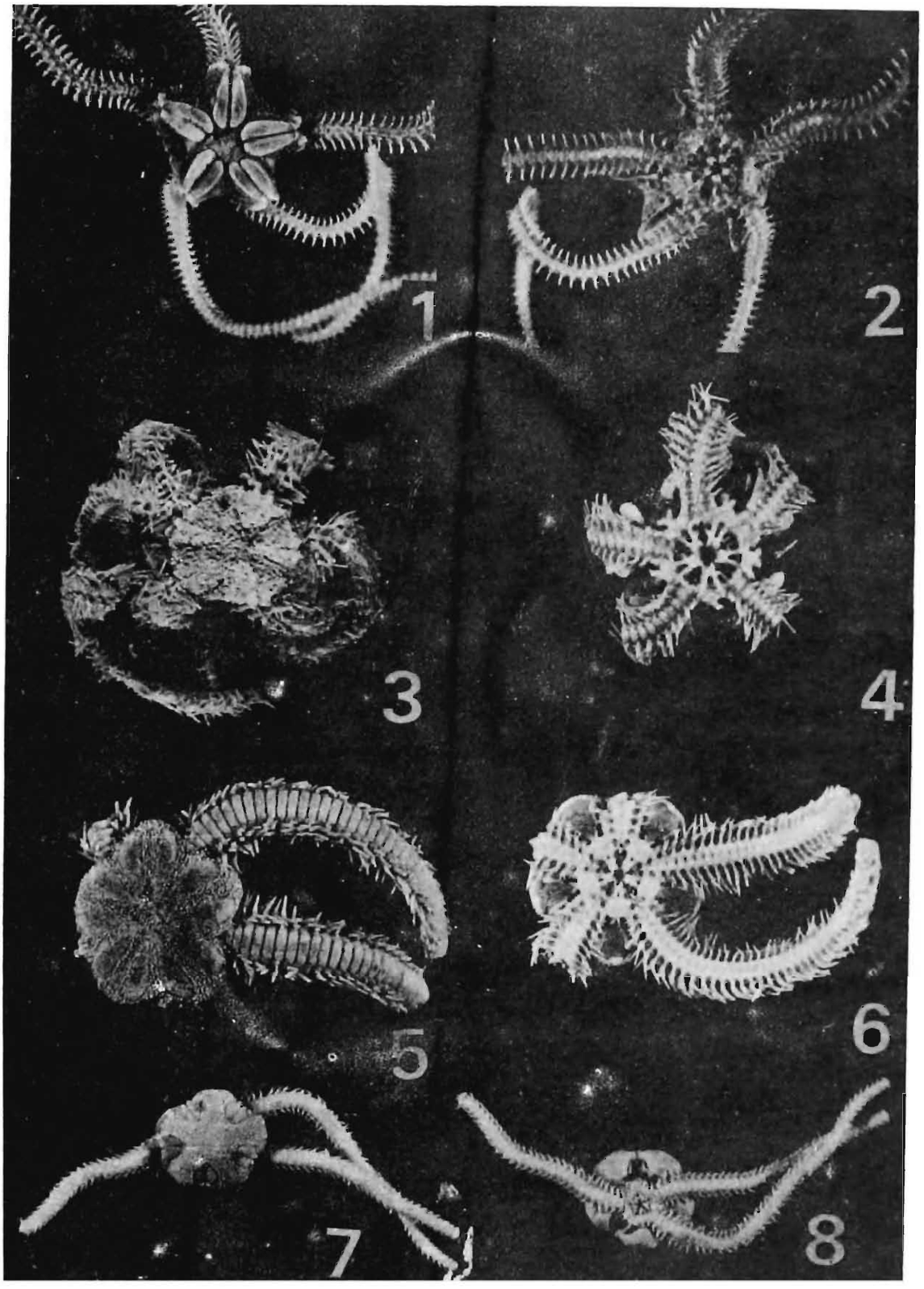


Plate III Figs 1 and 2. *Amphiura* (*Ophiopeltis*) *tenuis*, Matla. Figs 3 and 4. *Macrophiothrix longipeda*, Digha Figs 5 and 6. *Ophiocnemis marmorata*, Sandheads. Figs 7 and 8. *Amphioplus* (*Lymanella*) *hastatus*. Sandheads.

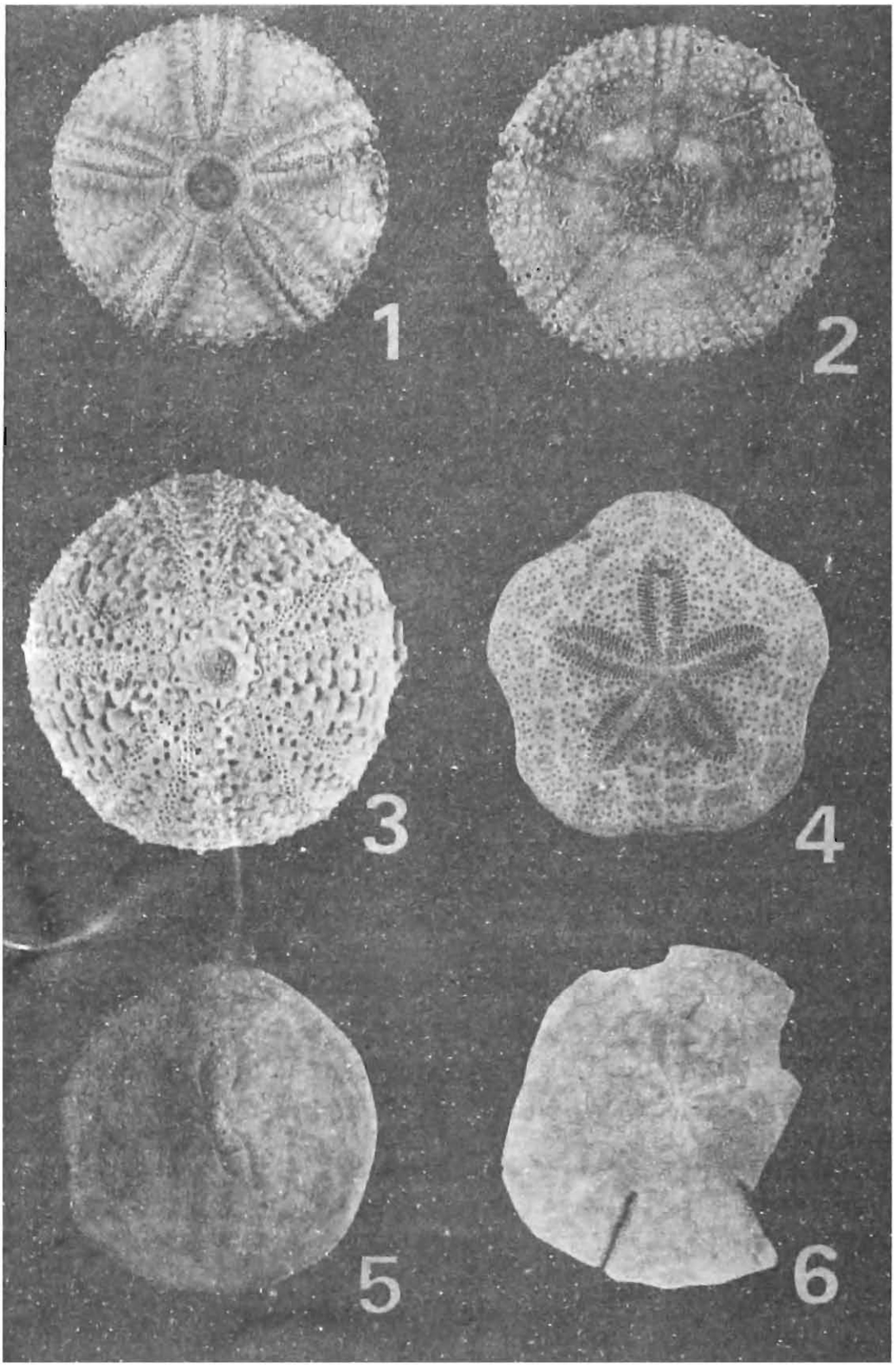


Plate IV Figs 1 and 2. *Chaetodiadema granulatum*, Sandheads. Figs 3. *Temnopleurus toreumaticus*, Digha. Fig 4. *Clypeaster rarispinus*, Sandheads. Fig 5. *Laganum decagonale*, Sandheads. Fig 6. *Echinodiscus auritus*, Hooghly River Mouth.

SUMMARY

The echinoderm fauna of West Bengal comprises of six species of Asteroidea, nine species of Ophiuroidea and three species each of Echinoidea and Holothurioidea. Of these the asteroid, *Goniopecten* sp. and the ophiuroids, *Amphioplus* (*Lymanella*) *hastatus* (Ljungman), *Amphioplus* (*L.*) sp. near *laevis* (Lyman), *Amphiura* (*Ophiopeltis*) *tenuis* (H. L. Clark) and *Ophiactis delagoa* Balinsky are new to the echinoderm fauna of Indian coast.

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