

ANNELIDA POLYCHAETA OF THE INDIAN MUSEUM, CALCUTTA.

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(Plates I—IX.)

Introduction.

The collection of Polychaetes of the Indian Museum, Calcutta, is a very extensive one, including upwards of three hundred species belonging to thirty different families. Indeed, with the exception of a few small groups, nearly all the families of Polychaetes are represented. The bulk of the collection consists of the material collected by the R. I. M. S. "Investigator", but a very large number of specimens was obtained by the officers of the Zoological Survey in the Gangetic Delta, in the Cochin Backwaters, Krusadai, Pamban, and other localities on the coasts of India; and from other parts of the Indian Ocean.

The coastal fauna as might be expected is generally much richer in species than the deep-sea fauna, for the conditions of life in inshore waters are much more varied and are influenced by many more factors than those on the still bottom of the ocean.

In brackish waters, modified and often very peculiar forms are plentiful. Out of thirty species collected in the Chilka Lake, the Cochin Backwaters and the Gangetic Delta, and described by Southern (1921), three genera and twenty-seven species were found to be new to science. In the collections of the Indian Museum I was lucky to find again and examine most of the species described by Southern. Taléh-Sap, or the Inland Sea of Singgora, a lake connected with the Gulf of Siam, though far remote from the Chilka Lake, which lies partly in Bihar and Orissa and partly in the Madras Presidency, presents a number of analogous conditions as regards variations of salinity. Its fauna was partially investigated by Annandale. The Polychaetes collected from this locality consisted of the following species already found by Southern in the brackish waters of India: *Nereis glandicincta* Southern, *Nephtys oligobranchia* Southern, *Nephtys polybranchia* Southern, *Heteromastus similis* Southern, *Barantolla sculpta* Southern and *Ficopomatus macrodon* Southern. The collection also yielded three new species: *Nereis talehsapensis*, *Brada talehsapensis* and the very singular *Talehsapia annandalei* which so far I have not succeeded in referring to any known family.

Although many references to Indian Polychaeta are scattered in a number of papers dealing with Annelida, only a few reports are specially devoted to the Indian fauna. These are the following:—Grube (1874), Michaelsen (1892) and Augener (1926)—papers on Ceylon Polychaeta; Willey (1905)—Report on the Polychaeta of the Gulf of Manaar; Southern (1911), Gravely (1921) and Fauvel (1930)—Fauna of Krusadai Island; and Bindra (1927)—Fauna of Karachi.

LIST OF SPECIES.¹

Family APHRODITIDAE.

Subfamily HERMINONINAE.

Aphrodita australis Baird.*Aphrodita talpa* Quatrefages.**Aphrodita aculeata* Linné.*Aphrogenia alba* Kinberg.**Hermione hystrix* (Savigny).*Laetmatonice producta* Grube var. *benthaliana* McIntosh.*Pontogenia nuda* Horst.

Subfamily POLYNOINAE.

Iphione muricata (Savigny).*Lepidonotus carinulatus* Grube.*Lepidonotus jacksoni* Kinberg.*Lepidonotus hedleyi* Benham.*Lepidonotus dictyolepis* Haswell.*Lepidonotus tenuisetosus* (Gravier).*Lepidonotus cristatus* Grube.*Lepidonotus melanogrammus* Haswell.*Lepidonotus* (*Thormora*) *jukesi* Baird.*Hermenia acantholepis* (Grube).*Eunoë pallida* (Ehlers).*Gattyana deludens*, sp. nov.*Lagisca flaccida* Potts.*Harmothoë dictyophora* (Grube).*Harmothoë ampullifera* (Grube).*Harmothoë minuta* (Potts).*Harmothoë* sp.*Harmothoë sinagawaensis* Izuka.**Scalisetosus pellucidus* Ehlers.*Gastrolepidia clavigera* Schmarda.*Hyperhalosydna striata* (Kinberg).*Allmaniella ptycholepis* (Grube).*Admetella longipedata* McIntosh.*Drieschia pelagica* Michaelsen.**Lepidasthenia maculata* Potts var. *striata* nov.*Hololepidella commensalis* Willey.

Subfamily SIGALIONINÆ.

**Sthenelais boa* Johnston.*Sthenelais zeylanica* Willey.*Euthalenessa djiboutiensis* (Gravier).*Psammolyce fijiensis* McIntosh.*Leanira japonica* McIntosh.

Subfamily ACOETINAE.

Polyodontes maxillosus* Ranzani.*Polyodontes melanonotus* (Grube).Panthalis oerstedii* Kinberg.*Eupanthalis edriophthalma* (Potts).

Family CHRYSOPETALIDAE.

Chrysopetalum ehlersi Gravier.*Bhawania cryptocephala* Gravier.

Family AMPHINOMIDAE.

Amphinome rostrata (Pallas).*Eurythoë complanata* (Pallas).*Eurythoë parvecarunculata* Horst.*Pseudeurythoë paucibranchiata*, gen. et sp. nov.*Pseudeurythoë microcephala*, sp. nov.*Paramphinome indica*, sp. nov.*Benthoscolex caecus* Horst.*Chloeia flava* (Pallas).*Chloeia parva* Baird.*Chloeia amphora* Horst.*Chloeia fusca* McIntosh.*Chloeia rosea* Potts.*Notopygos labiatus* McIntosh.*Notopygos hispidus* Potts.*Notopygos variabilis* Potts.*Euphrosyne myrtosa* Savigny.**Euphrosyne foliosa* Audouin & M. Edwards.

Family HESIONIDAE.

Hesione pantherina* Risso.Leocrates claparedii* (Costa).*Leocrates diplognathus* Monro.*Leocratides ehlersi* (Horst).*Podarke angustifrons* (Grube).*Ancistrostylis rigida* Fauvel.*Ancistrostylis constricta* Southern.

Family TOMOPTERIDAE.

Tomopteris mortenseni Augener.*Tomopteris* sp.*Tomopteris* (*Johnstonella*) *aloyssi-sabaudiae* Rosa.

Family TYPHLOSCOLECIDAE.

**Travisiopsis lobifera* Levinsen.¹ European species are marked with an asterisk.

Family PHYLLODOCIDAE.

Phyllodoce castanea (Marenzeller).*Phyllodoce quadraticeps* Grube.*Phyllodoce malmgreni* Gravier.*Phyllodoce gracilis* Kinberg.**Phyllodoce madeirensis* Langerhans.*Phyllodoce tenuissima* Grube.*Eulalia albopicta* Marenzeller.*Eulalia (Pterocirrus) magalhensis* Kinberg.*Eteone barantollae*, sp. nov.*Eteone (Mysta) ornata* Grube.*Paralacydonia weberi* Horst.**Lopadorhynchus uncinatus* Fauvel.

Family SYLLIDAE.

Syllis (Haplosyllis) spongicola* Grube.Syllis gracilis* Grube.**Syllis variegata* Grube.*Syllis closterbranchia* Schmarda.*Syllis exilis* Gravier.**Trypanosyllis zebra* Grube.*Trypanosyllis gigantea* McIntosh.*Trypanosyllis misakiensis* Izuka.*Autolytus orientalis* Willey.*Sacconereis*, sp.

Family NEREIDAE.

Lycastis meraukensis Horst.*Lycastis indica* Southern.*Tylonereis bogoyawlenskyi* Fauvel.*Tylonereis fauveli* Southern.*Leonnates jousseaumei* Gravier.*Dendronereis arborifera* Peters.*Dendronereis aestuarina* Southern.*Dendronereides heteropoda* Southern.*Nereis anchylochaeta* Horst.*Nereis onychophora* Horst.*Nereis chingrighattensis*, sp. nov.*Nereis cricognatha* Ehlers.*Nereis glandicincta* Southern.*Nereis unifasciata* Willey.*Nereis talehsapensis*, sp. nov.*Nereis chilkaensis* Southern.*Nereis trifasciata* Grube.*Nereis indica* Kinberg.*Nereis contierei* Gravier.*Nereis zonata* var. *persica* Fauvel.*Nereis kauderni* Fauvel.*Nereis jacksoni* Kinberg.**Nereis (Ceratonereis) mirabilis* Kinberg.*Nereis (Ceratonereis) tripartita* Horst.*Nereis (Ceratonereis) microcephala* Grube.*Nereis (Ceratonereis) flagellipes*, sp. nov.*Perinereis sulwana* Horst.*Perinereis singaporiensis* Grube.*Perinereis vancaurica* Ehlers.*Perinereis cultrifera* Grube, varr. *typica*, *floridana*, *perspicillata* and *helleri*.*Perinereis aibuhitensis* Grube.*Perinereis nigro-punctata* Horst.*Perinereis cavifrons* Ehlers.*Perinereis neocaledonica* Pruvot.*Perinereis nuntia* (Savigny), varr. *typica*, *brevicirris*, *heterodonta* and *vallata*.*Pseudonereis gallapagensis* Kinberg.*Pseudonereis anomala* Gravier.*Pseudonereis rotnestiana* Augener.**Platynereis dumerilii* Audouin & M. Edwards.*Platynereis abnormis* Horst.*Platynereis polyscalma* Chamberlin.*Nereis* sp.

Family NEPHTHYDIDAE.

Nephtys dibranchis Grube.*Nephtys gravieri* Augener.*Nephtys prox. malmgreni* Theel.*Nephtys polybranchia* Southern.*Nephtys oligobranchia* Southern.

Family GLYCERIDAE.

Goniada emerita Audouin & M. Edwards.*Goniada annulata* Moore.*Goniada*, sp.*Goniada (Goniadopsis) incerta*, sp. nov.*Glycinde oligodon* Southern.*Glycera tessellata* Grube.*Glycera lancadivae* Schmarda.*Glycera longipinnis* Grube.*Glycera alba* Rathke.*Glycera prashadi*, sp. nov.*Glycera sagittariae* McIntosh.**Glycera gigantea* Quatrefages.**Glycera rouxii* Audouin & M. Edwards.*Glycera cirrata* Grube.*Glycera manorae*, sp. nov.

Family EUNICIDAE.

**Eunice aphroditois* Pallas.*Eunice tentaculata* Quatrefages.

**Eunice florissana* Pourtales.

Eunice afra Peters.

Eunice afra var. *paupera* Grube.

Eunice coccinea Grube.

Eunice grubei Gravier.

Eunice savignyi Grube.

Eunice investigatoris, sp. nov.

Eunice antennata (Savigny).

Eunice australis Quatrefages.

Eunice indica Kinberg.

**Eunice siciliensis* Grube.

Eunice (*Nicidion*) *gracilis* (Crossland.)

**Marphysa sanguinea* Montagu.

Marphysa graveleyi Southern.

Marphysa mossambica Peters.

Marphysa stragulum (Grube).

Lysidice collaris Grube.

**Diopatra neapolitana* Delle Chiaje.

**Onuphis conchylega* Sars.

Onuphis holobranchiata Marenzeller.

Onuphis aucklandensis Augener.

**Onuphis eremita* Audouin & M. Edwards.

Onuphis investigatoris, sp. nov.

**Hyalinoecia tubicola* (O. F. Müller).

Rhamphobrachium chuni Ehlers.

Aglaurides fulgida Savigny.

**Lumbriconereis latreilli* Audouin & M. Edwards.

Lumbriconereis sphaerocephala Schmarda.

**Lumbriconereis impatiens* Claparède.

Lumbriconereis heteropoda Marenzeller.

Lumbriconereis biflaris Ehlers.

Lumbriconereis pseudobiflaris, sp. nov.

Lumbriconereis notocirrata, sp. nov.

**Arabella iricolor* (Montagu).

**Drilonereis filum* Claparède.

Drilonereis major Crossland.

Ninoë chilensis Kinberg.

Family ARICIIDAE.

**Aricia cuvieri* Audouin & M. Edwards.

Aricia cuvieri var. *persica* nov.

Aricia nuda Moore.

Aricia exarmata, sp. nov.

Scoloplos marsupialis Southern.

(?) *Scoloplos kerguelensis* McIntosh.

Scoloplos latus (Chamberlin).

Family SPIONIDAE.

Nerine sp.

Scolecopsis indica Fauvel.

Laonice cirrata Sars.

*(?) *Polydora ciliata* Johnston.

*(?) *Polydora antennata* Claparède.

Prionospio pinnata Ehlers.

**Prionospio cirrifera* Wiren.

Family DISOMIDAE.

Disoma orissae, sp. nov.

Family CHAETOPTERIDAE.

**Chaetopterus variopedatus* (Renier).

**Phyllochaetopterus socialis* Claparède.

Family CIRRATULIDAE.

**Audouinia filigera* Delle Chiaje.

Audouinia anchylochaeta Schmarda.

Tharyx multifilis Moore.

Family CHLORAEMIDAE.

Stylarioides parmatum Grube.

**Stylarioides eruca* Clap. var. *indica* Fauvel.

Stylarioides bengalensis, sp. nov.

Stylarioides bifidus, sp. nov.

Brada talehsapensis, sp. nov.

Brada mamillata Grube.

*(?) *Diplocirrus glaucus* (Malmgren).

Family SCALIBREGMIDAE.

**Scalibregma inflatum* Rathke.

Parasclerocheilus branchiatus Fauvel.

Family OPHELLIIDAE.

Armandia lanceolata Willey.

Armandia leptocirris Grube.

**Ammotrypane aulogaster* Rathke.

**Polyophthalmus pictus* (Dujardin).

Travisia arborifera, sp. nov.

Family CAPITELLIDAE.

**Notomastus latericeus* Sars.

Notomastus giganteus Moore.

**Dasybranchus caducus* Grube.

Heteromastus similis Southern.

Barantolla sculpta Southern.

Capitellethus dispar (Ehlers).

Branchiocapitella singularis, gen. et sp. nov.

Family MALDANIDAE.

Clymene (*Euclymene*) *annandalei* Southern.

Clymene (*Euclymene*) *insecta* (Ehlers).

(?) *Clymene* (*Euclymene*) *grossa* Baird.

(?) *Clymene* (*Euclymene*) *watsoni* Gravier.

(?) *Clymene* (*Euclymene*) *santanderensis* Rioja.

(?) *Chymene (Praxillella) gracilis* Sars.

(?) *Axiiothella obockensis* Gravier.

**Maldane sarsi* Malmgren.

Maldane sp.

**Maldanella harai* Izuka.

**Petaloproctus terricola* Quatrefages.

Asychis disparidentata Moore.

Asychis triflora Augener.

(?) *Asychis gotoi* Izuka.

Asychis theodori Augener.

Asychis gangeticus, sp. nov.

Family OWENIIDAE.

**Owenia fusiformis* Delle Chiaje.

Family SABELLARIDAE.

**Sabellaria spinulosa* Leuck. var. *alcocki* Gravier.

Sabellaria cementarium Moore.

Sabellaria pectinata Fauvel, var. *intermedia* nov.

Pallasia pennata Peters.

Pallasia (Lygdamis) indicus Kinberg.

Family STERNASPIDIDAE.

**Sternaspis scutata* Ranzani.

Family AMPHICTENIDAE.

Pectinaria antipoda Schmarda.

Pectinaria abbranchiata, sp. nov.

Pectinaria (Amphictene) crassa Grube.

Family AMPHARETIDAE.

**Amphicteis gunneri* Sars.

Amphicteis posterobranchiata, sp. nov.

Amage bioculata Moore.

Melinopsis dubita Hoagland.

Schistocomus hiltoni Chamberlin.

Melinna aberrans, sp. nov.

Family TERESELLIDAE.

**Loimia medusa* Savigny.

Loimia medusa Sav. var. *annulifilis* Grube.

**Polymnia nebulosa* Montagu.

Nicolea gracilibranchis Grube.

Terebella ehrenbergii Grube.

Pista typha Grube.

Pista fasciata Ehlers.

Pista robustiseta Caullery.

Pista macrolobata Hessle.

Pista herpini Fauvel.

Pista (?) *pachybranchiata*, sp. nov.

Thelepus plagiostoma Schmarda.

**Thelepus cincinnatus* (Fabricius).

Polycirrus sp.

**Terebellides stroemi* Sars.

Family SABELLIDAE.

Dasychone cingulata Grube.

Dasychone serratibranchis Grube.

Branchiomma pacificum Johansson.

Branchiomma intermedium Beddard.

Sabellastarte indica Savigny.

Hypsicomus phaeotaenia Schmarda.

Potamilla ehlersi Gravier.

Potamilla leptochaeta Southern.

Family SERPULIDAE.

**Serpula vermicularis* Linné.

**Hydroides norvegica* Gunnerus.

Hydroides heteroceros Grube.

**Hydroides lunulifera* Claparède.

Pomatostegus stellatus Ablildgaard.

**Ditrupa arietina* O. F. Müller.

Ditrupa arietina O. F. Müller, var. *monilifera* nov.

Spirobranchus giganteus Pallas.

Spirobranchus jousseaumei Gravier.

Spirobranchus maldivensis Pixell.

(?) *Pomatoleios crosslandi* Pixell.

Ficopomatus macrodon Southern.

Mercierella enigmatica Fauvel.

Spirorbis foraminosus Augener.

(?) *Vermiliopsis* sp.

(?) *Protula* sp.

INCERTAE SEDIS.

Taleksapia annandalei, gen. et sp. nov.

As is usual in tropical seas, the families best represented are the Aphroditidae and Nereidae each with 42 species; the Eunicidae with 38; the Amphinomidae with 17; the Maldanidae and Serpulidae with 16; the Terebellidae with 15; the Glyceridae with 13 and the Phyllodocidae with 12 species.

The three new genera are *Pseudeurythoë*, a connecting link between *Eurythoë* and *Paramphinome*; *Branchiicapitella* a Capitellid with branchiae and a copulatory apparatus as in *Capitella*, and last but not the least, the curious genus *Talehsapia*, which as stated above, does not fit satisfactorily into any known family. Nevertheless, I have not deemed it advisable to create a new family to include it till fresh material is more fully investigated.

The small number of 28 new species is not to be wondered at, as the fauna of the Indian Ocean and the adjoining seas has been fairly well investigated both in recent times and formerly.

The fauna of India does not materially differ from that of the Red Sea, the Persian Gulf, the Philippine Islands and the Malay Archipelago, while many species from the Pacific Ocean, New-Zealand, New-Caledonia and Australia are also found in this area.

It must also be borne in mind that many Polychaetes are really cosmopolitan; several European species are met with nearly all the world over and their number is increasing steadily. A careful comparison of many exotic forms with well-known species from the Atlantic Ocean, English Channel and the Mediterranean, has failed to reveal any distinctive features to differentiate them. In the above list 67 out of 306 species are marked with asterisks.

The new species are: *Gattyana deludens*, which strongly mimicks an *Iphionella*; *Paramphinome indica*, *Pseudeurythoë microcephala* and *Ps. paucibranchiata*, intermediate between *Paramphinome* and *Eurythoë*; *Eteone barantollae*; *Nereis talehsapensis*; *Nereis chingri-ghattensis*, *Ceratonereis flagellipes*, with its striking whip-like appendages on the parapodia; *Glycera manorae*; *Gl. prashadi*; *Goniadopsis incerta*; *Eunice investigatoris*; *Onuphis investigatoris*; *Lumbriconereis notocirrata*; *L. pseudobifilaris*; *Aricia exarmata*; *Disoma orissae*; *Stylarioides bengalensis*; *Sty. bifidus*; *Brada talehsapensis*; *Travisia arborifera*, a singular form with ramified gills; *Branchiicapitella singularis*, a very peculiar Capitellid; *Asychis gangeticus*; *Pectinaria abbranchiata*, the only known species of the family without gills; *Amphicteis posterobranchiata*; *Melinna aberrans*; *Pista pachybranchiata*; and *Talehsapia annandalei*, an enigmatic worm.

Four new forms differing only from already known species by less important characters have been described as varieties, these are: *Lepidasthenia maculata* Potts var. *striata* nov., *Aricia cuvieri* Audouin and M. Edwards var. *persica* nov., *Sabellaria pectinata* Fauvel var. *intermedia* nov., *Ditrupa arietina* Müller var. *monilifera* nov.

Among already known species there are a few specially interesting forms which are either very rare, incompletely described, or have not previously been found in the Indian waters; these are: *Admetella longipedata* McIntosh, *Panthalis oerstedii* Kinberg, *Polydonte maxillosus* Ranzani, *Eurythoë parvecarunculata* Horst, *Benthoscolex coecus* Horst, *Travisia lobifera* Levinsen, *Lopadorhynchus uncinatus* Fauvel, the very singular *Platynereis polyscalma* Chamberlin, *Eunice gracilis* (Crossland) which was described as a *Nicidion* but is really an *Eunice* with the branchiae set very far back; *Ninoë chilensis* Kinberg; *Aricia nuda* Moore, of which a large number of specimens were collected; *Scoloplos latus* Chamberlin with conspicuous multifid gills; *Notomastus giganteus* Moore; *Capithellethus dispar* Ehlers; *Asychis triflora* Augener, with long whip-like processes; two very strange-looking Ampharetidae, *Melinopsis dubita* Hoagland with flattened gills, and *Schistocomus hiltoni*

Chamberlin, which has both simple and pinnate gills. The genus *Pista* is represented by no less than five species which exhibit an interesting range of variation in the shape of the anterior hooks.

Mercierella enigmatica Fauvel, first recorded from brackish waters near Caen and from the London docks and later found near St. Malo and St. Servan in the river Rance, next on the coasts of Spain, Tunis, Black Sea and Morocco, nearly always from brackish waters, has been supposed to be an exotic Polychaete brought home on ships' hulls. Its nearest allied form is *Ficopomatus macrodon* described from the Chilka Lake by Southern. In the collection of the Indian Museum, specimens of *Mercierella enigmatica* were found adhering to oyster shells from the Ennur Backwater near Madras, thus confirming the supposition of its Indian origin. Once it was even found fixed on the same shell with *Ficopomatus macrodon*.

In the following report it has not been deemed advisable to give again the full literature of each well-known species. In most cases the usual synonyms are mentioned with references to the papers giving the best descriptions and figures, occasionally a more complete synonymy and literature list is given.

A short description is added of each species, giving only the main characters, sufficient for a rough identification, but this must be supplemented by reference to the more extensive papers mentioned. The dichotomous keys given include as a rule only the species recorded in this report. Species recorded from India in other papers, but not found in the present collection, are not included in this paper.

A dichotomous key of families will be found in Fauvel's *Faune de France, Polychaeta* (1923-1927) and an English translation in Gravel's and Fauvel's *Fauna of Krusadai Island* (1927-1930).

Family APHRODITIDAE Savigny.

1. Elytrigerous and cirriferous segments alternating more or less regularly 2

In the anterior part of the body, elytrigerous segments alternating; in the posterior part, all the segments bear eytra. Compound setae. Body long and cylindrical

Subfamily Sigalioninae.

2. In the anterior part of the body, a cirriferous segment between two elytrigerous, in the posterior part all the segments are inserted between two elytrigerous. Without compound setae 3

Only one cirriferous segment between two elytrigerous. Body vermiform. Without compound setae

Subfamily Acoetinae.

3. Eyes pedunculate (rarely sessile). A single tentacle. Facial tubercle very conspicuous

Subfamily Hermioninae.

Eyes sessile. Three tentacles.¹ Facial tubercle wanting or obsolete

Subfamily Polynoinae.

¹ *Macellicephala*, *Bylgia* and *Iphione* excepted.

Subfamily Hermioninae Grube.

Body ovate, depressed, a pair of eyes, a median tentacle under which is a papillose facial tubercle. No lateral tentacles. Proboscis devoid of horny teeth. Elytra fifteen pairs.

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|---|----------------------|
| 1. Harpoon-shaped dorsal spines | 2 |
| Without harpoon-shaped dorsal spines | 3 |
| 2. Ventral bristles with spurs | <i>Hermione.</i> |
| Ventral bristles with a fringe of hairs | <i>Laetmatonice.</i> |
| 3. Dorsal bristles smooth | 4 |
| Dorsal bristles flattened, serrated | <i>Pontogenia.</i> |
| 4. Dorsal bristles acicular, a thick dorsal felt | <i>Aphrodita.</i> |
| Dorsal bristles sabre-like ; no dorsal felt present | <i>Aphrogenia.</i> |

Genus **APHRODITA** Linné.

Eyes sessile. Elytra hidden under a thick, close felt. Ventral bristles acicular, disposed in three tiers. Dorsal bristles of two kinds, (1) stout, smooth, piercing the felt, (2) very long and slender, iridescent.

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|---|----------------------|
| 1. Dorsal bristles long, golden, curving backwards, thatch-like | <i>A. australis.</i> |
| Dorsal bristles, short, erect, dark-coloured | 2 |
| 2. Dorsal bristles with a slender end. Ventral bristles very hairy | <i>A. talpa.</i> |
| Dorsal bristles straight, blunt. Ventral bristles smooth in the adult. | <i>A. aculeata.</i> |

Aphrodita australis Baird.

Aphrodita australis, Baird 1865, p. 176.

Aphrodita australis, McIntosh 1885, p. 34, pl. vii, figs. 6, 7.

Aphrodita australis, Fauvel 1917, p. 165, fig. 1ⁿ; 1923 a, p. 136, fig. 3 (Synonymy).

Aphrodita terrae-reginae, Haswell 1883, p. 271.

Aphrodita haswelli, Johnston 1908, p. 241, pl. lix, figs. 1-8.

? *Aphroditella malayana*, Horst 1917, p. 48, pl. xi, figs. 1-3.

"Investigator" Sta. 177, Laccadive Sea, 637 fms. ; Sta. 388, West of Comorin, 670 fms.

The specimens are small, one is only 22 mm. long and, with the setae, 20 mm. broad. The dorsal bristles are golden but rather straight and diverging, as in *Hermione*, instead of curving backwards as in the typical adult. The ventral bristles are hairy and rather slender, the superior ones of a golden hue, the inferior greenish. The specimens are very unlike young of *A. talpa*, of the same size and are not coated with mud.

Habitat.—Australia, Indian Ocean, Japan.

Aphrodita talpa Quatrefages.

Aphrodita talpa, Quatrefages 1865, I, p. 196, pl. iii, figs. 2-4 (*non* Ehlers, *nec* Benham, Fauvel 1917, Augener).

Aphrodita talpa, Fauvel 1925, p. 140, fig. 4.

? *Aphrodita castanea*, Moore 1910, p. 380, pl. xxxii, figs. 85-97 ; pl. xxxiii, fig. 98.

? *Aphrodita longipalpa*, Essenberg 1917, p. 403, pl. xxxi, figs. 1-14 ; pl. xxxvii, figs. 77, 78.

"Investigator" Sta. 232, 386, Laccadive Sea ; 233, 322, Andaman Sea ; 323, Bay of Bengal, 463 fms. ; 339, Gulf of Oman, 604 fms. ; 467, off Travancore, 105 fms. ; 610.—Sandheads, P. V. "Lady Fraser" Capt. Parks, July 1927 ; off Malabar Coast ; Orissa Coast, 10 fms. ; Hongkong ; Andamans.

Most of the specimens are small, ranging from 15 mm. to 30 mm., with a breadth of 13 to 25 mm. The lateral capillary setae are lustreless or very faintly iridescent, more or less densely coated with cylinders of mud as figured by Quatrefages (1865, pl. vi, fig. 4, *a*, *b*). The appearance of the flanks is, owing to this coating of mud, decidedly scaly, as described and figured by this author. The ventral setae are hairy, but devoid of fangs or spurs.

Years ago, under the name of *A. talpa*, I described a small *Aphrodita* from Australia agreeing with Ehler's and Benham's description. But later, having had the opportunity of examining Quatrefages' type specimen, I recognised my mistake. My Australian specimen having ventral setae with a small lateral hook is *A. armifera* Moore. The genuine *A. talpa* has hairy ventral setae, without any hook or spur.

The dorsal setae are not conspicuous, they are imbedded into the dorsal felt and only their slender colourless, transparent end protrudes above it and curves backwards.

Habitat.—Pacific Ocean, South Australia, New Zealand, China, Indian Ocean.

***Aphrodita aculeata* Linné.**

Aphrodita aculeata, McIntosh 1900, p. 247 (Bibliography).

Aphrodita aculeata, Fauvel 1923, p. 33, fig. 10; 1925, p. 132, figs. 1-2 (Synonymy).

Aphrodita japonica, Marenzeller 1879, p. iii, pl. i, fig. 2.

Aphrodita japonica, Izuka 1912, p. 74, pl. ix, figs. 1-3.

"Investigator" Sta. 569.—"Golden Crown," Santapalli, Madras Presidency Oct. 1909.

The specimen from Santapalli (65 mm. × 35 mm.) has a few hairy ventral bristles. The inferior ones are smooth. The dorsal bristles are blackish, short, erect, very little protruding over the dorsal felt.

On the larger specimens from Sta. 569 (75-80 mm. × 25 mm.) the ventral bristles are all smooth. The dorsal bristles are of a dark golden hue, stiff, straight, smooth. They are not long and flattened backwards as in *A. australis*. The slender lateral capillary setae are beautifully iridescent. These specimens agree with *A. japonica*, but I fail to find any distinctive feature between this species and the European *A. aculeata*.

Habitat.—North Sea, English Channel, Atlantic Ocean, Mediterranean, Indian Ocean, Japan.

Genus **APHROGENIA** Kinberg.

Sabre-like curved dorsal bristles. Ventral setae bifurcated. Without dorsal felt.

***Aphrogenia alba* Kinberg.**

Aphrogenia alba, Kinberg 1857, p. 6, pl. ii, fig. 6.

Aphrogenia villosa, Horst 1917, p. 63, pl. xiv, figs. 10-12.

Aphrogenia villosa, Augener 1926b, p. 439.

Port Blair, Andamans.

Specific Characters.—Elytra 13 pairs uniformly white, with a faint mother-of-pearl gloss and with scattered minute papillae. Dorsal cirri long, with a clavate tip. Dorsal bristles stout and curved. Ventral setae with two unequal limbs.

The only specimen agrees with Kinberg's description and figures and Augener's description of Kinberg's type-specimen. But it agrees also with *Aphrogenia villosa* Horst and

Augener (1913). The elytra are uniformly white or grey mother-of-pearl and do not show the pattern which Augener holds as characteristic of his *A. margaritacea* from Australia.

The dorsal bristles are smooth and not swollen at the tip. The enlargement and hairs figured by Horst are only due to a coating of mud and minute parasitic algae, as I had the opportunity to observe on an Australian specimen. Augener also observed that this appearance is due to a parasitic growth.

The ventral bristles are forked, with a strong spur and a longer limb ; smooth or sometimes bearing one or two obsolete teeth. I fail to see any material difference between *A. alba* Kinberg and *A. villosa* Horst, the villose appearance of the bristles being of no account.

If *A. alba* and *A. margaritacea* are really distinct species, they differ only in reference to the pattern of the elytra.

Habitat.—West Indies, Malay Archipelago, Indian Ocean (Ceylon, Andamans).

Genus **HERMIONE** Blainville.

Harpoon-shaped dorsal bristles. Ventral setae bifurcated and toothed but not fringed. Without dorsal felt.

Hermione hystrix (Savigny).

Hermione hystrix, Fauvel 1923a, p. 35, fig. 11 (Synonymy).

Hermione malleata, Grube 1878, p. 17.

Hermione malleata, Willey 1905, p. 245, pl. i, figs. 3-4.

Hermione malleata, Potts 1909, p. 329.

Hermione malleata, Horst 1917, p. 52, pl. xii, figs. 11-13.

"Investigator" Sta. 631, Nankauri Harbour, 19-30 fms. ; Nicobars.

Specific Characters.—Body ovate, flattened. Median tentacle very variable in length. Elytra smooth. Dorsal bristles erect, diverging, spear-like, with lateral recurved fangs at the tip, which is often enclosed in a sheath. Ventral setae bifurcated with a short limb and a longer one curved, smooth or toothed in the anterior and posterior feet.

The specimens from the Andamans are smaller than those from the Atlantic or Mediterranean, as had already been noted by Willey for the Ceylon worms. *Hermione malleata* does not differ otherwise from *H. hystrix* and, as I have stated elsewhere (1919, p. 328), both species are synonymous.

Habitat.—Atlantic, Mediterranean, Philippines and Malay Archipelago, Red Sea, Ceylon, Andamans.

Genus **LAETMATONICE** Kinberg.

Harpoon-shaped dorsal bristles. Ventral setae bifurcated, with a fringe of hairs at the distal end. A dorsal felt, sometimes very little developed.

Laetmatonice producta Grube var. **benthaliana** McIntosh.

Laetmatonice producta var. *benthaliana*, McIntosh 1885, p. 45, pl. viii, figs. 4-5 ; pl. iv, fig. 12.

Laetmatonice producta, Moore 1903, p. 420.

Laetmatonice producta, Izuka 1912, p. 89, pl. ix, figs. 7-10.

"Investigator" Sta. 278, S. of Ceylon, 1912 fms. ; Off South Sentinel, 240 fms.

Specific Characters.—Elytra 15-18 pairs, delicate, finely granular with radiating lines. No dorsal felt (?). Dorsal spines very large, with 3-4 fangs on each side. Slender bristles from the inner dorsal tuft overlapping the elytra. Ventral setae with a spur and a long fringe of hairs. These specimens have only 15 pairs of elytra; according to McIntosh their number varies from 15 to 18 pairs. The ventral cirri are small, filiform, inserted about the middle of the foot, which is long and slender.

As Horst and Izuka have remarked, I did not find any dorsal felt. With the greater number of scales it is the best feature distinguishing *L. producta* from *L. filicornis*, but in the last species the dorsal felt is sometimes very loose, especially on animals long dragged in the trawl. One of the specimens from Sta. 278 bears, under the elytra, two large parasitic Copepods lying side by side in the length of 3-4 segments.

Habitat.—Japan, Indian Ocean.

Genus **PONTOGENIA** Claparède.

Dorsal bristles (paleae) golden yellow, slightly bent, serrated, arranged like a fan; ventral setae few, bifid. A dorsal felt usually present.

Pontogenia nuda Horst.

Pontogenia nuda, Horst 1917, p. 62, pl. xiv, figs. 5-7.

"Investigator" Sta. 384, Off C. Negrais, Burma, 40 fms.—Andamans.

Specific Characters.—No dorsal felt. Long skin papillae. 15 pairs of elytra. Paleae rather broad, faintly curved, showing two rows of cusps lying at some distance from each other and cup shaped. A dorsal fascicle of capillary setae. Teeth of the bifurcated apex of the ventral setae obtuse and short.

In both specimens the dorsal felt is wanting, or is at least reduced to a few lateral threads. The paleae agree with Horst's description and figure. The two rows of cusps, seen from above, are like two rows of pearls; in a side view they look like teeth. These cusps are larger and more numerous than in *P. chrysocoma* from Naples.

The lateral spur of the ventral setae is more or less sharp, and the distinction drawn by Horst is very doubtful.

P. nuda differs from *P. chrysocoma* var. *minuta* Potts in the absence of a dorsal felt which is very conspicuous in the latter. Both differ from typical *P. chrysocoma* in their paleae being more boldly serrated. They may be only varieties of the European species.

Habitat.—Malay Archipelago, Andamans, Burma.

Subfamily Polynoinae Grube.

Body short or rarely elongate. Elytra 12-18 pairs, or more, inserted on segments 2, 4, 5, 7, 9 23, 26, 29, etc. Prostomium bilobed, with four sessile eyes, three tentacles,¹ 2 long palps. Proboscis with a row of terminal papillae and four horny jaws. Feet biramous. Setae all simple. Two anal cirri.

- | | |
|---|------------------|
| 1. Only two tentacles. 13 pairs of elytra | <i>Iphione</i> . |
| Three tentacles | 2. |
| 2. Lateral tentacles inserted terminally | 3. |
| Lateral tentacles inserted ventrally | 8. |

¹ Except in *Macellicephala*, *Iphione* and *Bylgia*.

3. Elytra 12 pairs	4.
Elytra more than 12 pairs	5.
4. Elytra very small and tough. Ventral setae trifurcate	<i>Hermenia</i> .
Elytra normal. Ventral setae unidentate or bidentate	<i>Lepidonotus</i> .
5. Elytra 30 pairs or more	<i>Lepidasthenia</i> .
Elytra less than 30 pairs	6.
6. Cirrophores very large	<i>Drieschia</i> .
Cirrophores normal	7.
7. Elytra with longitudinal dark stripes. Dorsal setae few or absent	<i>Hyperhalosydna</i> .
Elytra soft, translucent, dorsal setae stout	<i>Allmaniella</i> .
8. Fifteen pairs of elytra	9.
More than fifteen pairs of elytra	13.
9. Elytra covering the whole body	10.
Elytra leaving the posterior segments of the body uncovered	<i>Lagisca</i> .
10. Ventral setae bidentate	11.
Ventral setae unidentate	12.
11. Setae transparent as crystal, with spinous pouches	<i>Scalisetosus</i> .
Setae without spinous pouches	<i>Harmothoë</i> .
12. Dorsal setae capillary	<i>Gattyana</i> .
Dorsal setae stouter than the ventral setae	<i>Eunoë</i> .
13. Eyes absent. Dorsal and ventral setae similar, flattened, vitreous	<i>Admetella</i> .
Eyes conspicuous. Dorsal and ventral setae unlike	14.
14. Tentacles and cirri long and club-like. Very conspicuous ventral lamellae	<i>Gastrolepidia</i> .
Tentacles and cirri tapering. Dorsal tubercles conspicuous	<i>Hololepidella</i> .

Genus **IPHIONE** Kinberg.

Body short, ovate, thirteen pairs of elytra. Only two tentacles, which are inserted laterally; facial tubercle present. Dorsal setae more slender than the ventral, which are unidentate.

Iphione muricata (Savigny).

Iphione muricata, Seidler 1922, p. 75 (Synonymy).

Iphione muricata, Willey 1905, p. 246, pl. i, fig. 6.

Iphione muricata, Gravely 1927, p. 4, pl. ix, fig. 1.

Iphione muricata, Pruvot 1930, p. 3, fig. 1.

"Investigator" Sta. 593, coral reefs, shore collecting; Sta. 645, Maldives, Lagoon reef; Sta. 650, Maldives, Horsburg atoll; Sta. 659, Andamans; Sta. 665, Andamans; Port Blair, Andamans; Off Little Andamans; Rock pool Reef, Diamond I., Snod Island, Coco Island (Alcock), Kilakarai, Coral Reefs; Mergui; Pamban, on rock under the bridge, Feb. 1925.

Specific Characters.—Body ovate, flattened, entirely covered by the overlapping elytra. Prostomium square, with a deep anterior median notch; four eyes, two tentacles with a large basal part and a filiform tip. A facial tubercle. 13 pairs of elytra, reniform, deeply notched, their surface is divided up into polygonal areas and these again into numerous secondary areoles. The posterior margin bears large spinous tubercles. Dorsal setae extremely fine, in dense clusters. Ventral setae stout, with a smooth curved tip.

The colour of preserved specimens is yellowish brown, somewhat leathery. According to the label of a specimen from Sta. 650 "in life it was a pale fawn colour with deep blue border"

This species is a frequent inhabitant of coral reefs.

Pruvot (1930, p. 4) demonstrated how the larger spinous tubercles of the posterior part of the elytra are gradually formed by a rising of the upper surface of the polygonal areas.

Habitat.—Red Sea, Indian Ocean, Ceylon, Andamans, Philippine Islands, Malay Archipelago, Pacific Ocean, New Caledonia.

Genus **LEPIDONOTUS** Leach.

Paired tentacles short, terminal; twelve pairs of elytra.

- | | |
|---|---------------------------|
| 1. Without dorsal setae | <i>L. melanogrammus</i> . |
| With dorsal setae | 2. |
| 2. Two kinds of dorsal setae | <i>L. jukesi</i> . |
| One kind of dorsal setae | 3. |
| 3. Ventral setae bidentate | 4. |
| Ventral setae unidentate | 6. |
| 4. Elytra fringed | 5. |
| Elytra without fringe | <i>L. hedleyi</i> . |
| 5. Elytra with echinulate papillae | <i>L. jacksoni</i> . |
| Elytra with carinulate papillae | <i>L. carinulatus</i> . |
| 6. Elytra fringed | 7. |
| Elytra without fringe, with a tumid, more or less bilobed crest | <i>L. cristatus</i> . |
| 7. Elytra divided into polygonal areas with star-like papillae | <i>L. dictyolepis</i> . |
| Elytra without polygonal areas | <i>L. tenuisetosus</i> . |

Lepidonotus carinulatus Grube.

Lepidonotus carinulatus, Grube 1878, p. 26, pl. iii, fig. 2.

Lepidonotus carinulatus, Horst 1917, p. 69, pl. xv, fig. 10.

Lepidonotus carinulatus, Fauvel 1919, p. 330.

Lepidonotus carinulatus, Seidler 1924, p. 72 (Synonymy).

Kilakarai, from Coral reefs; Pamban bridge, on rocks and coral reefs; Shingle Island; Tuticorin Pearl Oyster Bank, 12 miles from shore; Ceylon Pearl Oyster Banks.

Specific Characters.—Elytra round, next oval and elliptic, fringed, covered with flat or carinulate tubercles. Dorsal setae slender, spinulose, ventral setae stout, bidentate. *Lepidonotus carinulatus* is a Polynoid widely spread on the shores of the whole Indian Ocean, where it replaces the Atlantic species *L. squamatus*. Both species are indeed closely related, differing mainly in their ventral setae, which are bidentate in the former and unidentate in the latter.

The elytra are very similar, with a long fringe and very small caliciform papillae on their rims. The larger papillae are more or less flattened, somewhat carinated, as represented by Grube (1878, pl. vi, figs. 2, 2b), whilst the smaller side-papillae are sometimes spinous or divided into several short processes, but are not so large and so strongly echinoid as in *L. jacksoni*.

Augener (1922, p. 8, fig. 3) has carefully redescribed *L. carinulatus*.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Madagascar, India, Philippine Islands and Japan.

Lepidonotus jacksoni Kinberg.

Lepidonotus jacksoni, Kinberg 1858, p. 11, pl. iii, fig. 11 ; pl. viii, fig. 48.

Lepidonotus jacksoni, Augener 1922a, p. 11 ; 1924, p. 270 ; 1927, p. 99.

Lepidonotus jacksoni, Seidler 1904, p. 74.

Lepidonotus carinulatus, Willey (non Grube) 1905, p. 248, pl. i, figs. 7-11.

Lepidonotus willeyi, Benham 1915, p. 183, pl. xxxviii, figs. 8-15.

"Investigator" Sta. 74, Ganjam Coast ; Sta. 468, Port Blair Harbour, Andamans.

Specific Characters.—Elytra fringed with flat, carinulate and large spheroidal echinate papillae. Dorsal setae slender ; ventral setae bidentate.

According to Augener and Seidler, who had the opportunity to examine Grube's and Kinberg's specimens, *L. jacksoni* and *L. carinulatus* have both of them bidentate setae. They differ mostly in the papillae of the elytra, which in *L. jacksoni* are more conspicuously echinate or stellate. But in *L. carinulatus* and in *L. squamulatus*, there is a large range of variation in the number and the size of the spinous tubercles, not only in the different specimens but even in the scales of each worm ; I am doubtful whether specific distinction based on these characters has any value.

Habitat.—Indian and Pacific Oceans, Australia and New Zealand.

Lepidonotus hedleyi Benham.

Lepidonotus hedleyi, Benham 1915, p. 181, pl. xxxviii, figs. 1-7.

Lepidonotus hedleyi, Seidler 1924, p. 77.

Lepidonotus hedleyi, Pruvot 1931, p. 7, pl. i, figs. 6-10.

Manora Shore, Karachi, 28th December 1920.

Specific Characters.—Elytra oval, without fringe, smooth in appearance, pale grey, translucent, thin, slightly overlapping, sparsely covered with uniformly arranged, low conical tubercles, which have an oval base. Dorsal setae pale, all alike, with incomplete spiral frills. Ventral setae with a subapical tooth and from 9 to 15 pectinated frills. Tentacles smooth. Dorsal cirri with a slight subterminal swelling (Benham).

The only specimen, broken into two, agrees with the description and figure of Benham. The dorsal cirri are stout, brown with a dark band below the enlarged tip.

Habitat.—South Australia, New-Caledonia, Indian Ocean.

Lepidonotus dictyolepis Haswell.

Lepidonotus dictyolepis, Haswell 1883, p. 287, pl. ix, figs. 7-8.

Lepidonotus dictyolepis, Seidler 1924, p. 25.

Lepidonotus dictyolepis, Augener 1927 a, p. 94, fig. 3.

Shingle Island, Gulf of Manaar, 5th September 1925.

Specific Characters.—Elytra oval, overlapping, covering entirely the back, and with a thick fringe and cylindrical papillae along the margins. The surface is divided into polygonal areas, which may bear in their middle a round papilla with star-like diverging ridges and a central pore. Dorsal setae slender and spinulose. Ventral setae stout, with a short unidentate apex and a few spines.

The two whole specimens agree with Augener's description, except that the fringes of the elytra are longer and the ventral setae are nearly smooth.

I noticed on the elytra a black triangular spot pointing forwards. The papillae in the polygonal areas are more or less rounded; a number have a starry appearance with a central small round spot which Augener regards as an opening.

Habitat.—South Australia, India.

***Lepidonotus tenuisetosus* (Gravier).**

Lepidonotus tenuisetosus, Fauvel 1919, p. 330; 1930, p. 8.

Lepidonotus tenuisetosus, Seidler 1924, p. 25.

Euphione tenuisetosa, Gravier 1901, p. 122, pl. viii, figs. 123-125.

Euphione tenuisetosa, Fauvel 1911, p. 368.

"Investigator" Sta. 571, Jack and Una Islands; Madras, Sta. 3; Off Puri, Orissa.—Port Canning, Bengal, from a piece of brick below water.

Specific Characters.—Elytra ovate, slightly reniform, with a small fringe; covered with a few large and a number of smaller rounded papillae, and also very small calicinate papillae on the outer edge. [Dorsal setae slender, nearly capillary and spinulose. Ventral setae with a rather long smooth tip and a few fringes.

This species is closely allied to *L. squamatus* and differs only in having more slender dorsal setae, smaller tubercles of the elytra and more closely placed eyes.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Madagascar, India.

***Lepidonotus cristatus* Grube.**

Lepidonotus cristatus, Grube 1878, p. 27, pl. ii, fig. 3.

Lepidonotus cristatus, Gravier 1901, p. 270, pl. vii, figs. 104-110.

Lepidonotus cristatus, Fauvel 1919, p. 329 (Synonymy).

Lepidonotus oculatus, Baird, Seidler 1924, p. 43, figs. 3-8.

"Investigator" Sta. 693, March 2nd, 1925.—Andamans 238-290 fms.

Specific Characters.—Elytra soft, large, entirely covering the back. They are rounded or slightly emarginate, without fringe, covered with small stellate tubercles and bearing a large tumid, more or less bilobed crest. Dorsal setae stout, crenulated, ventral setae with a short smooth, sharp apex and a few rows of small spines.

The elytra, with their large warty process, are very characteristic. Seidler (1924, p. 43) identifies *L. cristatus* Grube with *L. oculatus* Baird. As far as I can judge from the *L. oculatus* from Australia, which I had the opportunity to investigate, the two species appear to be quite distinct.

Habitat.—Red Sea, Indian Ocean, Zanzibar, Mauritius, Amboina, Philippine Islands, West Australia.

***Lepidonotus melanogrammus* Haswell.**

Lepidonotus melanogrammus, Haswell 1883, p. 284, pl. viii, fig. 13.

Lepidonotus melanogrammus, Fauvel 1917, p. 176, pl. iv, figs. 18-19.

Lepidonotus melanogrammus, Seidler 1924, p. 84.

Port Blair, Andamans.

Specific Characters.—Elytra rounded, then ovate, overlapping but leaving the middle of the back uncovered. They are smooth, without papillae or fringe, and are divided into

polygonal areas. Dorsal ramus reduced to a small conical tubercle, with an aciculum. Ventral setae stout, bidentate or unidentate in the posterior feet. Dorsal cirri short, with a large cirrophore.

The single specimen is broken into three parts.

The elytra are dark grey with two round spots, as I have figured them previously (1917, pl. iv, fig. 19) for an Australian specimen. Their polygonal areas could only be seen by clearing in glycerin. The dorsal ramus of the foot is devoid of setae. On the Australian specimen, I found, only in a few feet, a very small dorsal seta enclosed in the teguments; I failed to find this in the Andaman specimen.

Many of the ventral setae appear unidentate, others have a small sub-apical tooth often broken.

On the ventral side, each segment is marked with two transverse grey lines, more or less interrupted and a broad triangular spot at the base of the foot. In the posterior part of the body, each segment bears four ventral dark spots. The last segments appear to be regenerated.

Habitat.—South Australia, Andamans.

Lepidonotus (Thormora) jukesii Baird.

Thormora jukesii, Baird 1865, p. 199.

Lepidonotus (Thormora) jukesii, Seidler 1924, p. 88.

Lepidonotus (Thormora) jukesii, Fauvel 1930, p. 508.

Lepidonotus (Thormora) jukesii, Pruvot 1930, p. 9, pl. i, figs. 11-15.

Lepidonotus trissochaetus, Grube 1878, p. 25, pl. ii, fig. 4.

Lepidonotus trissochaetus, Fauvel 1919, p. 332 (Synonymy).

Andamans; Mergui Archipelago, 3 fms.

Specific Characters.—Two kinds of dorsal setae: (1) short, curved spinulose, (2) long, straight, smooth, slightly hastate. Ventral setae unidentate, with a few rows of spines. Elytra tough, rounded, overlapping, but leaving the middle of the back bare. They are destitute of any fringe and bear a few cylindrical, more or less starry tubercles and smaller rounded ones. Monro (1924, p. 38) having examined Baird's type-specimen was unable to find any trace of marginal ciliation on the elytra. Consequently Grube's species falls into the synonymy of *L. jukesii*.

Habitat.—Red Sea, Indian Ocean, Malay Archipelago, Australia, New-Caledonia.

Genus **HERMENIA** Grube.

Paired tentacles terminal. Twelve pairs of elytra, small, not overlapping. Dorsal division of the foot rudimentary. Ventral setae trifurcated.

Hermenia acantholepis (Grube).

Hermenia acantholepis, Seidler 1924, p. 94.

Hermenia acantholepis, Pruvot 1930, p. 11, pl. i, figs. 27-33.

Lepidonotus acantholepis, Grube 1878, p. 24, pl. ii, fig. 1.

Lepidonotus acantholepis, Horst 1917, p. 67, pl. xv, figs. 3-4.

Lepidonotus acantholepis, Fauvel 1922, p. 990, fig. 1.

"Investigator" Sta. 175, N. E. of Ceylon, 28 fms.

Specific Characters.—Segments rough and warty. Elytra, with the exception of the 2-3 first pairs, very small, rounded, covered and bordered with large brown, ovate tubercles and a few cylindrical papillae. Only a few dorsal setae, small, slender, serrated. Ventral setae with two, small, conical teeth at the bases of their large faintly bent tips.

Hermenia differs from *Lepidonotus* only in its much smaller and thicker elytra and more specially in having trifurcated setae. In *L. clava* the scales are not always overlapping, while reduced dorsal setae are met with in other species; they are wanting in *L. melanogrammus*. As regards the ventral setae they differ only in the absence of the rows of spines, which are reduced to a pair of large teeth at the base of the unidentate apex.

Hermenia should probably be considered a sub-genus of *Lepidonotus*, but the general appearance of the animals of this genus is so striking that it may be considered with advantage as a distinct genus.

Habitat.—Indian Ocean, Ceylon, Philippine Islands, Malay Archipelago, Madagascar, Pacific Ocean, Samoa, New-Caledonia, Australia.

Genus **EUNOË** Malmgren.

Prostomium bilobed, with frontal peaks. Lateral tentacles inserted ventrally. Fifteen pairs of elytra, covering the whole body. Dorsal setae stout, with transverse rows of minute spines. Ventral setae unidentate.

Eunoë pallida (Ehlers).

Eunoë pallida, Fauvel, 1931, p. 7, pl. i, figs. 1-5.

Gattyana pallida, Ehlers, 1908, p. 49, pl. i, figs. 1-9.

Harmothoë pallida, Horst, 1917, p. 91.

? *Harmothoë holothuricola*, Izuka 1912, p. 55, pl. vi, figs. 2-7.

“Investigator” Sta. 115, Andaman Sea, 180-220 fms.; Sta. 332, Andaman Sea, 279 fms.; Sta. 353, Persian Gulf, 25 fms.; Sta. 391, off Travancore Coast, 260 fms.; On *Xenophora pallidula*, Andaman Sea, 173 fms.

Specific Characters.—Prostomium bilobed, with two small, short, pointed peaks. Median tentacle with a large, short ceratophore. Lateral tentacles filiform, shorter. Four small, pale coloured eyes. Elytra fifteen pairs, overlapping, large, soft, smooth, unfringed. Dorsal cirri with papillae. Dorsal tubercles present. Both divisions of the feet elongated, pointed. Dorsal setae stout, curved and serrated on the convex side. Ventral setae with a long, faintly spinulose, enlarged part and a smooth unidentate tip. The upper ventral setae long, slender, straight, nearly capillary.

Specimens from Sta. 115 were found “parasitic on a star-fish”

The number of setigerous segments was found to vary between 36 and 39, most frequently 37; so far as could be seen the last ones were often very small. Ehlers and Horst mention 37 segments. I never found more than 15 pairs of elytra, as did also Horst but according to Ehlers this species has 16 pairs. This is the only discrepancy, as otherwise the above specimens agree perfectly with Ehlers’ description and figures. On other specimens, from the Malay Archipelago, I found also only 15 pairs of elytra.

Izuka (1912, p. 55) described, under the name of *Harmothoë holothuricola*, a Polynoid discovered on the under surface of a Holothurian from Japan, which appears to be very similar, but like Ehlers’ specimen it has 16 pairs of elytra.

Ehlers included his species in the genus *Gattyana*, but as it is provided with stout dorsal setae, whilst in *Gattyana* these setae are slender or nearly capillary, this view is not correct, and I think it must be placed in the genus *Eunoë* which has stout dorsal setae and unidentate ventral setae.

Habitat.—Persian Gulf, Indian Ocean, Andaman Sea, Travancore, Malay Archipelago and Japan (?).

Genus **GATTYANA** McIntosh.

(*Nychia* Malmgren).

Prostomium with frontal peaks. Lateral tentacles inserted ventrally; fifteen pairs of elytra covering the whole body. Dorsal setae numerous, spinulose, capillary. Ventral setae stout, unidentate.

Gattyana deludens, sp. nov.

(Text-figs. 1-2.)

Akyab; Chandipore, Balasore, Orissa, 27th May 1919, probably from shell with Hermit-crab, low Tide; Sandheads, P. V. "Fraser" 11th January 1926; Gangetic Delta; Mergui Archipelago, 3 fms.; Madras, Sta. 13.

Specific Characters.—Body elongated, ovate, nearly uniform in breadth, *much flattened*. 36-38 setigerous segments. Prostomium bilobed, frontal peaks blunt. Four small black eyes, the anterior pair somewhat under the middle part of the lateral ridge of the prostomium. Elongate median tentacle borne on a large ceratophore inserted before and partly under the prostomial lobes. Lateral tentacles filiform, much shorter, ciliated, inserted beneath the base of the median tentacle, partly hidden by it and exceeding it by about half its length. A nuchal fold present. Palps tapering. Tentacular cirri nearly equal, arising from a common, rather long base, with setae. Like the tentacles, they have clavate papillae (Fig. 1, *a*). Dorsal cirri little exceeding the setae, arising from a swollen, asymmetrical, papillate cirrophore. Ventral cirri short, small, inserted on the base of the foot on a short asymmetrical knob. *Cirrigerous feet provided with a long gill-like dorsal process* (Fig. 1, *g*). Fifteen pairs of elytra, yellow, tough, holding fast, crossing and overlapping largely, covering the whole body. The first pairs are orbicular, the next reniform (Fig. 1, *b*), fringed on the outer edge, upper surface smooth, divided into conspicuous polygonal areas without any spines or papillae and without any secondary areoles in the meshes (Fig. 1, *c*, *d*, *e*). Dorsal ramus small, conical, with an enclosed aciculum and a number of white setae, long, slender, hair-like, with transverse rows of delicate spines and a finely tapering, undulating tip (Fig. 2, *a*). The superior dorsal setae are shorter, stouter, bent and denticulate (Fig. 2, *b*). Ventral ramus larger, conical, with an enclosed aciculum and yellowish setae, larger, with a longer spinulose part slightly enlarged and a smooth *unidentate tip* (Fig. 2, *e-h*). Nephridial papillae not protruding. Two long papillated cirri.

Length—12 to 19 mm., breadth—5 to 7 mm.

In alcohol, the elytra are yellow, the dorsal setae pale and the ventral setae pale yellow.

At first sight, this Aphroditid looks a great deal like *Iphionella cimex* Quatrefages with its body much flattened, its yellow, tough, smooth elytra, largely imbricated, covering the

whole body with the exception of the setae of the anterior feet. These elytra are also areolated but there are fifteen pairs of them instead of thirteen. Moreover, the prostomium having frontal peaks and three tentacles is of the same type as *Harmothoe* whilst *Iphione* and *Iphionella* are devoid of the median tentacle.

The prostomium has also four small black eyes which are wanting in *Iphionella*. The lateral tentacles, though small, are conspicuous and furnished with papillae. But they are partly hidden under the ceratophore of the median tentacle, which is much larger, almost as long as the palps. On examining the head from the ventral side, the ceratophores of the lateral tentacles are seen drawn close together under the ceratophore of the median tentacle, which covers them on the dorsal side (Fig. 1, *a*).

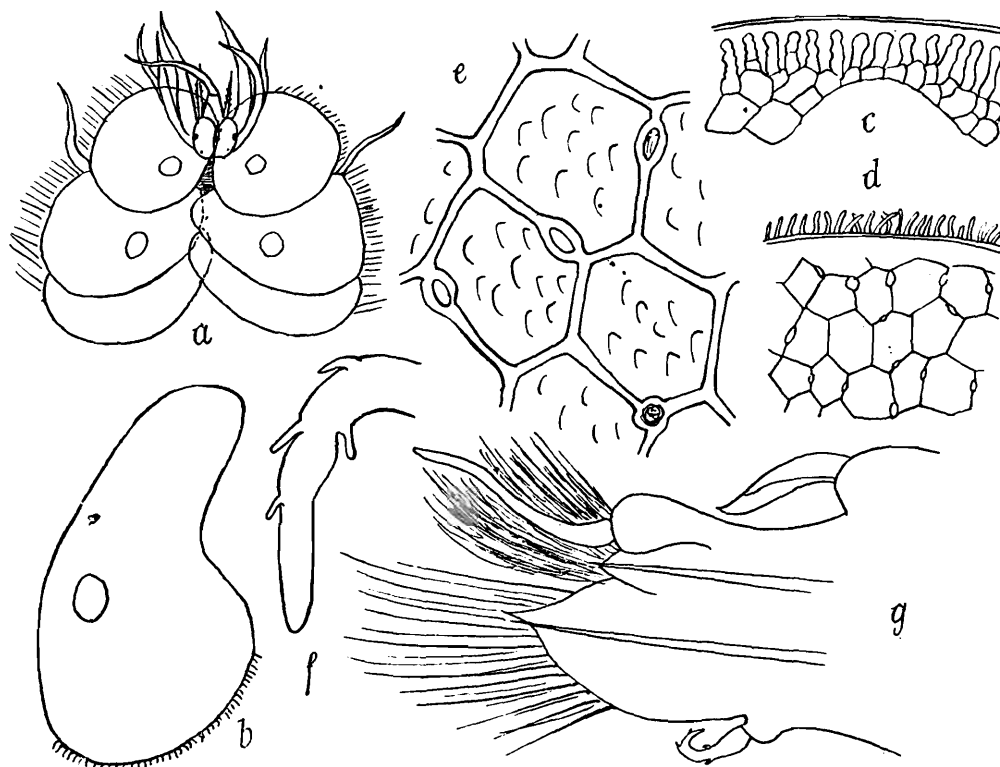


FIG. 1.—*Gattyana deludens*: *a*. anterior end, dorsal view. The head is supposed to be seen through the elytra which are really opaque $\times 9$; *b*. elytron, pattern not figured $\times 9$; *c*. areolate part of the elytron on the smooth border near the scar $\times 65$; *d*. areolate part of the elytron near fimbriate border $\times 65$; *e*. polygonal areas with raised cuticle and stomatiform spots $\times 150$; *f*. ventral cirrus $\times 150$; *g*. cirriferous foot $\times 30$.

The tentacular cirri, which are about the same length, have their cirrophores joined in a long common base bearing a few setae. The palps are larger and tapering. The nuchal fold is little conspicuous. The first ventral cirrus is long and pointing forwards.

The first pairs of elytra are orbicular, but the next are elongated with an irregularly reniform shape the posterior part being more rounded and provided with a short fringe of cylindrical papillae, whilst the anterior part, covered by the preceding elytra, is more elongate, paler and without fringe (Fig. 1, *b*). The point of attachment is very eccentric.

The elytra are destitute of spines and large papillae, but their structure is very peculiar. The surface is divided into polygonal areas (Fig. 1, *c*, *d*) which, under a low magnification, singularly resemble those of the elytra of *Iphionella cimex*, as figured by McIntosh (1885, pl. ix, fig. 6). But the appearance of this polygonal net-work is variable. In the posterior, enlarged and fringed part of the elytron, smaller rounded spaces, looking like stomata, are

seen in the net-work. On the concave part, hidden under the preceding elytron, the polygonal areas are larger, without stomata-like spots (Fig. 1, c), but present a wrinkled appearance due to broad and depressed swellings of the cuticle (Fig. 1, e). Pruvot (1930, p. 5) has described a similar appearance in *Iphione muricata* and shown all the transitions from these papillae to the large tubercles and spines by a progressive swelling of the cuticle. On the outer convex part of the elytron, near its point of attachment, the polygonal areas are smaller, with few stomata-like spots, but sinuous lines radiate and fade near the edge of the elytron which is destitute of fringe (Fig. 1, c). The dorsal tubercle, above the cirriferous feet, is very long and somewhat like the dorsal gill of the Sigalionidae (Fig. 1, g). The cirrophore of the dorsal cirri is expanded at the tip, rather pear-shaped. The ventral cirrus is short, has rather long cylindrical papillae and an expanded base (Fig. 1, f). The dorsal division of the foot, although much smaller than the ventral, has a dense cluster of white, long and slender setae with tiny spines. As is often the case in Polynoinae, the superior setae of the bundle are much shorter, stouter, more boldly serrated and curved than the others (Fig. 2, a, b). The ventral setae are longer and larger, with a long and little-expanded spinous region under the tip, which is smooth, straight or little curved and unidentate (Fig. 2, e-h). Several specimens bear numerous parasites (*Loxosomes*) on and between the feet.

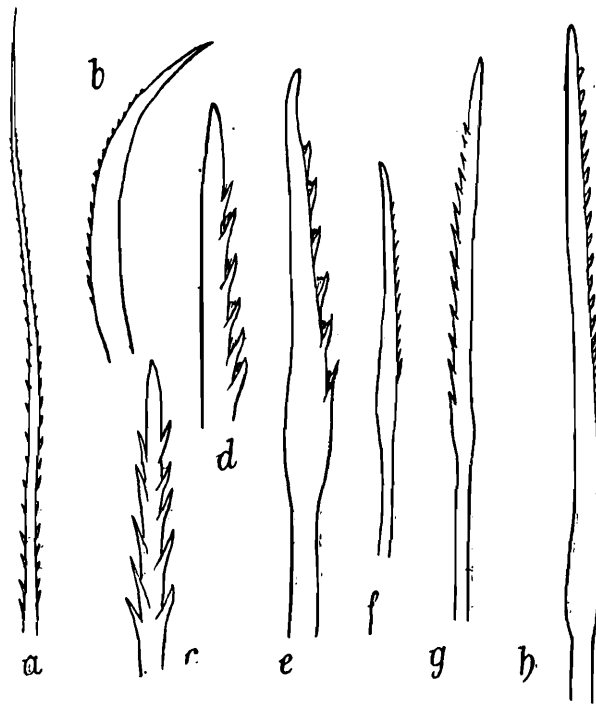


FIG. 2.—*Gattyana deludens*: a. dorsal bristle $\times 120$; b. upper dorsal bristle $\times 120$; c. d. tip of upper ventral seta, side and front view $\times 380$; e. inferior ventral bristle $\times 380$; f. inferior ventral bristle $\times 150$; g. median ventral bristle $\times 150$; h. upper ventral bristle $\times 150$.

With its three tentacles, its prostomium of the *Harmothoë* type, its fifteen pairs of elytra, its slender, spinulose dorsal setae and its larger unidentate setae, this species fits very well into the genus *Gattyana*, of which it is a new species, peculiarly conspicuous by its long dorsal tubercles and its elytra so strangely resembling those of *Iphionella cimex* whose general appearance is also alike.

De Quatrefages and McIntosh both attribute only thirteen pairs of elytra to *I. cimex*, which, moreover, is destitute of a median tentacle, as is *Iphione muricata*. Later, this species was found by Horst (1917, p. 66, pl. xv, fig. 1-2) who figured the head, but did not give the

number of elytra, and by Treadwell (1920, p. 591), who mentions the two lateral tentacles, he adds: "no median antenna was preserved", but does not mention the number of elytra.

If ever it is found that the number of scales has been erroneously stated and that the absence of the median antenna is due to an accident, then *Iphionella cimez* should be included in the genus *Gattyana*.

Habitat.—Bay of Bengal.

Genus **LAGISCA** Malmgren.

Head as in *Harmothoe*, with lateral tentacles inserted ventrally. Fifteen pairs of scales, leaving the posterior segments of the body uncovered. Dorsal setae stout. Ventral setae bidentate.

Lagisca flaccida Potts.

Lagisca flaccida, Potts, 1909, p. 339, pl. xvii, fig. 11; pl. xxi, figs. 49-50.

Lagisca flaccida, Horst, 1917, p. 94.

"Investigator" Sta. 464, S. of Ceylon, 52-68 fms.

Specific Characters.—Body very flattened. Breadth fairly uniform, tapering slightly just before posterior end. Head hexagonal, with small distinct eyes. There are two tiny lateral peaks. Median tentacle long, lateral tentacles shorter, sparsely ciliate. A slight nuchal fold behind the head. Elytra soft and gelatinous, with the margins entire; the inner half is covered with tiny tubercles. Dorsal setae with acute tip and a rather long smooth portion between it and spiniferous area. Ventral setae long, with rather short spiniferous area and a short rather blunt spine under the incurved apex.

The two specimens agree with the above description abridged from Potts. They number 40-41 setigerous segments. On the first specimen the frontal peaks, though small and short, are sharp; on the other they are blunt.

The median tentacle is long, slender and borne on a large, short ceratophore. The tentacular cirri are about the same length as the palps, and have small cylindrical papillae. The dorsal cirri are long.

Only a few elytra are preserved. They are white, soft, without fringe, but with tiny papillae and sometimes bear, on the posterior margin, a few soft mamilliform papillae, such as those mentioned by Horst.

Habitat.—Indian Ocean, Zanzibar, Ceylon, Malay Archipelago.

Genus **HARMOTHOE** Kinberg.

Prostomium bilobed, often with lateral peaks. Four eyes. Lateral tentacles inserted ventrally. Fifteen pairs of scales covering the whole dorsum. Dorsal setae stouter than the ventral which are bidentate.

1. Elytra fringed

Elytra without fringe

2. Elytra divided into polygonal areas, with bifurcate tubercles

Elytra not divided into polygonal areas. Large oviform papillae

2.

H. minuta.

H. dictyophora.

H. ampullifera.

Harmothoë dictyophora (Grube).

Harmothoë dictyophora, Willey, 1905, p. 251, pl. i, figs. 14-16.

Harmothoë dictyophora, Fauvel, 1911, p. 370 ; 1919, p. 334 ; 1927, p. 4.

Harmothoë dictyophora, Gravely, 1927, p. 4.

Polynoë dictyophora, Grube, 1878, p. 44, pl. xv, fig. 9.

Kilakarai, Feb. 17, 1913, from Coral Reefs.

Ganjam Coast, Madras Presidency, "Golden Crown", 24-30 fms.

Specific Characters.—Tentacles and cirri ciliate. Fifteen pairs of elytra covering the back. They are divided into polygonal areas carrying chitinous spines, simple or bifurcated, and filiform papillae. The posterior edge of the elytra is fringed with long and numerous filiform papillae. Dorsal setae numerous, verticillate, spinulose. Ventral setae conspicuously bidentate.

The only two specimens agree with the above description which is partly compiled from Willey. This species is very closely allied to *H. areolata* from Europe. It differs mainly in having bifurcate chitinous papillae, instead of horny prong-like tubercles.

Habitat.—Persian Gulf, Red Sea, Ceylon, Bay of Bengal, Madagascar, Malay Archipelago, Australia.

Harmothoë ampullifera (Grube).

Harmothoë ampullifera, Fauvel, 1911, p. 368 ; 1927, p. 414 ; 1930a, p. 8 ; 1930b, p. 508.

Polynoë ampullifera, Grube, 1878, p. 35, pl. iii, fig. 5.

Lepidonotus ampulliferus, Gravier, 1901, p. 214, pl. vii, figs. 111-113.

Paralepidonotus ampulliferus, Horst, 1917, p. 76.

"Investigator" Sta. 385, Arabian Sea, 630 fms. ; Sta. 622, Camorta Island, rockpool on shore, inside reef ; Coveit Harbour, between tide marks ; Pamban, coral reefs ; Rameswaram Beach, near Fisheries bungalow.

Specific Characters.—Prostomium without frontal peaks ; tentacles and cirri ciliate. Lateral tentacles inserted somewhat ventrally. Elytra fringed, with small papillae and large vesicles in concentric rows. Dorsal setae arching, verticillate, spinulose. Ventral setae bidentate. Elongated nephridial papillae and ventral lamellae conspicuous.

The dorsal setae and elytra of the specimen from Sta. 622 are densely coated with fine black ooze, very adherent, giving the appearance of a dense cluster of black bristles above each foot.

Though the lateral peaks are wanting and the lateral tentacles are inserted somewhat as in *Halosydna* this species does not belong to the genus *Lepidonotus*, which has only twelve pairs of elytra and tentacles clearly terminal.

In *H. ampullifera* the lateral tentacles are inserted on each side of the median tentacle and somewhat under it, as I had opportunity to notice on the above specimens, as well as on many others from various localities. Grube was right in describing "*tentacula paria infra impar orientia*" and Gravier and Horst, probably misled by the absence of lateral peaks, were mistaken in mentioning the lateral tentacles as inserted terminally.

Indeed, *H. ampullifera*, very closely related to *H. imbricata*, differs from it principally in its ventral lamellae and elongate nephridial papillae.

Habitat.—Red Sea, Persian Gulf, India, Philippine Islands.

Harmothoe minuta (Potts).

Polynoë (?) *minuta*, Potts, 1910, p. 337, pl. xix, fig. 12 ; pl. xx, fig. 31 ; pl. xxi, figs. 42, 43.

Lagisca minuta, Horst, 1917, p. 97.

"Investigator" Sta. 468, Port Blair Harbour, Andamans, 25 fms.

Specific Characters.—Prostomium bilobed, with acute frontal peaks. Four very small eyes. Lateral tentacles very minute and slender. Fifteen pairs of elytra, almost circular, translucent, with entire margin, smooth surface with delicate veins and occasional tiny chitinous tubercles. Dorsal setae broad, slightly curved, with a rather blunt apex and serrations near the tip. Ventral setae numerous, with apex rather faintly serrated, not bearing recognisable spines ; upper setae with a very elongated serrated region, a short incurved tip and projecting tooth just under it.

The setae are translucent, glass-like as in *Scalisetosus*, without pouches.

Potts' specimen was only an anterior fragment with 27 segments ; Horst's had 38 segments. In the specimen from the Andamans, there are 38 of them, with only very few posterior ones wanting. The number of elytra is fifteen pairs.

I fail to see on what grounds Horst included this species in the genus *Lagisca* which has a greater number segments (above 40), and has the posterior part of the body uncovered.

The eyes are very small, the anterior ones lying sideways and rather under the prostomial lobes. They seem to have escaped Potts' notice.

Despite its small size, one of the two specimens from the Andamans is a female, full of eggs.

Habitat.—Red Sea, Suez, S. Male (Indian Ocean), Andamans.

Harmothoe spec.

A number of small Polynoinae from Sta. 351, 352, 461, 607, 655, with all or the greater part of their scales, tentacles, and cirri lost, are probably post-larval *Harmothoe* with stout dorsal, curved and spinulose setae, and ventral setae bidentate ; but they cannot be identified with any certainty.

?? Harmothoe sinagawaensis Izuka.

(Pl. I; Figs. 1, 2, Text-fig. 3.)

Harmothoe sinagawaensis, Izuka, 1912, p. 57, pl. vi, figs. 8-12.

Rameswaram, near Fisheries bungalow, Madras Presidency.

With much doubt, I refer to Izuka's species a Polynoid broken into two fragments and incomplete posteriorly. It measures 10 mm., with a breadth of 4 mm., feet included. Only 26 segments are preserved, of which 13 were elytrigerous. The remaining elytra are white, with a transverse black streak, soft, destitute of fringe and tubercles (Pl. I, Fig. 1). The prostomium is elongated, with four small eyes wide apart. The tentacles and cirri are papillated.

The lateral tentacles are short, nearly piriform, with an acute tip and a short, stout ceratophore. They are not inserted quite ventrally, but are rather, as in *Halosydna*, subterminal. The median tentacle has a large ceratophore and a ceratostyle twice as long as the lateral tentacles. The palps are short. The first dorsal cirri are longer than the bristles

and bear a few cylindrical papillae. The posterior cirri are shorter than the feet, setae included.

There is no trace of ventral lamellae. In the posterior part of the body, the ventral face shows black spots, and dark crescents adorn the back.

The feet are long and tapering (Pl. I, Fig. 2). The dorsal division is provided with a dense cluster of very slender, smooth capillary setae (Fig. 3, *a*).

The upper ventral setae are long, straight, slender, with spines on the long tip above the faint enlargement (Fig. 3, *b*). The median and inferior setae have a short enlarged part with only a few spines and a long, smooth unidentate tip (Fig. 3, *c*, *d*).



FIG. 3.—*Harmothoe sinagawaensis*: *a*. tip of dorsal bristle $\times 380$; *b*. tip of upper ventral bristle $\times 380$; *c*. median ventral bristle $\times 380$; *d*. inferior ventral bristle $\times 380$.

Owing to the absence of the posterior part, the number of the segments and elytra could not be ascertained, and consequently the genus remains doubtful. The above specimen agrees tolerably well with Izuka's *Harmothoe sinagawaensis*, the setae of which are more serrated than in the former. Izuka's species, however, with slender dorsal setae and unidentate ventral bristles, is not a genuine *Harmothoe*, but belongs to *Gattyana*. *Lagisca elytophora* Horst differs in having stouter dorsal setae.

Genus **SCALISETOSUS** McIntosh.

Body very bristle. Four eyes. Three tentacles, lateral tentacles inserted ventrally. Fifteen pairs of elytra, delicate, pellucid. Setae having the transparency of crystal. Dorsal bristles curved, with some blunt spines. Ventral bristles hooked, bidentate, with semilunar cusps.

Scalisetosus pellucidus Ehlers.

Scalisetosus pellucidus, Fauvel, 1923a, p. 74, fig. 27 (Synonymy).

Scalisetosus sp., Horst, 1917, p. 101, pl. xxi, figs. 8-10.

"Investigator" Sta. 468, Port Blair, Andamans; Sta. 650, Maldives; Andamans Sta. 25, 32; Kilakarai, from coralline rock.

Specific Characters.—Body of moderate length. Elytra and cirri very easily detached. The anterior pair of eyes larger and wide apart. Tentacles and cirri with filiform tip and clavate papillae. Elytra round or oval, very transparent and delicate, with small cylindrical or clavate papillae, not fringed. Dorsal setae shorter than the ventral, curved, with several cusps on the convex side, and tip faintly bifid. Ventral setae with a short enlargement, a semilunar cusp or spinous pouch, and a bidentate tip.

All the specimens are more or less broken and have lost most of their elytra and cirri, as it generally happens with species of *Scalisetosus* which are amongst the most brittle of Polynoinae. They agree with the *Sc. pellucidus*, as regards elytra, dorsal and ventral setae, and also the checkered brown pattern on the back of the body.

Scalisetosus sp. of Horst very likely appertains to the above species.

Habitat.—Atlantic, Mediterranean, Bay of Bengal, Malay Archipelago.

Genus **GASTROLEPIDIA** Schmarda.

The sternum of the segments provided with a foliaceous appendage on each side. More than 21 pairs of elytra, the arrangement of the posterior pairs irregularly alternating with the cirri. Tentacles and cirri club-like, with a filiform tip.

Gastrolepidia clavigera Schmarda.

Gastrolepidia clavigera, Schmarda, 1861, p. 159, pl. xxxvii, fig. 315.

Gastrolepidia clavigera, Willey, 1905, p. 253.

Gastrolepidia clavigera, Potts, 1909, p. 341.

Gastrolepidia clavigera, Horst, 1917, p. 84, pl. xvi, fig. 5.

Gastrolepidia clavigera, Seidler, 1924, p. 142, fig. 19, 20.

Gastrolepidia clavigera, Fauvel, 1919, p. 335.

Gastrolepidia clavigera, Augener, 1926b, p. 443 ; 1927, p. 130.

Gastrolepidia clavigera, Pruvot, 1930, p. 13, pl. i, figs. 16-19.

Gastrolepidia amblyphyllus, Grube, 1878, p. 46, pl. iii, fig. 7.

“Investigator” Sta. 655, Maldives ; Sta. 669, Nicobars ; Andamans.

Specific Characters.—Prostomium without frontal peaks. Lateral tentacles inserted ventrally. Tentacles and dorsal cirri long and much enlarged distally with a small filiform tip. Elytra soft, without fringe and tubercles, semi-transparent, covering the whole back. Dorsal setae few, stout, slightly curved and spinulose. Ventral setae with unidentate tip. Ventral lamellae very large and conspicuous.

The specimens from Sta. 669 “ectoparasitic on black Holothurians” are brown, those from Sta. 665 “Black Polychaets symbiotic on large Holothurians, either all black or black and yellow,” have elytra of a deep black or mottled dark-brown and white.

The commensalism with Holothurians has already been noticed by Potts, Augener and Horst.

In *Gastrolepidia* the last pairs of elytra alternate with a cirrus-bearing segment. But this arrangement has not the regularity noticed by Willey. Of the above specimens, one has the five last pairs of elytra alternating with cirri, while another has the eight last pairs of elytra alternating. I have already noticed such irregularities in specimens from Madagascar.

The insertion of the lateral tentacles is ventral, but the absence of frontal peaks gives them an appearance intermediate between *Lepidonotus* and *Harmothoe* as in *Halosydna*.

The ventral lamellae, though not restricted to the genus, are here especially large, conspicuous and imbricated.

The large club-like tentacles and cirri are very characteristic.

Most of the ventral setae have a slightly curved smooth tip, but the superior ones, less enlarged, and finer, have a small notch at the tip, and are well figured by Seidler (1924, p. 143, fig. 20).

Habitat.—Indian Ocean, Zanzibar, Madagascar, Ceylon, Bay of Bengal, Philippines, Pacific Ocean, New Zealand, New-Caledonia.

Genus **HYPERHALOSYDNA** Augener.

About 50 segments. More than 18 pairs of elytra. Lateral tentacles inserted terminally. Dorsal setae few or absent. Ventral setae bidentate. Without ventral lamellae.

Hyperhalosydna striata (Kinberg).

Hyperhalosydna striata, Seidler, 1924, p. 136 (Synonymy).

Halosydna fulvovittata, Horst, 1917, p. 80.

Polynoë fulvovittata, Grube, 1878, p. 33, pl. iii, fig. 1.

Polynoë platycirrus, McIntosh, 1885, p. 111, pl. iii, fig. 4.

Lepidonotus, striatus, Kinberg, 1857, p. 14, pl. iv, fig. 18.

Halosydna striata, Monro, 1924, p. 41, fig. 4.

Andamans.

Specific Characters.—Lateral tentacles terminal, as in *Lepidonotus*. Elytra 21-22 pairs, oval, with longitudinal dark stripes and 1-2 keels near the posterior edge. Dorsal division of the foot reduced to a small process with only a few short, curved serrated setae often wanting. Ventral setae all alike and bidentate.

The only specimen is incomplete and has only 14 anterior setigerous segments.

The elytra are large, ovate, with four or five longitudinal brown stripes and a small keel. Potts noticed two keels on some specimens and none on others. The dorsal cirri are long and flattened, abruptly ending in a filiform tip. The dorsal ramus of the foot is reduced to a small tubercle with an aciculum, but without setae. McIntosh, Marenzeller, Horst, Augener and Monro noticed a few short dorsal setae. Grube, Potts and Seidler did not find any. The ventral setae have a hooked tip with a sharp spur underneath (often broken) and a short spiniferous area.

According to Monro (1924, p. 42), the genus *Hyperhalosydna* appears insufficiently differentiated from *Halosydna*.

Habitat.—Indian Ocean, Malay Archipelago, Australia, Japan.

Genus **ALLMANIELLA** McIntosh.

Prostomium bilobed, with four large eyes. Lateral tentacles terminal. Fifteen pairs of elytra (or more). Dorsal setae stouter than the ventral, which are bidentate.

Allmaniella ptycholepis (Grube).

Allmaniella ptycholepis Horst, 1917, p. 79, pl. xvii, figs. 6-9.

Allmaniella ptycholepis, Seidler 1923, p. 151.

Polynoë ptycholepis, Grube 1878, p. 39, pl. ii, fig. 6.

“ Investigator ” Sta. 703, Nankauri Harbour, Nicobars ; Andamans Sta. 32.

Specific Characters.—Head broader than long, divided into two rounded lobes with four large black eyes. Median tentacle long and slender inserted on a ceratophore between the two lobes. Lateral tentacles filiform, shorter than the median and inserted on the frontal border. Palps twice as long as the lateral tentacles. Elytra 15 to 17 pairs, large, soft, translucent, smooth, and without fringe. Parapodia with a long pointed ventral lobe. Dorsal lobe with a few setae, stout, curved blunt, smooth or very finely serrated. Upper ventral setae slender, nearly smooth, unidentate; median and lower setae enlarged, bidentate, nearly smooth or very finely serrated. Upper ventral setae slender, nearly smooth, unidentate; median and lower setae enlarged, bidentate, nearly smooth or very finely serrated. Dorsal cirri long and slightly enlarged under the tip. Dorsal tubercles present.

None of the specimens is complete, those from the Andamans consist of anterior fragments, while that from Nankauri is broken after the fifteenth pair of elytra. The back is striped brown and white. The head is brown near the base of the lateral tentacles. The elytra, though smooth in appearance, bear a few small three or four-spined papillae. The shape of the head is very characteristic.

Habitat.—Philippine Islands, Malay Archipelago, Andaman and Nicobar Islands.

Genus **ADMETELLA** McIntosh.

Body elongated, with 75 segments. 30 pairs of scales. Head with the lateral frontal corners elongated, triangular; eyes absent (?). Both lobes of the parapodia with an elongated distal extremity; their bristles long, vitreous (Horst).

Admetella longipedata McIntosh.

Admetella longipedata, McIntosh, 1885, p. 124, pl. xiv, fig. 5; pl. xx, fig. 6; pl. xiiA, fig. 17.

Admetella longipedata, Augener, 1906, p. 123.

Admetella longipedata, Ehlers, 1908, p. 40, pl. ii, fig. 10, 11; pl. iii, figs. 1-5.

Admetella longipedata, Horst, 1917, p. 101.

Admetella longipedata, Seidler, 1923, p. 153.

“Investigator” Sta. 331, Andaman Sea, 569 fms.; Sta. 332, Andaman Sea, 279 fms.

Specific Characters.—Prostomium with two rounded lobes and two thin triangular processes. Lateral tentacles inserted under the prostomial lobes. Eyes absent. Elytra 24 to 30. Parapodia very long, ending in a slender tip. Dorsal and ventral setae long, delicate, translucent, flattened out in their distal part, finely serrated along both edges and ending in a smooth elongated tip. Nephridial papillae very conspicuous.

The size of the specimens ranges from 52, 54 to 60 mm., with a breadth of 28 mm., including that of the feet and bristles. They number about 65 segments. Unfortunately the specimens are indifferently preserved and have lost the elytra, most of the tentacles and the cirri.

The head bears, on each side, a rounded prominence which resembles, as already noticed by McIntosh, a depigmented eye.

Owing to the poor preservation of the material I could not detect with any certainty, the posterior triangular processes of the head figured by Ehlers and also mentioned by Horst, but I observed a nuchal fold, somewhat like McIntosh's fig. 5, pl. xiv. Ehlers' “lappen” may be only two folds due to a contracted head (?), such as I noticed in a specimen.

A deep median groove runs along the middle of the ventral side of the body, while a transverse ridge, on each segment, unites the groove to the base of the nephridial papillae, which are large, swollen, and end in a small neck turned backwards.

The feet are very long and tapering along the protruding aciculum. The dorsal lobe is smaller than the ventral and its fascicle of setae is much reduced. The ventral setae are very numerous, long, delicate and very translucent. They are somewhat like those of *Macelliocephala*, flattened and faintly serrated:

This species has always been found at great depths.

Habitat.—Off Prince Edward Island, West Indies, Indian Ocean, Somali Coast, Pater Noster Island, Andamans.

Genus **DRIESCHIA** Michaelsen.

Body short with about 28 setigerous segments. Head and tentacles as in the genus *Lepidonotus*; lateral tentacles inserted terminally. Elytra thirteen pairs, on the segments 2, 4, 5, 7 .21, 23 and 26. Parapodia sesquiramous, with an aciculum and setae of two kinds. Setae of the first kind very slender, long, capilliform; other setae stouter, enlarged and ornamented beneath the pointed tip (Michaelsen). Dorsal setae absent.

Drieschia pelagica Michaelsen.

(Text-fig. 4.)

Drieschia pelagica, Michaelsen 1892, p. 6, figs. 15-18.

Drieschia pelagica, Seidler 1923, p. 173.

“Investigator” Sta. 461 and 607, Bay of Bengal.

Specific Characters.—Prostomium divided into two large rounded lobes, with four small eyes, the anterior pair lateral. The three tentacles are slender, with short ceratophores. The median is twice as long as the lateral ones. They are inserted terminally, somewhat resembling those of *Halosydna*. The palps are curved and thick. The two pairs of tentacular cirri are equal and elongated. The elytra are small, rounded, soft, translucent, with a few yellow grains, but without a fringe. The dorsal cirri are very variable in length, but bear enormous cirrophores which are the most striking feature of this worm. The feet are

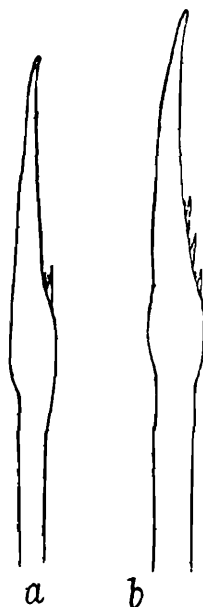


FIG. 4.—*Drieschia pelagica*: a, b, inferior ventral bristles from an anterior foot x 380.

long, ending in two unequal triangular vertical lips. The filiform ventral cirrus is shorter than the foot. The dorsal setae are wanting, but there is a dorsal aciculum, not mentioned by Michaelsen. The ventral setae are numerous, very long and slender capillary and accompanied by 2-4 much shorter and stouter setae which are straight, with a short enlargement under the tip, which is sometimes slightly bent and bears a few rows of spines (Fig. 4, *a, b*).

The above specimens are small, measuring about 5 mm. in length and 2.5 mm. in breadth, with 20-22 setigerous segments. Only a few elytra were preserved in one of the two worms from Sta. 607.

The dorsal aciculum, being wholly enclosed in the dorsal division of the foot, can only be detected in compressed and cleared preparations; and it was probably because of this fact that Michaelsen did not observe it. The specimen from Sta. 461 is a little larger, and has about 35 setigerous segments; the very small terminal ones are difficult to count. The feet are longer and have very long capillary setae. A few are short and stout, but not so much as in other specimens. The eyes are large, a condition suggestive of epitoky. The feet are not uniramous, as is stated by Michaelsen, but sesquiramous, since there is a dorsal aciculum.

Habitat.—Ceylon, Bay of Bengal.

Genus **LEPIDASTHENIA** Malmgren.

Body elongated, worm-like, segments numerous. Lateral tentacles inserted terminally, as in *Lepidonotus*. Elytra-bearing segments up to the end of the body. Minute elytra leaving the greater part of the back naked. Dorsal ramus reduced to an aciculum and occasionally a few setae. Ventral setae bidentate.

Lepidasthenia maculata Potts.

Lepidasthenia maculata, Potts 1909, p. 344, pl. xx, fig. 33; pl. xxi, fig. 51.

Lepidasthenia maculata, Fauvel 1914*b*, p. 71; 1923*a*, p. 88, fig. 33, *h-k*.

Mergui, 4 fms.

Specific Characters.—Upper setae of ventral bundle more slender than the rest. Elytra relatively large, soft, destitute of fringe and papillae, 31 pairs. The dorsum is provided with black pigment flecks. Dorsal setae absent.

Var. *striata* n. var.

Three specimens were found enclosed in tubes of *Phyllochaetopterus*; two of them consist of anterior fragments, while one is a complete worm, with the proboscis everted and tail doubled under the body. It is 55 mm. long and 3 mm. broad. The head is similar to that of *Lepidonotus*, with slender, slightly unequal tentacles a little enlarged under the tip. The nuchal fold is conspicuous. The anterior pair of eyes is large and provided with a whitish lens, the posterior pair is smaller. The first dorsal cirri are longer than the following ones.

The rather large elytra cover the feet, leaving about a third of the back naked, and are almost in contact with the preceding and the following ones. They are rounded, soft, delicate, translucent, smooth, without either fringe or tubercles, and inserted, as in *Harmothoe*, on every third segment in the back part of the body.

The feet are elongated with two vertical, parallel, nearly equal fillets. The cirrophores of the dorsal cirri are big and short, the cirrostyles are slightly enlarged distally, with a short

slender tip in addition in those of the anterior feet. In the median and posterior feet, the dorsal cirri are shorter than the setae, conical or fusiform. The ventral cirri, inserted under the middle of the ventral ramus, are short. The dorsal ramus is reduced to a small knob with an enclosed aciculum.

In the ventral bundle there are no giant setae. Two or three of the upper setae are more slender, with a long spiniferous area. The others are shorter and stouter with transverse rows of spines and a bidentate apex.

This variety is characterised by the pattern of the back which is somewhat similar to that of *L. elegans* Grube or rather to that of *Ophiodromus*.

In the anterior part of the body, a white segment is followed by three marked with seven dark transverse stripes distributed on all of them ; further on, a colourless segment is followed by two on which there are five stripes.

Each of the elytra bears a large dark spot just above its attachment to the elyrophore. *Lepidasthenia maculata* is found in the Atlantic, and in horny tubes of *Phyllochaetopterus* from the coasts of Morocco I have found specimens differing very slightly from those from Mergui. The colour of the elytra is only more diffuse and the dorsal stripes are broader, paler, more regular and the pattern does not show intermediate colourless segments.

The striped specimens from Mergui are only a colour variety of *L. maculata*. The typical form of the species has been recorded from Zanzibar, Azores and Morocco.

Genus **HOLEPIDELLA** Willey.

Antennae arising at a lower level than the unpaired tentacle ; segments and elytra numerous (Willey). Posterior elytra irregularly inserted. Parapodia biramous:

Hololepidella commensalis Willey.

Hololepidella commensalis, Willey 1905, p. 251, pl. i, figs. 17-20.

" Investigator " Sta. 503, Mergui.

Specific Characters.—Fifty segments or more ; body elongated. Prostomium bilobed, with short frontal peaks. Anterior eyes lateral, posterior eyes dorsal. Median tentacle slender, inserted on a short and broad ceratophore. Lateral tentacles small, piriform, inserted ventrally, as in *Harmothoe*. Nuchal fold not conspicuous. Dorsal cirri smooth, long tapering, ventral cirri short. Elytra large, rounded, pale, delicate, translucent, overlapping and covering the back. They are destitute of either fringe or tubercles. There are at least 25-26 pairs, the last very irregularly alternating with the cirri. Dorsal tubercles conspicuous on the cirriferous feet. Dorsal setae few, curved, smooth or partly serrate, much shorter than the ventral setae. Superior ventral setae slender, serrated, unidentate ; inferior short ; median with a faint subterminal spur and normal fringes of spines.

One of the above specimens is complete, with 54 setigerous segments and 25 pairs of elytra. It is 8 mm. long and 5 mm. broad. The other is incomplete, with 33 segments and about 15 elytra.

The back is brown and on the ventral side there are four longitudinal rows of brown spots.

The elytra are colourless.

Habitat.—Ceylon, Mergui.

Subfamily Sigalioninae Grube.

Body long and narrow, segments numerous. 4 sessile eyes. One or three tentacles. Two palps. Proboscis with a row of terminal papillae and four horny jaws. Elytra numerous, inserted on alternate segments 2, 4, 5, 7, etc., and on each segment from the 23rd-29th up to the end of the body. Cirriform dorsal gills. Feet biramous. Dorsal setae single, ventral setae single or compound. Two anal cirri.

- | | |
|---|------------------------|
| 1. Gills absent. Only one tentacle | <i>Pholoë</i> . |
| Cirriform gills. 2-3 tentacles | 2. |
| 2. Only two lateral tentacles | <i>Sigalion</i> . |
| Three tentacles | 3. |
| 3. Third setigerous segment with a dorsal cirrus | 4. |
| No dorsal cirrus on third setigerous segment | 5. |
| 4. Median tentacle inserted on a ceratophore. Elytra deeply coated with sand | <i>Psammolyce</i> . |
| Median and lateral tentacles inserted on the prostomium without ceratophore or ctenidia | <i>Eruthalenessa</i> . |
| 5. Ventral setae falcigerous, with single or jointed bidentate tip | <i>Sthenelais</i> . |
| Ventral setae spinigerous, with terminal piece pectinate-canaliculate | <i>Leanira</i> . |

Genus **STHENELAIS** Kinberg.

A pair of ctenidia at the base of the median tentacle. Lateral tentacles fused with the first foot. Two long subulate palps, with ctenidia at the base. Scales covering the back, fringed. A branchial process on every foot from the fourth setigerous segment. Dorsal setae simple, capillary tapering and spinous. Ventral setae compound, falcigerous, and sometimes a few simple setae.

- | | |
|---|-------------------------|
| Ventral cirrus tapering, smooth, without basal stylodes | <i>Sth. boa</i> . |
| Ventral cirrus with two long basal stylodes giving it a trifurcate appearance | <i>Sth. zeylanica</i> . |

Sthenelais boa Johnston

Sthenelais boa, McIntosh 1900, p. 408, pl. xxvi, figs. 7-8.

Sthenelais boa, Fauvel 1923a, p. 110, fig. 41; 1930a, p. 9.

Sthenelais idunae, Sars, Saint-Joseph, 1888, p. 187, pl. viii, fig. 55.

Ceylon, Galle, 1 specimen; Cape Comorin, 1 specimen.

Specific Characters.—Scales mostly reniform, crossing and overlapping over the back, with numerous minute papillae and a fringe on the outer border. Ventral ramus of the podiopara provided with 2-3 simple bipectinate setae; compound setae with a short sickle-shaped appendix and a smooth shaft, others with a pluriarticulate appendix, and, on the anterior feet, a few compound setae with a spinulose shaft. Three cup-shaped ctenidia above the dorsal division of the foot. Ventral division with stylodes and three bracts and a papillose, ciliated frill. Ventral cirrus elongate, subulate.

The above specimens, as well as a specimen from Krusadai examined formerly, agree very well with those from the coast of France.

Habitat.—English Channel, Atlantic Ocean, Mediterranean Sea, Indian Ocean.

Sthenelais zeylanica Willey.

Sthenelais zeylanica, Willey 1905, p. 258, pl. ii, fig. 48.

Sthenelais zeylanica, Fauvel 1927b, p. 416.

Kilakarai, Ramnad District, S. India.

Specific Characters.—Differs from *S. boa* in its ventral cirrus with two long tapering stylodes giving a trifurcate appearance, in the absence of the parapodial frilled collars and in the compound bristles with fewer joints and shorter sickle-shaped tips.

In the above small specimen, the elytra are dotted with small red-brown specks.

According to Willey, simple bipectinate setae are wanting in the upper part of the ventral ramus. I did not notice any on the few parapodia I examined, but, in specimens from the Suez Canal, I found one simple seta on a few of the posterior feet only. It appears, therefore, that in this species such setae are less common than in *S. boa*, and their presence or absence is not a differential character between the two species. The most striking differences are the trifid appearance of the ventral cirrus, which is very easily detected; and the absence of the semilunar frill under the foot.

Habitat.—Ceylon, Kilakarai, Suez Canal.

Genus **EUTHALENESSA** Darboux.

Median tentacle inserted between the prostomial lobes without ceratophore or ctenidia. Lateral tentacles inserted on the frontal margin. A dorsal cirrus on the third setigerous segment. A branchial process on every foot from the fourth setigerous. Elytra overlapping but leaving the middle of the back uncovered. They are fringed with multifid papillae. Dorsal setae spinous, simple. Ventral setae compound, falcigerous.

Euthalenessa djiboutiensis (Gravier).

Thalenessa djiboutiensis, Gravier 1901, p. 231, pl. vii, figs. 114-117.

Euthalenessa djiboutiensis, Fauvel 1918, p. 331; 1919, p. 345; 1922, p. 492.

"Investigator" Sta. 464, S. of Ceylon, 52-68 fms.; Sta. 549, Mergui; Pedro Shoal, 26 fms.; Off Puri, Orissa, 4-4½ fms; Madras Coast 5-10 fms; Seven Pagodas, Madras.

Specific Characters.—Three small conical tentacles, all alike. Anterior pair of eyes large, posterior pair small. Dorsal cirrus on the third setigerous segment with a large ceratophore and a small tapering ceratostyle. Elytra reniform, with long digitiform multifid papillae on their outer margin. Three ctenidia on the dorsal division of the feet and numerous digitiform stylodes on the anterior feet and foliaceous parapodial bracts on the others. A dorsal tuft of slender simple setae. Ventral setae compound, with a bidentate end-piece, simple or pluriarticulate.

The specimens from Madras coast in life were "pale yellow marked with pigment spots", and a small one, from Sta. 464, still shows, in alcohol, elytra with rusty spots.

The closely allied species, *E. dendrolepis* Clap., has elytra marked with a reddish crescent.

Habitat.—Red Sea, Persian Gulf, Ceylon, Madras Coast, Mergui, Houtman (Abrolhos, Australia).

Genus **PSAMMOLYCE** Kinberg.

Body narrow and long, segments very numerous. Median tentacle inserted on the anterior margin of the prostomium, without ctenidia. Lateral tentacles fused with the first

foot. A dorsal cirrus on the third setigerous segment. A branchial cirriform process on every foot. Elytra and back with adhesive papillae, densely coated with sand grains. Dorsal setae simple, slender. Ventral setae compound, falcigerous.

***Psammolyce fijiensis* McIntosh.**

Psammolyce fijiensis McIntosh, 1885, p. 148, pl. xxi, fig. 6; pl. xxii, fig. 4; pl. xxiv, fig. 6; pl. xiiia, fig. 18.

Mergui Archipelago, 40 fms.

Specific Characters.—First pair of elytra very large, prow-shaped. Elytra with anterior margin concave and slightly bilobed, but without large club-like process.

The single specimen from Mergui consists of the anterior half of the worm with only a few of the scales preserved. It is encrusted with sand grains and *Foraminifers*. The ventral surface is covered with filiform papillae giving it a velvety or woolly appearance; it is coated with an ochreous mud.

The elytra are oval-elongated in outline, with the anterior concave margin slightly bilobed but without any large club-like prominent lobe such as are observed in *P. zeylanica* Willey and *P. rigida* Grube. The posterior border of the elytra is beset with long adhesive papillae.

The dorsal cirrus of the third setigerous segment is small and conical, the tentacular cirri are not swollen at the tip, which differentiates this species from the closely allied *P. malayana* Horst in which the cirrus is long and whip-shaped and the tentacle and tentacular cirri are swollen at the tip. Unfortunately Horst did not figure the elytra of his species.

There is a transparent collar above the foot. The dorsal setae are plentiful, long, slender and serrated. The ventral setae are large, yellow, straight, all compound, and differ very little from one another. The shaft is more or less spinous, the terminal piece, which is more or less elongated, is always conspicuously bidentate. The ventral cirrus is filiform.

P. fijiensis differs from *P. antipoda* in its setae, but, principally, in its elytra which are devoid of the large processes, so characteristic of most species of the genus. Of these more or less club-like processes, covered with long adhesive papillae, there are two in *P. arenosa* Delle Chiaje, *P. rigida* Grube, *P. zeylanica* Willey and only one in *P. antipoda* Schmarda.

Habitat.—Fiji Islands, Mergui Archipelago.

Genus **LEANIRA** Kinberg.

Body narrow and long, segments very numerous. Median tentacle with a ceratophore, and ctenidia. Lateral tentacles fused with the first foot. No dorsal cirrus on the third setigerous segment. A branchial cirriform process one very foot from the fourth backwards. Elytra smooth or fringed. Dorsal setae simple, slender, serrated. Ventral setae compound, spinigerous, and sometimes a few simple bristles.

***Leanira japonica* McIntosh.**

Leanira japonica, McIntosh 1885, p. 154, pl. xxii, fig. 8; pl. xivA, figs. 1, 2.

Leanira sibogae, Horst 1917, p. 115, pl. xxiv, figs. 1-3.

Sthenolepis japonica, Willey 1905, p. 259, pl. ii, fig. 49.

Sthenolepis japonica, Izuka 1912, p. 88, pl. x, figs. 3-7.

"Investigator" Sta. 112, Bay of Bengal, 561 fms. ; Sta. 166, Bay of Bengal, 133 fms. ; Sta. 172, N. E. of Ceylon, 200-350 fms. ; Sta. 264, Bay of Bengal, 900-987 fms. ; Sta. 281, Bay of Bengal, 300 fms. ; Sta. 315 S. of Andaman Is., 705 fms. ; Sta. 322, Andaman Sea, 378 fms. ; Sta. 343, Gulf of Oman, 609 fms. ; Sta. 362, Arabian Sea, 490 fms. ; Sta. 366, Arabian Sea, 544 fms. ; Sta. 395 and 396, off Tenasserim, Burma, 50 fms. ; Sta. 711, Andamans, 290 fms. ; Mergui.

Specific Characters.—Prostomium with four black eyes and antennal ctenidia. On the third setigerous segment a small conical tubercle, but no true cirrus. Elytra smooth, unfringed, overlapping, leaving the mid-dorsum exposed. Dorsal setae numerous, long, slender and transversely fringed. Ventral setae compound, spinigerous, with a long, sharp pectinate—canaliculate terminal piece, and occasionally one or a few superior simple bristles provided with whorls of spikes.

There are numerous specimens in the collection, but many of them are in a bad condition and several of them have the bristles broken or wanting.

As I have already remarked (1930, p. 9), this species comes very near *Leanira yhleni* Malmgren. It differs from it chiefly in its few superior ventral simple bipectinate setae. In some specimens such simple setae are fairly numerous and conspicuous, in most of them these are very few or even wanting. In specimens from Krusadai Island, these simple setae were only to be found on a few feet. In the worms in the present collection they are often wanting, but sometimes conspicuous. Izuka noticed that they were occasionally present.

I agree with Horst in reference to the inadmissibility of the genus *Sthenolepis*, which was based on a misinterpretation, but I fail to find any noteworthy difference between his *L. sibogae* and *L. japonica*.

L. japonica though chiefly a deep-sea inhabitant, has also been met with in shallow waters, in seven fathoms, off Galle and off Kobe, in 8-50 fathoms.

Habitat.—Malay Seas, Japan, Gulf of Manaar, Bay of Bengal, Arabian Sea.

Subfamily Acoetinae Grube.

Body elongate. Prostomium bilobed with two large ommatophores (stalked eyes) or four sessile eyes. Three tentacles, the median sometimes reduced to a small tubercle. Two long palps. Proboscis with papillae on the margin; median, dorsal and ventral, are tentaculiform. Elytra on segments 2, 4, 5, 7, 9 and on every succeeding alternate segment. Feet biramous. Bristles simple. A spinning gland in the dorsal division of the feet.

- | | |
|---|------------------------|
| 1. With but two tentacles | <i>Eupolyodontes</i> . |
| With three tentacles | 2. |
| 2. Eyes sessile | <i>Eupanthalis</i> . |
| Two eyes borne on ommatophores | 3. |
| 3. With branchiae. True bipennato-penicillate setae absent | <i>Polyodontes</i> . |
| No branchiae. Bipennato-penicillate setae present | <i>Panthalis</i> . |

Genus **POLYODONTES** Renier.

Segments very numerous. Two large ommatophores (eye-stalks) and two small posterior sessile eyes. A median tentacle. Lateral tentacles inserted beneath the ommatophores. Two long palps. Four horny jaws. Proboscis bilobed. Two pairs of tentacular cirri with basal setae. Spinning glands in the feet. Branchial tubercles present. First foot little or not modified. Elytra leaving the back uncovered. Feet biramous; dorsal

ramus small, with capillary setae. Ventral ramus large, thick with the following three types of setae: (1) serrulate, (2) aristate, (3) *serrulate-subspiral*; genuine bipennato-penicillate setae absent.

1. Without dorsal tubercles. No penicillate setae. First foot short *P. maxillosus*.
Dorsal tubercles present. Pseudo-penicillate setae. First foot
elongated . . . *P. melanonotus*.

Polyodontes maxillosus Ranzani.

(Text-fig. 5).

Polyodontes maxillosus, Fauvel 1923a, p. 97, fig. 37.

Panthalis lacazii, Pruvot and Racovitza 1895, p. 441, pl. xix, figs. 84-104.

? *Panthalis bicolor*, Grube (*partim*) 1877, p. 517.

? *Eupompe australiensis*, Mc Intosh, 1885, p. 135, pl. xxi, figs. 4-5; pl. xxiii, fig. 8; pl. xxiv, fig. 4; pl. xiiiA, figs. 2-6.

? *Eupompe indica*, Beddard 1887, p. 256, pl. xxi, figs. 1, 3.

? *Polyodontes oculaea*, Treadwell 1902, p. 188, figs. 14-18.

Polyodontes oculaea, Monro 1928, p. 572, figs. 27-30.

"Investigator" Sta. 225, Andaman Sea, 53 fms.

Specific Characters.—Body reaching a very large size. Stout dark ommatophores ending in pale lenses. Median tentacle about the same length as the ommatophore. Lateral tentacles short, filiform. Tentacles and cirri smooth. Proboscis flattened dorso-ventrally, each lip provided with a long median cirriform papilla and 8-10 short ones. Bases of the

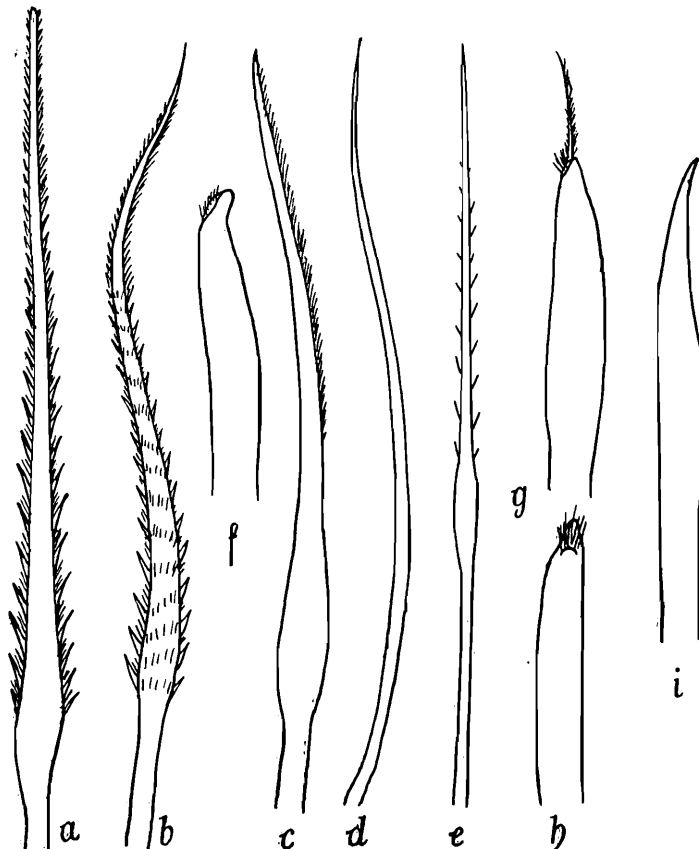


FIG. 5.—*Polyodontes maxillosus*: a. ventral bristle from 17th foot $\times 150$; b. sub-spiral bristle $\times 150$; c. upper ventral bristle from 4th foot $\times 150$; d. capillary dorsal bristle $\times 150$; e. slender bristle $\times 150$; f, g, h. tips of aristate bristles from 34th foot $\times 65$; i. aristate bristle from 4th foot $\times 65$.

fangs denticulate. Facial tubercle absent. First elytra large, rounded, smooth, without fringe, the others with posterior margin often folded pocket-like. Anterior elytra overlapping in front. Branchial tubercles on the feet, but no dorsal process. Spinning glands from the 8th foot backwards, and a flattened dorsal ramus with a few spinulose, capillary setae (Fig. 5, *d*) posteriorly; the ramus reduced to a short conical knob. Ventral ramus large, thick, with two vertical lips enclosing (1) a bundle of slender setae enlarged above, the shaft finely serrated (Fig. 5, *a*), (2) a vertical row of large yellow, aristate setae, blunt or bearing a long hairy process (Fig. 5, *f. g. h*), and a bundle of *serrulate-subspiral* setae (Fig. 5, *b*).

Polyodontes maxillosus is a giant Polychaete; its length may reach to one metre and more and the breadth is 20-25 mm. Unfortunately only fragments are generally collected; in the present collection there is an anterior fragment of 35 segments, 45 mm. long and 20 mm. broad.

The stout stalked eyes are black with a small eye-spot at the base. The median tentacle is a little longer than the ommatophores and inserted on a ceratophore at the back of the prostomium. The lateral tentacles, inserted under the ommatophores, project only a short distance beyond. The palps are long. The tentacular cirri are short, nearly equal, inserted on a common flattened base, with a few setae. The first foot is slightly modified, being a little larger and more protruding than the others. The dorsal ramus is a small digitiform process. The ventral ramus is divided into two parallel, somewhat oblique lips with a warty edge, a ventral foliated bract and a long ventral cirrus pointing forwards.

On the second and third foot the dorsal ramus is conical, the aristate setae are scarce, long, slender, without the terminal hairy whip (Fig. 5, *i*), some with only a few hairs.

The dorsal setae of the fourth foot are slender, capillary, finely serrated (Fig. 5, *e*). The upper ventral bristles are straight, spear-headed and spinous. The ventral setae (5-6) are aristate, a few slightly hairy at the tips (Fig. 5, *f. g. h*). There is an inferior bundle of *serrulate-subspiral* setae, more or less curved (Fig. 5, *b*).

On the following feet the dorsal ramus becomes progressively enlarged, flattened and turned down against the side of the lower division; its setae have often been mistaken for the upper ventral ones. On the 34th foot these dorsal setae are capillary (Fig. 5, *d*); the upper ventral setae are serrulate, spear-like, hairy at the tips (Fig. 5, *a*) and mixed with others finer, aristate setae (8-10). They are provided with a few hairs or a long hairy whip. The inferior bundle of *serrulate-subspiral* setae is dense.

Branchial tubercles, sometimes more or less bladder-like, are conspicuous on the feet 9 to 30 and decrease on the following ones.

No dorsal processes, such as those found in *P. melanonotus*, are present above the dorsal cirrus or under the elytra.

Only a few elytra are preserved and even these are much crumpled. They are smooth, without fringe and are densely spotted with a rusty brown pigment. The anterior ones are flat, the others have the usual small pouch on their posterior margin. In *Polyodontes* the elytra are very easily macerated and assume a bell-shaped or vesicular appearance.

The spinning glands appear on the 8th foot (tentacular segment not included).

I have carefully compared the specimen from the Andamans with others from Monaco and Naples and have not found any noteworthy difference between them; the above description fits very well the normal specimens of *P. maxillosus* from the European coasts.

Polyodontes maxillosus differs materially from *P. melanonotus* in the absence of bilobed processes above the dorsal cirrus, the absence of bipennato-penicillate and pseudo-penicillate setae, and its smaller and less modified first foot.

Eupompe indica Beddard from Mergui is probably synonymous, but unfortunately its description is too brief to be of any use for purposes of comparison.

Panthalis bicolor Grube is also a nearly allied species or is perhaps synonymous with it but the specimens described by Augener having pseudo-penicillate setae are different.

Polyodontes ocula Treadwell, as redescribed by Monro, does not appear to differ materially from *P. maxillosus*. *Eupompe australiensis* McIntosh is also very closely allied.

Habitat.—Atlantic Ocean, Mediterranean and Adriatic Seas, Bay of Bengal, Panama, Trinidad, Red Sea? Australia?

***Polyodontes melanonotus* (Grube).**

(Text-fig. 6).

Polyodontes melanonotus, Buchanan 1894, p. 441.

Polyodontes melanonotus, Fauvel 1914c, p. 472.

Panthalis melanonotus, Grube 1878, p. 48, pl. iv, fig. 1.

Panthalis melanonotus, Willey 1905, p. 254, pl. i, figs. 21-27.

Polyodontes sibogae, Horst 1917, p. 131, pl. xxviii, figs. 4-10.

Acoetes magnifica, Treadwell 1924, p. 1-4, figs. 1-7.

“Investigator” Sta. 341, Gulf of Oman, 230 fms.; Sta. 395, off Tenasserim, Burma, 50 fms.; Arakan Coast, 20-50 fms.; Andamans, 60 fms.

Specific Characters.—Ommatophores large, with black subspherical eyes on the extremity of the clavate peduncles. Two small eye-spots on each side of the prostomium. Tentacles and palps with pigment spots. First pairs of elytra large, crossing and overlapping in front, flat, smooth, without fringe or pouch. Others with a narrow posterior pouch.

First foot slightly modified, elongated and pointing forwards. Bladder-like branchial gills on a number of feet. A dorsal geniculate or subcylindrical process above the base of the dorsal cirrus. Spinning glands from the 8th foot backwards. Dorsal ramus flattened, with a few capillary setae. Ventral ramus large, thick, with four kinds of setae: (1) a bundle of slender setae enlarged above the shaft and serrulate, (2) pseudo-penicillate setae, (3) a vertical row of large yellow aristate setae, and (4) a bundle of serrulatae-subspirales setae.

Only fragments were obtained. One from Sta. 395 is 40 mm. long and 10 mm. broad; the 15 mm. long proboscis is not included in these measurements. It has about forty segments. The ommatophores are club-like and are provided with a long narrow stalk. The eyes are very dark. The eye-spots on the swollen prostomial lobes at the base of the eye-stalks are very small and black. The three tentacles are sub-equal, longer than on Willey's specimen from Rameswaram, and clavate at the tip as in *Acoetes magnifica* Treadwell. The palps are slender, tapering, nearly as long as the extruded proboscis. The inferior tentacular cirri are longer than the upper ones, with a few delicate setae between them.

The first foot, pointing forward, is more modified than in *P. maxillosus*, but not so much as in *Panthalis*. The foot, on the right side, is elongated and bears a small regenerated elytron. The left foot is shorter and thicker. The dorsal ramus is digitiform, with a bundle of long capillary setae. The ventral ramus, protruding farther, is divided into two vertical

lips with a semicircular foliaceous bract and a tuft of setae. The ventral cirrus is long and pointing forwards. The foot agrees with my fig. 1, pl. xv, 1919, being only somewhat shorter.

The dorsal ramus, more or less cylindrical in the first pairs of feet, gradually flattens and turns down along the vertical side of the compressed ventral ramus and the dorsal setae are liable to be easily mistaken for upper ventral bristles.

The aristate setae are already conspicuous on the third setigerous segment, though still less stout than further on. The upper ventral setae are serrulate, straight, spear-headed.

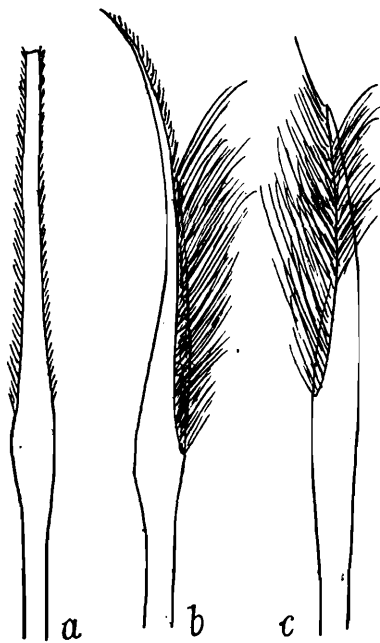


FIG. 6.—*Polyodontes melanonotus* : a. serrulate bristle from 10th foot $\times 150$; b. c. pseudo-penicillate bristles $\times 380$.

(Fig. 6, a). The setae of the inferior bundle are serrulate-subspirales, more or less curved. In the first pairs of feet the setae do not materially differ from those of *P. maxillosus*, but after the eleventh foot, or thereabouts, the upper serrulate setae gradually disappear and are superseded by long *pseudo-penicillate* setae with a long shaft tapering to a delicate tip with a fringe of long hairs on one side only (Fig. 6, b. c.), whilst the *bipennato-penicillate* setae of *Panthalis* end in a square-cut fan-shaped brush of hairs (Fig. 7, a).

The branchial tubercles are conspicuous, arranged in two rows on the tenth foot. They gradually disappear about the 30th foot, and are superseded by a geniculate appendix on the cirriferous feet and a long digitiform appendix on the elytrigerous feet.

These processes, which contain an intestinal diverticulum, and are inserted above the cirrophore, have been noticed by Willey, and I also found them in specimens from Madagascar. They are wanting in *P. maxillosus*, but are very conspicuous in specimens from Sta. 341 and 395, though less typical on the other fragments, probably owing to their poor preservation.

Buchanan (1894) referred this species, first recorded by Grube as a *Panthalis*, to the genus *Polyodontes*. I also referred it to *Polyodontes* in 1914, but later, in 1919, attaching more importance to the modification of the first foot and the penicillate setae, I, in spite of its branchiae, transferred it again to the genus *Panthalis*.

The first foot, though more elongated than in *P. maxillosus*, is not really different, and in any case, this character is not generic. The absence of genuine bipennato-penicillatae

setae and the presence of branchiae are much more important, and these features class it with *Polyodontes*.

Polyodontes sibogae Horst, as far as I can judge from its description, agrees closely with *P. melanonotus*, as described by Willey and myself, only differing in its small size (6 mm. broad). It is very likely based on a younger stage.

Acoetes magnifica Treadwell, from Jamaica, shows also all the distinctive features of *P. melanonotus*, such as the clavate ommatophores, dorsal processes and pseudo-penicillate setae.

Habitat.—Philippine Islands, Malay Archipelago, Ceylon, Gulf of Oman, Madagascar, Jamaica.

Genus **PANTHALIS** Kinberg.

Body elongated. Two large ommatophores (eye-stalks). A median tentacle. Lateral tentacles inserted beneath the ommatophores. Two long palps. Four horny jaws. Proboscis bilobed. Two pairs of tentacular cirri. Spinning glands in the feet. *Branchial tubercles absent*. First foot modified. Elytra flat or with a posterior pouch. Feet biramous; dorsal ramus small, with capillary setae; ventral ramus large, thick, with the following kinds of setae: (1) serrulate, (2) bipennato-penicillate, (3) aristate, and (4) *serrulate-subspiral*. A felt-like tube.

Panthalis oerstedii Kinberg.

(Text-figure 7).

Panthalis oerstedii, Kinberg 1857, p. 25, pl. vi, fig. 34.

Panthalis oerstedii, Watson 1895, p. 169, pls. ix, x.

Panthalis oerstedii, Fauvel 1914b, p. 78 (Synonymy); 1923a, p. 98, fig. 38.

Panthalis marenzelleri, Pruvot and Racovitza 1895, p. 442, pl. xix, fig. 105; pl. xx, figs. 106-110.

Panthalis jogasimae, Izuka 1912, p. 68, pl. i, fig. 6; pl. viii, figs. 1-6.

Panthalis jogasimae, Monro 1928, p. 568.

"Investigator" Sta. ? Bay of Bengal, 296-320 fms.; Sta. 233, Andaman Sea, 185 fms.; Sta. 362, Arabian Sea, 490 fms.; Sta. 363, Arabian Sea, 810 fms.; Sta. 378, off Akyab, Burma, 34 fms.; Sta. 383, off Burma, 517 fms.; Sta. 386, Laccadive Sea, 360 fms.; Sta. 610, Arabian Sea, 245-300 fms.; Sta. 711, Andamans, 290 fms.; "The Swatch", Bay of Bengal.

Specific Characters.—Size comparatively small. About 80 segments. Two large ovate or cylindrical colourless ommatophores. Tentacles subulate. Two long tapering palps. Tentacles and cirri smooth. Proboscis with the median papilla elongated. Bases of the fangs denticulate. Facial tubercle absent. First elytra large, rounded, smooth, without fringe, overlapping in front, the others with posterior margin folded, pocket-like. Branchial tubercles and dorsal process absent. First foot modified, elongated, pointing forwards with a heart-shaped foliaceous ventral ramus. Spinning glands from the 8th foot backwards. Dorsal ramus flattened, achaetous; ventral ramus compressed. Ventral setae as follows: (1) bipennato-penicillatae, (2) a vertical row of aristate bristles, and (3) a bundle of serrulatae-subspirales setae. In the anterior segments, preceding the spinning glands, setae similar to the lower ones take the place of the brush-shaped setae. A felt-like tube secreted by the spinning glands and coated with mud is always present.

Panthalis never reaches the large size of *Polyodontes*. Of the numerous specimens obtained, several which are complete, have only 55, 65, 70 segments with a length of 25-30 mm.; the larger fragments are only 5-8 mm. broad.

With the exception of a small specimen from Sta. 233 with black eyes, all have large, obovate, stalked, quite colourless ommatophores as in the European specimens. Watson's living specimens were also destitute of pigment. The small posterior eye-spots are also wanting.

The length of the median tentacle which protrudes more or less in front of the ommatophores, varies a great deal. The tentacular cirri bear a few setae on their base.

The first pair of feet, bearing the first pair of elytra, on the second setigerous segment, if the tentacular segment is included in this count, is modified. The dorsal ramus is conical, nearly cirriform, with long slender setae. The ventral ramus, much larger, has two compressed lanceolate fillets and an inferior foliaceous bract with a bundle of setae stouter and shorter than the dorsal. The ventral cirrus is large, and points forwards.

In short, the first foot of *Panthalis* is fundamentally constituted as in *Polyodontes*, but its parts are more distinct, more elongated and differ in their proportions; at first sight it looks quite different. The foot of *P. melanonotus* is intermediate between the short small foot of *P. maxillosus* and the elongated foot of *Panthalis*.

The distinction between the two genera does not, as I previously thought, rest on this feature, but on the presence or absence of branchiae and on the setae.

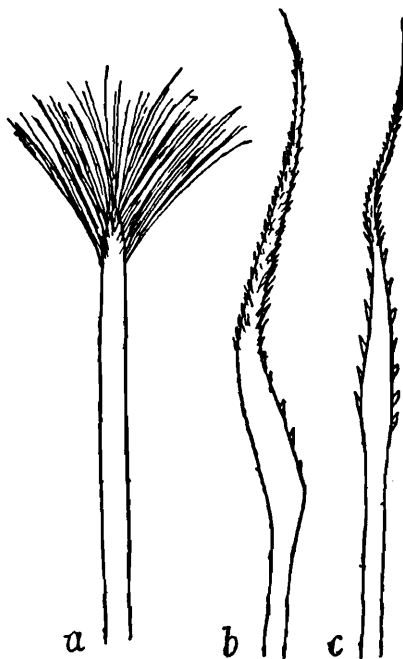


FIG. 7.—*Panthalis oerstedii*: a. penicillate bristle $\times 150$; b. c. serrulate subspiral bristle, side and front view $\times 150$.

In *Panthalis*, the superior ventral setae of the feet preceding the spinning glands are serrulate-subspiral (Fig. 7, b. c.), as in the inferior bundle, but further back they are superseded by true bipinnato-penicillate, or brush-shaped bristles, with long hairs inserted on each side, spreading in a fan-like manner; the end of the shaft does not protrude above (Fig. 7, a). Watson has shown how the worm uses these bristles to spin its felt-like tube.

I have compared the specimens from India with others from Europe and with the descriptions by McIntosh, Marenzeller and Pruvot and am unable to find any noteworthy

differences between them. The feet, the elytra and setae are alike. The dorsal setae appear to be generally absent. Straight ventral setae are often mixed with the doubly bent ones. The size of the body is about the same: 60, 70, 80 segments and a breadth of 5-8-10 mm. The body is equally flattened and enlarged in the anterior part, tapering backwards. According to Watson, the colour is very variable. Pruvot noted pale red eyes in living specimens. Occasionally black eyes have been met with, so that there is no distinction to be made on that account between *P. jogasimae* Izuka and *P. oerstedii*, and both species are probably synonymous.

Habitat.—Atlantic Ocean, Mediterranean and Arabian Seas, Bay of Bengal, Pacific Ocean, Japan, Panama.

Genus **EUPANTHALIS** McIntosh.

Body narrow, size moderate. Four sessile eyes; no ommatophores. A median tentacle. Lateral tentacles inserted at the end of the prostomial lobes. Two palps. Proboscis bilobed. Median dorsal and ventral papillae somewhat larger and lobed. Two pairs of tentacular cirri. Spinning glands in the feet. Branchial tubercles absent. Elytra flat. Feet biramous. Dorsal ramus achaetous (first feet excepted). Ventral ramus thick, with three kinds of setae: (1) serrulate; (2) aristate; (3) serrulatae-subspirales. A felt-like tube.

Eupanthalis edriophthalma (Potts).

Panthalis edriophthalma, Potts, 1910, p. 345, pl. xix, fig. 19; pl. xxi, figs. 56-57.

Panthalis nigromaculata (non Grube) Willey, 1905, pl. i, figs. 28-32.

"Investigator" Sta. 379, off Akyab, Burma, 250 fms.

Specific Characters.—"Head spherical, divided by median longitudinal line. Eyes two pairs, sessile, anterior pair rather larger, both distinct, pigment masses situated quite on lateral border. Median tentacle . . . ; lateral slender structures gradually tapering to tip, rather longer than corresponding structures in *P. nigromaculata*. Palps stout and conical, abruptly ending in acute tip; no trace of cilia (as found in *P. nigromaculata*) even when examined microscopically.

Ventral setae of four types, viz. (1) slender gibbous setae with close-set spines placed irregularly; (2) similar setae with spines arranged in whorls occurring after the eleventh segment; (3) aristate setae with long appendix; (4) slender gibbous setae differing slightly from (1)" (Potts).

Only an anterior fragment with 32 segments, measuring 10 mm. long and 3 mm. broad, feet included.

The papillae, on the extruded proboscis, are in poor condition, especially the median. The horny jaws are pale yellow, translucent, with 5-6 basal teeth.

The prostomium is divided into two hemispherical lobes. The anterior pair is larger and discoloured. The posterior eyes, reduced to a mere black speck, are farther back and nearly lateral. The median tentacle is slender, filiform, inserted backward on the prostomium near the thin, curved nuchal fold (it was lost in Potts' specimen). The lateral tentacles are filiform, about the length of the prostomium, and longer than the median.

The palps are rather long. The ventral cirri are slender and subulate.

The elytra are translucent, colourless. The anterior are larger and overlapping forwards (inversely imbricated), whilst the others overlap backwards and show a slight posterior flap.

In the anterior segments, there are a few small and delicate serrulate upper setae (dorsal setae?). Next there are setae in the form of long straight hairy brushes, which are intermediate between the typical serrulate setae and the *pseudo-penicillate*. The aristate setae are arranged in a vertical row above the serrulatae-subspirales which are shorter than in *Panthalis*.

The above specimen agrees with Potts' description and differs only from *P. nigromaculata* Willey in its palps which, according to Potts, are not fimbriated (perhaps owing to their poor preservation). The discoloured anterior pair of eyes may have escaped Willey's notice.

According to Horst (1917, p. 134), *P. nigromaculata* Willey differs from Grube's species characterised by its pigment spots, clavate tentacles, elytra not overlapping, four eyes and smooth palps.

Such small differences, after all, are not very important and may partly be ascribed to the state of preservation. *Eupanthalis edriophthalma*, if not synonymous, comes also very near to *E. kinbergi* McIntosh. I compared the feet and bristles and found them identical in both species. Nevertheless a careful comparison of a number of specimens in very good condition is necessary to settle the question.

Habitat.—Indian Ocean, Ceylon, Akyab.

Family CHRYSOPETALIDAE Ehlers.

Body short or elongated with few or numerous segments, bearing on their dorsal side a fan or a transverse row of paleae. Prostomium with four eyes and three tentacles. Feet biramous, with dorsal cirri on every segment. Ventral bristles compound.

Body short			<i>Chrysopetalum</i> .
Body elongated			<i>Bhawania</i> .

Genus **CHRYSOPETALUM** Ehlers.

Body short, segments comparatively few; dorsal ramus carrying paleae only, which cover the greater part of the back. Stout dorsal cirri. Ventral ramus carrying compound setae only.

Chrysopetalum ehlersi Gravier.

Chrysopetalum ehlersi Gravier, 1901, p. 260-263, pl. x, figs. 150-151.

This species is not included in the collection of the Calcutta Museum, but I have seen a specimen from Pamban, from the collection of the Madras Government Museum, which is recorded by Gravier (1927, p. 5) in his paper on "The Littoral Fauna of Krusadai Island."

Genus **BHAWANIA** Schmarda.

Body elongated, with numerous segments. Head very small, hidden. Paleae arranged in a transverse row, only denticulated along the median edge. Ventral setae compound, of three kinds.

Bhawania cryptocephala Gravier.

Bhawania cryptocephala Gravier, 1901, p. 263, pl. x, figs. 152-156.

Bhawania cryptocephala Potts, 1909, p. 328.

Bhawania cryptocephala Horst, 1917, p. 137.

Bhawania cryptocephala Fauvel, 1919, p. 347.

Bhawania cryptocephala Pruvot, 1930, p. 20.

?? *Bhawania myrialepis* Schmarda, 1861, p. 164, pl. xxxvii, figs. 323-325.

"Investigator" Sta. 619, Camorta Island, shore collecting; Sta. 628, Nankauri Harbour; Sta. 650, Maldives; Sta. 664, Andamans, coral reef; Sta. 699, Port Blair, Andamans; Kyaukpyu, Burma, among Sponges.

Specific Characters.—Body yellow, twisted, very brittle, entirely covered by the paleae. Head very small, hidden by the protruding anterior feet and the paleae which are imbricated, arranged in dense transverse rows. They are yellow or brown, oval-elongated, striated transversely and longitudinally, serrated on one side, and show prominent ridges with a beaded edge. Dorsal cirri digitiform, partly retractile. Ventral ramus bearing (1) upper setae with long spinigerous terminal piece, (2) heterogomph falcigerous and (3) slender setae with an elongated smooth filiform appendix. Ventral cirrus short.

The larger specimens, much twisted, are 80-100 mm. long and 5 mm. broad. Many others consist only of fragments, as this species is often very stiff and brittle. The paleae are often coated with mud.

The general appearance, as already noted by Pruvot, is like that of a Sigalionid.

This species is probably a synonym of *Bhawania myrialepis* Schmarda, first recorded from Ceylon, but as Schmarda's description is very incomplete and as, on the other hand, other species have been described from the Indian Ocean it is impossible to be certain; I have, therefore, adopted Gravier's denomination.

Habitat.—Red Sea, Indian Ocean, Philippine Islands, Pacific Ocean, New Caledonia.

Family AMPHINOMIDAE Savigny.

Body elongated, square, or short, ovate, depressed. Prostomium deeply set into the anterior segments. Three tentacles. Two palpal pads with subulate palpostyles (resembling a second pair of lateral tentacles). A caruncle. Parapodia biramous, with branchiae; one or two dorsal cirri on each side, a ventral cirrus (exceptionally uniramous with compound hooks). Setae simple, straight or furcate. Proboscis unarmed.

- | | |
|--|-----------------------|
| 1. Branchiae pinnate | <i>Chloeia</i> . |
| Branchiae bushy | 2. |
| 2. Branchiae set in transverse rows of tufts | <i>Euphrosyne</i> . |
| Branchiae in dense clusters | 3. |
| 3. Two dorsal cirri on each foot | <i>Notopygos</i> . |
| A single dorsal cirrus on each foot | 4. |
| 4. Eyes absent | <i>Benthoscolex</i> . |
| Eyes present | 5. |
| 5. Caruncle small, branchiae only on the anterior part of the body | 6. |
| Caruncle well developed. Branchiae up to the end of the body | 7. |

- | | |
|---|-----------------------|
| 6. Hooks on the first setigerous segment | <i>Paramphinome.</i> |
| No hooks on the first setigerous segment | <i>Pseudeurythoe.</i> |
| 7. Caruncle heart-shaped. Short, hooked ventral setae | <i>Amphinome.</i> |
| Caruncle trilobed. Ventral setae furcate | <i>Eurythoe.</i> |

For a more extensive key see Gravier (1901, p. 213), Fauvel (1923a, p. 126) and Chamberlin (1919, p. 25).

Genus **AMPHINOME** Bruguière.

Caruncle small, heart-shaped. Three tentacles. Ventral setae uncinat. Arborescent branchiae in dense clusters.

Amphinome rostrata (Pallas).

Amphinome rostrata, McIntosh 1885, p. 21, pl. Ia, fig. 16 ; 1923, p. 190.

Amphionome rostrata, Fauvel 1914b, p. 87 ; 1930a, p. 10 (Synonymy).

Amphionome pallasii, Quatrefages 1865, p. 314.

Amphinome pallasii, Fauvel 1914b, p. 85 (Bibliography).

Pleione tetraëdra, Milne-Edwards 1849, pl. vii, bis, fig. 1.

Puri, Orissa. Andaman Sea, 112 fms.; Nankauri Harbour, on a drifting log, November 25, 1921.

Specific Characters.—Body square. Prostomium small, rounded, with 2 eyes. Caruncle smooth or slightly plaited. Median tentacle short, inserted on the anterior margin of the caruncle. Lateral tentacles short, subulate. Palps conical. Bushy gills from the 2nd or 3rd setigerous segment. Dorsal cirrus inserted under the branchial cluster. Dorsal setae of two kinds : (1) long slender, more or less serrated at the tip ; (2) stouter bristles with lateral fangs (glochidiate setae, harpoon-shaped). Ventral setae few, 5-7, uncinat. Acicula with a terminal knob. Body bluish-grey, cirri and branchiae red (rusty yellow in alcohol).

The specimens from Puri, Orissa, and Nankauri are young and small, only 6, 10, 15 mm. long. The gills and tentacles are still yellowish, the back is brown and the ventral side is lighter.

As I have already stated (1930, p. 10), I now agree with McIntosh in considering *A. rostrata* and *A. pallasii* as synonymous. A careful comparison of specimens from the Indian Ocean and from the Atlantic has failed to reveal any specific differences, the features previously considered as distinctive being due to preservation only.

Habitat.—Indian Ocean, Atlantic and Pacific Oceans.

Genus **EURYTHÖE** Kinberg.

Body elongate, square in section. Prostomium large, rounded, with four eyes. Three subulate tentacles. Two large pad-like palpophores with subulate tentacle-like palpostyles. Caruncle consisting of a sinuous crest with vertical folds along its lateral sides. Branchiae ramified, commencing on the first, second or third segment. Feet biramous, each lobe bearing a cirrus. Setae brittle, calcareous. Ventral setae bifurcated, mostly bifid, generally short and thick. Dorsal setae usually longer, of three kinds : (1) bifid, shorter arm

being a spur; (2) harpoon-shaped; (3) sword-shaped. Acicula lanceolate. Anus dorsal, extending over several segments.

Branchiae beginning on the second segment. Caruncle terminating on third or fourth segment, with lateral lobes folded.

E. complanata.

Branchiae beginning on the third segment. Caruncle terminating on first segment

E. parvecarunculata.

Eurythoe complanata (Pallas).

Eurythoe complanata, Pallas, Augener, 1913, p. 87 (Synonymy).

Eurythoe complanata, Fauvel 1919, p. 348; 1930, p. 510.

Eurythoe complanata, Bindra 1927, p. 9, pl. i, figs. 5-6; pl. ii, fig. 1.

Eurythoe complanata, Pruvot 1930, p. 23.

Eurythoe alcyonia, Gravier 1901, p. 248, pl. ix, figs. 140-143; pl. x, figs. 144-146.

Eurythoe alcyonia, Pruvot 1930, p. 21.

Eurythoe laemisetis, Fauvel 1914a, p. 116, pl. viii, figs. 28-30, 33-37.

"Investigator" Sta. 195, Arabian Sea, 28 fms.; Sta. 527, Mergui Archipelago, shore collecting; Sta. 616, Camorta Island, Nicobars; Sta. 622, Camorta Island; Sta. 624, Nankauri Island, Nicobars, coral reef; Sta. 628, Nankauri Harbour; Sta. 630, Burleigh Rock, Nankauri Harbour; Sta. 637, 640, 644, 645, 650, Maldives; Sta. 657, Andamans; Sta. 659, Andamans; Sta. 664, 665, Andamans; Sta. 703, Nankauri Harbour; Sta. 709, near entrance to Nankauri Harbour; Karachi; Galle; Ceylon; Kilakarai; Cape Comorin; Tuticorin; Krusadai Island; Pamban; Mergui; Laccadive Islands; Henjam, Persian Gulf.

Specific Characters.—Branchiae commencing on the second segment. 4 very conspicuous eyes. Caruncle terminating on third or fourth segment, lateral lobes more or less hidden in grooves under the smooth median lobe. About five buccal segments. Dorsal setae very variable in length, of three kinds: (1) long calcareous setae with an elongated slender tip, more or less serrated, and a small spur at the base, (2) large straight harpooned glochidiate setae with lateral rows of easily deciduous teeth, and (3) stout, straight, *smooth* setae. Two kinds of ventral setae: (1) stout furcate setae with unequal arms, the longer one smooth, or slightly serrated, on the young specimens, and (2) a few subfurcate setae with one of the arms thin and greatly elongated. Acicula short, spear-headed.

This species, so widely distributed on the coral reefs of the whole tropical area, has been described under many names.

The length of the setae and their colour, usually more or less alabaster-like, are liable to extensive variation depending on environment, age and state of wear and epitoky. Moreover the calcareous setae of the Amphinomidae are very easily, and but too frequently altered by preservatives; the lateral teeth of the glochidiate setae and the fine serrations may entirely disappear in alcohol, and the setae themselves may become soft and woolly; such accidents often give rise to many mistakes.

Another cause of error is due to the ease and frequency of regeneration in this species which results in marked modifications in the appearance and proportions of the head, the number of the buccal and anal segments, the shape of the body, of the anal funnel, and the length of the tentacles. The contractions due to the fixatives also alter the appearance of the caruncle.

Very likely many so called species are only synonyms or, at best, varieties, of the widespread *E. complanata*.

Habitat.—Tropical area of Indian Ocean, Atlantic and Pacific Oceans.

***Eurythoë parvecarunculata* Horst.**

Eurythoë parvecarunculata, Horst, 1912, p. 37, pl. x, figs. 1-5.

Eurythoë parvecarunculata, Fauvel, 1923c, p. 9 ; 1927c, p. 525, fig. 1.

Eurythoë parvecarunculata, Augener, 1916, p. 90, pl. ii, fig. 3 ; pl. iii, figs. 37-38.

Off Chilka Lake, 7-8 fms. ; Port Blair, Andamans.

Specific Characters.—Branchiae commencing on the third segment. Rounded cephalic lobe with a large heart-shaped palpar part and four eyes ; upon its posterior border it bears a long unpaired antenna, the two anterior antennae are much shorter. The subulate palpostyles of the palps are somewhat shorter than the lateral antennae. The caruncle is a small ovate process only extending over the first segment. The strongly ramified branchiae are most developed in the anterior part of the body, decreasing posteriorly. The acicula have an elongated oval extremity. Dorsal setae of two kinds : (1) slender elongated bifurcated, with a long limb, smooth or coarsely denticulated along its internal border and a short limb often reduced to a mere spur, and (2) short stout harpoon-shaped bristles. Ventral setae furcated, with the longer limb bent backwards and provided with a few faint denticulations. They are associated with a few slender elongated setae with a spur-like short limb and a long limb, smooth or faintly denticulated.

The specimen from the Chilka Lake is small, 30 mm. long and 3 mm. broad.

The head agrees well with Horst's fig. 1, pl. x, only the eyes are less conspicuous and the caruncle is more ovate and projecting. The dorsal setae are relatively short and the ventral ones which are short and stout are fewer in number. The dorsal cirri are larger and longer than the branchial filaments. The ventral cirri are stout, short and subulate. The branchiae, most developed on the first twenty segments, decrease progressively but still exist on the last posterior segments.

The specimen from Port Blair is a large female (full of eggs) 220 mm. long and 14 mm. broad, setae not included. The prostomium agrees with that of the other specimen but the four black eyes are more conspicuous. The setae are much longer, the dorsal ones are white and soft ; the ventral ones are very numerous, long and yellow, and associated with a few slender capillary setae.

Augener (1916, p. 90) had already noticed such differences in large specimens and ascribed them to sexual dimorphism and epitoky. This species is a connecting link between *Eurythoë complanata* and the genus *Pareurythoë*, which has an analogous reduced caruncle but which lacks gills in the posterior part of the body.

Habitat.—Malay Archipelago, Bay of Bengal, India, Atlantic Ocean, Cameroon, Guiana.

Genus **PSEUDEURYTHOË**, gen. nov.

Body elongated, square in cross section of the anterior part. Prostomium rounded. Two pairs of eyes. Caruncle reduced to a small knob deeply set into the first segment. Three tentacles. Palps cushion-like, with subulate palpostyles. Feet biramous with dorsal and ventral divisions far apart. Dorsal setae of two kinds : (1) harpoon-shaped

and (2) capillary. Ventral setae: (1) short, bifurcate, and (2) capillary with or without a short basal spur. Each foot bearing a dorsal and a ventral cirrus. Gill-tufts limited to the anterior part of the body.

Remarks.—This genus is a connecting link between *Eurythoë* and *Paramphinome*. From *Eurythoë* it differs in the very much reduced caruncle and the absence of gills in the posterior part of the body. Although both these features approximate it to *Paramphinome*, the presence of eyes and the absence of hooks in the first setigerous segment clearly differentiate it.

Linopherus canariensis Langerhans (1881, p. 109) and *Paramphinome oculifera* Augener (1914, p. 89), which are provided with eyes, lack hooks in the first setigerous segment, and have the branchiae limited to the anterior part of the body, are both to be referred to the genus *Pseudeurythoë*. They may both belong to the same species for, according to Augener, his species differs only from Langerhans' in its yellowish-white colour, instead of reddish brown, and in its smaller size. Nevertheless, Langerhans' description being somewhat scanty, the identity of both forms must remain doubtful.

According to Gustafson (1930, p. 390), *Eurythoë borealis* Racovitza (*non* Sars) is probably synonymous with *Linopherus canariensis* and thus belongs to the genus *Paramphinome*. But, as stated above, it should rather be included in the genus *Pseudeurythoë*.

According to Langerhans and Augener, their species are devoid of a caruncle. But on a reference to Racovitza's study of the prostomium of the Amphinomidae (1896), we find that the more or less raised cephalic area bearing eyes and median tentacle belongs to the middle part of the brain, whilst the caruncle, inserted on the nuchal area, pertains to the posterior part of the brain. In the genus *Amphinome* the posterior part of the head is heart-shaped and rather like that of *Pseudeurythoë*, but this heart-shaped lobe, lying behind the eyes and the median tentacle, is not homologous with that of the latter but is a genuine caruncle, whilst in *Pseudeurythoë* the raised area, square or heart-shaped bears the four eyes and the median tentacle and belongs to the middle-brain.

Still farther backwards, on several species, a small rounded or square knob is noticeable lying between two dorsal folds of the first setigerous segment. This small knob is probably a reduced caruncle, as stated by Gustafson, differing very little from that of *Eurythoë parvecarunculata*. In view of the above, *Paramphinome* and *Pseudeurythoë* are intermediate between *Eurythoë* and *Hipponoë*.

- | | |
|---|-----------------------------|
| 1. Branchiae from 3rd to 10th-11th segment | 2 |
| Branchiae from 3rd to about 25th segment | 3 |
| 2. Length 4-5 mm., 55 segments | <i>P. oculifera</i> . |
| Length 20 mm., 60 segments | <i>P. canariensis</i> . |
| 3. Prostomium invaginated into the first segments. Ventral capillary setae without basal spur | <i>P. microcephala</i> . |
| Prostomium not invaginated into the first segments. Ventral capillary setae with a basal spur | <i>P. paucibranchiata</i> . |

***Pseudeurythoë paucibranchiata*, sp. nov.**

(Pl. I, figs. 3-4, Text-fig. 8).

¹Ain-Musa, Gulf of Suez, 1916; One specimen.

Specific Characters.—Body elongated, square in section in the anterior part, rounded and more or less moniliform posteriorly. Prostomium globular, slightly bilobed anteriorly, raised posteriorly in a heart-shaped lobe. Lateral tentacles articulate. Median tentacle inserted at the back of the heart-shaped lobe which bears two small, little conspicuous eyes on its anterior border. Caruncle reduced to a very small knob set into the first setigerous segment. Cushion-like palps with articulate palpostyles. On the first segment, a dorsal and a ventral articulated cirrus, a small nipple, dorsal and ventral setae, no hooks. The ventral cirrus of the second segment is longer than the preceding and the following ones. Branchiae from the 3rd setigerous segment to the 25th in clusters of filaments (pl. i, fig. 4). Parapodial rami well apart. Dorsal cirri inserted in front of the setae and branchiae. Ventral ramus with a small conical lobe and a subulate cirrus, smaller than the dorsal. Dorsal setae of the following types : (1) capillary, long, slender, smooth or faintly serrated, without basal spur, (2) short, slender, capillary, and (3) stout harpoon-shaped. Ventral setae consist of (1) upper bifurcate setae with a long spur and an elongated serrated limb, (2) very long, slender, capillary setae smooth or faintly serrated, without spur, and (3) furcate setae with longer limb strongly serrated.

The only specimen, (25 mm. long and 2 mm. wide) discoloured in alcohol, resembles *Linopherus canariensis* Langerhans. As far as can be ascertained from the rather crude figure of Langerhans, the prostomium is somewhat alike, but the species from the Canaries has four well marked eyes, different setae and branchiae only on the 8th or 9th segment, in spite of its nearly similar size (20 mm.). *Paramphinode oculifera* Augener (1914, p. 89), from Australia, is perhaps identical with the former, but differs from the species from 'Ain Musa in its setae and less developed branchiae. Unfortunately Augener did not figure the prostomium.

Amphinode djiboutiensis Gravier, which has long ventral setae, instead of the stout hooks of the true *Amphinode*, resembles it in certain features, but its branchiae extend all along the body and it is nearer *Eurythoe parvecarunculata*. The prostomium of *P. paucibranchiata*, which is larger than that of *P. microcephala*, is quite different in shape and not retracted into the first segment. Its anterior rounded border has, on the ventral side, a bilobed appearance, owing to the two longitudinal pads of the palps.

The lateral tentacles are rather long, plainly articulated and inserted on the dorsal part of the prostomium. The palpostyles of the palps (external antennae of a few authors) are of nearly the same length and are similarly articulated. At the back of this anterior globular part lies a raised heart-shaped area bearing, near the anterior border, a pair of very small eyes, hardly visible and, further back, a median tentacle (pl. i, fig. 3). Behind this area appears a kind of small square knob on the first setigerous segment, lying between two lateral folds of this segment.

This small knob is a reduced caruncle, for as Gustafson (1930) has proved, contrary to the views of previous authors, the analogous posterior knob of *Paramphinode* represents the reduced caruncle. The first setigerous segment is provided with two small bundles of delicate setae, but there are no such hooks as in *Paramphinode*. Dorsal and ventral cirri are articulate, as well as the ventral cirrus of the second setigerous segment, which is noticeably longer than the others.

The branchiae begin on the 3rd setigerous segment where they show several simple or bifurcate filaments. On the following segments, their branches are bifurcate or trifurcate near the base thus giving rise to a dozen or more of long filaments (pl. I, fig. 4). The gills lie behind the setae and the dorsal cirrus which is rather short. They disappear somewhat abruptly about the 25th setigerous segment. The ventral ramus bears a short blunt conical process and a ventral subulate cirrus, shorter than the dorsal.



FIG. 8.—*Pseudeurythoe paucibranchiata*: a. ventral serrated capillary bristle. $\times 520$; b. upper ventral furcate bristle. $\times 520$; c. inferior ventral forked bristle. $\times 520$; d. harpoon-shaped bristle. $\times 380$; e. posterior dorsal serrate bristle. $\times 520$.

In the bundle of the dorsal ramus there are several kinds of setae, first short and stout bristles more or less harpoon-like, serrated (Fig. 8, d) (glochidiate setae) and others analogous but quite smooth, which are perhaps only harpoon setae from which their fangs have been lost, for it is now well known how easily these calcareous brittle teeth disappear through wear or the effects of preservatives. The greater part of the bundle is made up of very long and slender capillary setae, smooth or very faintly serrated under the tip. Such setae never show any trace of the basal spur of the setae of *Eurythoe* (Fig. 8, e).

The ventral ramus bears: (1) upper setae with a rather long spur slightly diverging or appressed on the other limb which is long, slender, and serrated, (2) a large number of long slender capillary setae similar to the dorsal ones; such long setae may be epitokous, and (3) forked setae with unequal limbs, the shorter smooth and blunt, the longer curved and clearly serrated (Fig. 8, b, c). I did not notice any acicula which were hastate or swollen at the tips.

Habitat.—Gulf of Suez.

***Pseudeurythoe microcephala*, sp. nov.**

(Pl. I, Figs. 5-8, Text-fig. 9.)

"Investigator" Sta. 640. From reef flat between Huludu and Heratera, Maldives. Several specimens.

Specific Characters.—Body elongated, square in section in the anterior part, rounded and moniliform posteriorly. 120 to 150 segments. Head very small, entirely retracted

into the first segments. Prostomium longer than broad, rounded anteriorly, enlarged and quadrangular posteriorly. Caruncle very small. Two pairs of reddish eyes, the anterior larger and semi-circular, the posterior very small. Median tentacle filiform, much shorter than the prostomium, inserted far back between the posterior eyes. Lateral tentacles subulate, faintly articulated. Palpostyles (external antennae of authors) about the same length (pl. i, fig. 5). Mouth hidden in the folds of the anterior segments. On the first segment, dorsal and ventral cirri, a small nipple, a few slender capillary dorsal setae, a bundle of ventral setae, and *no hooks*. Cirri of the second setigerous segment longer than the others. Branchiae from the 3rd setigerous segment bushy, decreasing and disappearing about the 25th segment. Parapodial rami well apart (pl. i, figs. 6-8). Dorsal cirri elongated. Ventral ramus with a small blunt conical process and very short subulate cirrus. Dorsal setae as follows: (1) long, slender, smooth capillary setae without basal spur, and (2) harpoon-shaped (fig. 9, *e*). Ventral setae of two types: (1) long capillary serrated setae, without spur, and (2) furcate setae with the longer limb boldly serrated (fig. 9, *c. d*).

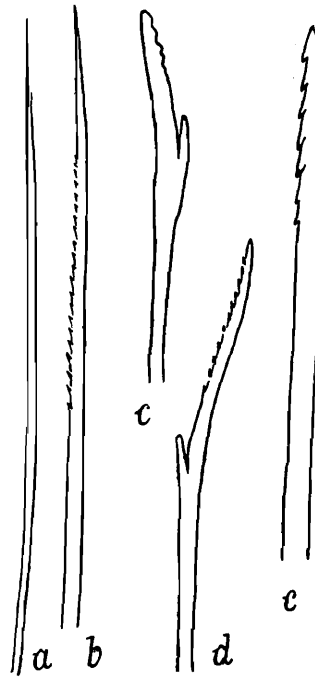


FIG. 9.—*Pseudeurythoe microcephala*: *a*. smooth dorsal bristle. $\times 380$; *b*. serrated capillary ventral bristle. $\times 520$; *c. d*. furcate ventral bristles. $\times 530$; *e*. harpoon-shaped bristle. $\times 380$.

Average length 30 mm. 2 mm. wide.

Body discoloured in alcohol. Setae alabaster-white or slightly yellow.

The body of this small species is more slender and tapering than in *Eurythoe*. In the posterior part, the segments are more elongated and nearly moniliform. The cross-section of the body is square in the anterior part, rounded in the posterior.

The head, being very small and deeply sunk into the anterior segments, it was difficult to ascertain the exact shape of the prostomium and caruncle. Its anterior border is rounded and bears two subulate, articulated tentacles slightly protruding, and a little shorter than the palpostyles which look like a second pair of tentacles. The median tentacle, inserted at the back of the raised square area bearing the eyes, is short and conical, and falls off very easily. The very small caruncle is very difficult to make out as it is deeply hidden under the protruding border of the next segment (pl. i, fig. 5).

Regarding the setae, it may be noted that I failed to find any hastate or knobbed acicula. The long slender, capillary setae are all without any basal spur, both in the dorsal and in the ventral ramus (fig. 9, *a. b*). The dorsal ones are smooth or with very faint serrations to be seen only with a very high magnification. Of the ventral capillary setae, the very long ones are smooth, the shorter ones are finely but clearly serrated in their middle part (fig. 9, *b*). In both rami, short, slender and very delicate setae resemble long capillary setae, apparently not fullgrown. As specimens full of eggs were met with, such long, slender, smooth setae are very likely epitokous. The short furcate setae have the longer limb clearly serrated (fig. 9, *c. d*). There are harpoon-shaped bristles (fig. 9, *e*).

This species differs from *P. paucibranchiata* in (1) the shape of its prostomium which bears two pairs of conspicuous eyes, (2) its head deeply sunk into the first segments, and (3) the absence of basal spur on the long setae in both rami.

This species is of about the same size as *Linophorus canariensis* Langerhans, but the latter has branchiae extending only from the 3rd to the 8th-9th segment, and long serrated dorsal setae which I did not observe in the new species. As far as can be ascertained from the indifferent figure given by Langerhans, the prostomium of his species is also different.

My new species comes near *Paramphinode oculifera* Augener (1914, p. 89). The setae are almost similar, the long capillary ones are serrated only for a part of their length and also lack the basal spur. The ventral furcate setae are analogous, and hastate acicula are wanting. Although the prostomium bears eyes, it has a different shape and is not sunk into the first segments. The branchiae extend from the 3rd to the 10th-11th segment only, which may perhaps be due to their small size, 5 mm.?

P. oculifera, which lacks hooks in the first segments, is not a genuine *Paramphinode* but a *Pseudeurythoe*.

Habitat.—Huludu, Maldives.

Genus **PARAMPHINOME** Sars.

Body moderately elongate, vermiform, segments few. Prostomium rounded, no eyes. Caruncle small. Three tentacles. Palps cushion-like, with subulate palpostyles. Feet biramous with dorsal and ventral divisions far apart. Dorsal setae of two kinds: (1) harpoon-shaped, and (2) capillary. Ventral setae also of two types: (1) short bifurcate and (2) long capillary with or without basal spur. Acicula hastate. *Two strong curved hooks on each side of the first setigerous segment*. Gills only on the anterior segments. Anus terminal.

Paramphinode indica, sp. nov.

(pl. I, figs. 9-16, Text-fig. 10).

"Investigator" Sta. 302, Arabian Sea 530 fms.; Sta. 308, S. W. of Cape Comorin, 881-891 fms. Green mud.

Specific Characters.—Body slightly flattened anteriorly, cylindrical, with longer and narrower segments posteriorly (pl. i, fig. 9). 25 to 28 setigerous segments. Prostomium eyeless, globular, rounded anteriorly, very slightly bilobed backwards, with a very small ovate or triangular caruncle set into the first segment (pl. i, fig. 10). Two filiform lateral tentacles inserted near the anterior border of the head. Median tentacle long, raised, inserted at the back. Cushion-like palps and tentacle-like palpostyles. Mouth extending

to the anterior border of the 2nd setigerous segment (when shut) Proboscis short cylindrical, thick, dark-coloured (pl. i, figs. 12-13). On the first setigerous segment, a long dorsal cirrus and a little shorter ventral cirrus, in front of the dorsal setae *two strong curved transparent hooks* (pl. i, fig. 16). On the second setigerous segment, both rami wide apart, a dorsal cirrus, no *ventral cirrus* and two bundles of setae. On the third setigerous a dorsal and a ventral cirrus. Branchiae 10 to 13 pairs, from the 4th setigerous to the 13th-16th; they are very large, entirely covering the body and feet, divided into many branches bearing lateral filaments, simple or bifurcate (pl. i, figs. 9, 10). Parapodial rami wide apart. In the posterior abbranchiate region of 10-13 segments, a short blunt dorsal process with a long cirrus and a tuft of capillary setae, a larger ventral ramus with two fillets, an anterior conical and a posterior rounded, a little shorter, a ventral cirrus and very long setae. Dorsal setae of two kinds: (1) large straight harpoon-shaped bristles, (2) long and slender capillary setae. Ventral setae also of two types (1) short with the tip of the shaft dilated and bifurcate, one of the limbs large, curved, serrated, the other much smaller, slender and smooth and (2) longer and slender serrated setae with a small basal spur. Acicula hastate. Anus terminal.

Length 15 to 20 mm. 4-5 mm. wide.

Discoloured in alcohol, with the exception of the tentacles and first cirri which are sometimes of a violet colour.

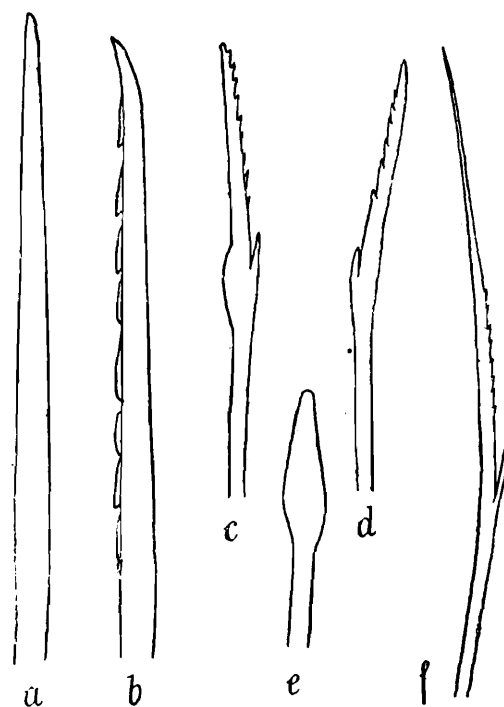


FIG. 10.—*Paramphinome indica*: a. large dorsal smooth bristle. $\times 150$; b. harpoon-shaped bristle from posterior foot. $\times 380$; c. furcate ventral bristle from 3rd setigerous segment. $\times 380$; d. furcate ventral bristle. $\times 380$; e. acicular bristle. $\times 380$; f. slender furcate capillary seta. $\times 380$.

A number of this Amphinomids were collected, most of them of the same size and consisting of 24 to 28 segments.

The somewhat broader anterior region is almost entirely hidden under the tangled long and slender branchiae covering the back and protruding over the feet, whilst the posterior part of the body is naked and its clearly distinct segments are nearly cylindrical, more elongated (pl. i, fig. 9). The number of the segments of this, often truncated, region is about 10-13; the last ones are very small.

The prostomium is rounded, without eyes, bearing the filiform lateral tentacles inserted near its anterior border (pl. i, fig. 10). Backwards, a rounded, raised cushion bears the median tentacle inserted into a posterior notch. The caruncle is reduced to an oval or somewhat square knob deeply set between the bases of the feet of the first setigerous segment. When seen from above, it looks smooth, the lateral folds being hidden under the close-set borders of the first segment. The caruncle does not protrude very much over the back part of the prostomium.

This species differs somewhat from *P. pulchella* as figured by Gustafson (1930, p. 392, fig. 39), the caruncle being broader, more compact, a mere knob in appearance, the lateral folds being inconspicuous from above.

The palpophores are, as usual, two rounded pads bearing subulate palpostyles resembling tentacles (pl. i, fig. 11).

The mouth opens at the bottom of a rounded wrinkled funnel extending over the first setigerous segment and half of the second, or to its anterior border (pl. i, figs. 11, 12).

When the proboscis is extruded, owing to the wrinkles in the ventral surface, the mouth appears to extend to the fourth segment. Then the contraction of the anterior segments causes the disappearance of the caruncle under the anterior border of the second setigerous segment. The short, cylindrical, proboscis ends in a horse-shoe shaped dark coloured flat area (pl. i, figs. 12, 13).

Sometimes the large dorsal cirrus on the first setigerous segments is purple coloured. The ventral cirrus is shorter. Two small bundles of setae represent the two rami, moreover this segment is armed, on each side, with two large curved, pointed hooks which, owing to their transparence, and very slight protrusion are not easily detected; further, owing to their very brittle nature, they are often broken (pl. i, fig. 16).

The branchiae begin on the fourth segment where there are already 10-13 very large pairs. They are to be found up to the 14th, sometimes the 16th setigerous segment. Each branchia is composed of a number of stems coming out from the same point and resembling a gill of *Eunice*, that is, bearing, only on one side, a row of long simple or, more, rarely, furcate filaments.

The posterior abbranchiate region clearly contrasts with the anterior one. It is more slender, cylindrical rather than flattened, with 10-13 longer and more distinct segments, the last 2-3 of which are often much smaller than the others.

The dorsal and ventral rami, which are well apart, bear each a long dorsal cirrus and a ventral cirrus (pl. i, figs. 14-15). But on the second setigerous segment the ventral cirrus is wanting.

In the dorsal division there are large, stout, straight setae, smooth or with more or less conspicuous harpoon teeth (fig. 10, *a*, *b*). It is well known how easily glochidiate setae lose their teeth and ornaments in preservatives. With such setae are found mixed up long and slender capillary setae with a rather long narrow spur, diverging or sticking to the base of the other limb which ends in a long faintly serrated whip-like tip (fig. 10, *f*).

The ventral ramus bears long capillary setae like those of the dorsal ramus, and shorter, stouter setae with a marked enlargement, a short spur, and a rather thick limb boldly serrated on the internal margin (fig. 10, *c*, *d*). There are also short acicular setae with an elongate knob-like tip (fig. 10, *c*).

This species is to be referred to the genus *Paramphinome* Sars and has many features in common with *P. pulchella* Sars, from the Arctic Seas, coasts of Norway and Shetlands. *P. pulchella* is also a deep-sea species (100 to 600 fms.), without eyes, with branchiae beginning on the 4th segment and a pair of sigmoid hooks on the first. The Indian species, however, is readily distinguished by its larger size (15-20 mm., instead of 9), its more numerous (10-13 pairs, instead of 4-6) and much stouter branchiae, and its shorter and thicker caruncle. The number of segments does not differ much: 24-28 against 24-33, according to McIntosh (1900, p. 222, fig. 15, pl. xxxv, fig. 19, *a, b, c*), and the setae are nearly alike.

Habitat.—Arabian Sea.

Genus **BENTHOSCOLEX** Horst.

Body oblong oval, agreeing in general appearance with that of *Chloeia*. Caruncle short, with three parallel, longitudinal ridges. Eyes absent. Branchiae commencing on the 6th segment, strongly developed on the posterior segments. Furcate bristles. An unpaired anal cirrus (Horst).

Benthoscolex caecus Horst.

Benthoscolex caecus, Horst 1912, p. 38, pl. x, figs. 11-16.

"Investigator" Sta. 248, Laccadive Sea, 224-284 fms.; Sta. 465, S. of Ceylon, 109-132 fms.

Specific Characters.—Body tapering in front and behind. Prostomium small, heart-shaped, with a short caruncle, consisting of three longitudinal ridges, that do not extend beyond the first segment. *No eyes present*. A small median tentacle in front. Lateral tentacles, nearly as long as the median one, situated on each side of the median dorsal line. Cushion-like palpophores with tentacle-like palpostyles. An unpaired anal papilla, faintly emarginated and a subterminal dorsal anus. Well developed branchiae from the 6th segment, in dense clusters of numerous filaments (as in *Eurythoe*); on the 5th, 6th last segments they are more numerous, crossing over the back and forming large bushy terminal clusters. Dorsal cirri about the length of the setae, ventral cirri shorter, with the exception of the 3-4 last ones which are filiform, very long. Dorsal and ventral bundles of bristles stiff and alabaster-white. Ventral ramus with only bifurcated setae, as follows (1) with a long limb, plain or with 1-3 denticulations and a short limb, like a spine, and (2) much more slender setae with a long limb coarsely denticulated and a short limb like a spur. Dorsal setae alike, but fewer and shorter and mixed with harpoon-shaped ones.

The two specimens from Sta. 248 are complete and measure respectively 34 and 37 mm. in length and 10 mm. in breadth, 17 mm. with the bristles. One is a female full of eggs. Other specimens are smaller, and more or less damaged.

On the first setigerous segment, dorsal and ventral cirri are small and equal, and there are only a few short setae. On the second setigerous, dorsal and ventral rami are still short, whilst they are well developed on the third. The fourth setigerous segment occasionally bears a rudimentary gill reduced to a single small filament. On the fifth (6th of Horst ?) appears a small bifurcate gill and, on the sixth appear well developed gills in dense clusters of many filaments.

With the exception of these anterior rudimentary gills, the above specimens agree very well with Horst's description.

Habitat.—Flores Sea, Laccadive Sea, Ceylon.

Genus **CHLOEIA** Savigny.

Body oval, caruncle composed of a plaited crest, arising from a horizontal plate, folded along its margin.

Pinnated branchiae.—All bristles more or less bifurcated; the ventral ones smooth, those of the dorsal fascicle, in some anterior segments, smooth, in those of the posterior body-region, serrated along the outer border. Two anal cirri sausage- or finger-shaped. Anus in the last segment (Horst). Only one pair of dorsal cirri on each segment.

- | | |
|---|----------------------|
| 1. Back with median purple spots | 2 |
| Back without median spots | 4 |
| 2. Median dorsal spots more or less circular | <i>Ch. flava</i> . |
| Median dorsal spots not circular | 3 |
| 3. Median dorsal spots T- or Y-shaped | <i>Ch. parva</i> . |
| Median dorsal spots resembling an amphora | <i>Ch. amphora</i> . |
| 4. Uniformly reddish pink, without any dorsal pattern | <i>Ch. rosea</i> . |
| Back uniformly dark-coloured or with a couple of thin longitudinal purple stripes | <i>Ch. fusca</i> . |

Chloeia flava (Pallas).

Chloeia flava, McIntosh 1885, p. 8, pl. iii, figs. 1-3.

Chloeia flava, Horst 1912, p. 18, pl. vii, fig. 2.

Chloeia capillata, Milne-Edwards 1849, pl. ix.

Chloeia ceylonica, Grube 1874, p. 326.

"Investigator" Sta. 597, Bay of Bengal; Sta. 605, Bay of Bengal. Port Blair, Andamans; Mergui; Palk strait; Mandapam.

Specific Characters.—Median dorsal purple spots varying in shape from a narrow ellipse to a circle. Setae varying from almost pure white to a bright yellow or pale green. Tentacles and dorsal cirri more or less violet or deep purple. Branchiae unpigmented or brown. Caruncle extends posteriorly to the commencement of the fourth segment and ends with a free tapering extremity.

Large specimens from Port Blair were "caught on a fishing line, on hooks baited with meat" According to Izuka (1912, p. 225) "the food of this animal consists of small crabs and other living organisms"

One large specimen from Andamans has the left dorsal cirrus of the seventh setigerous segment trifurcated, three distinct cirrophores with normal cirrostyles arising from a common base.

Two large specimens from Mergui were labelled *Chloeia ocellata* Alc. (??). Their body, branchiae and ventral cirri were colourless. One showed deep-purple dorsal spots, rounded anteriorly, and more or less elongated posteriorly. The other had the anterior spots rounded, the following ones oval, more or less square, and the last ones elongated.

These specimens agree with Baird's *Chloeia pulchella* var. *pallida*, which is now regarded as a mere colour-variety of *Ch. flava*. According to Monro (1924, p. 72) it appears not improbable that *Ch. conspicua*, *Ch. amphora*, *Ch. violacea* Horst and *Ch. pulchella* Baird, *Ch. parva* Baird, and *Ch. macleayi* Haswell are colour-varieties of *Chloeia flava*.

Habitat.—Indian Ocean, Pacific, Japan.

Chloeia parva Baird.

Chloeia parva, Baird, 1870, p. 233, pl. iv, figs. 8, *a*, *b*.

Chloeia parva, Horst 1912, p. 19, pl. viii, fig. 4 ; pl. viii, figs. 1-3.

Chloeia merguiensis, Beddard 1887, p. 258, pl. xxi, figs. 2, 8, 9.

“ Investigator ” Sta. 341, Gulf of Oman ; Andamans, Port Blair ; Penang ; Vizagapatam ; Chandipore, Balasore, Orissa ; Sandheads, mouth of Hughli R.

Specific Characters.—Body tapering posteriorly. Along the centre of the back, on each segment, there is a dark mark in the shape somewhat of the Roman T, or rather the Greek Y. The caruncle extends up to the anterior part of the sixth segment and its crest is surmounted with a black wavy line.

On some specimens from Port Blair the dorsal spot is clearly T-shaped, whilst on others, from the same locality, it is rather triangular and agrees quite well with Horst's fig. 4, pl. vii.

Habitat.—New Guinea, Java, Sumatra, Mergui, Andamans, west coast of India.

Chloeia amphora Horst.

Chloeia amphora, Horst 1912, p. 21, pl. vii, fig. 6 ; pl. viii, figs. 6-7.

“ Investigator ” Sta. 614, Octavia Bay, Nankauri Harbour, 13 fms.; Port Blair, Andamans.

Specific Characters.—Each segment shows in the middle a violet spot, somewhat resembling a Roman *Amphora*, surrounded by a white band. The dorsal cirri are dark-violet, the ventral ones colourless. The caruncle bears about 20 lateral folds and extends up to the anterior border of the 4th segment (Horst).

All the specimens are small, but show the typical dorsal pattern very clearly.

Habitat.—Malay Archipelago, Andamans and Nicobar Islands.

Chloeia fusca McIntosh.

Chloeia fusca, McIntosh 1885, p. 14, pl. ii, figs. 1, 2.

Chloeia fusca, Potts 1909, p. 356, pl. xlv, figs. 1, 2.

Chloeia fusca, Horst 1912, p. 22, pl. vii, fig. 7.

Chloeia fusca, Monro 1924, p. 72.

“ Investigator ” Sta. 268, S. of Cape Comorin, 556 fms.; Sta. 614, Octavia Bay, Nankauri Harbour.

Specific Characters.—Back uniformly dusky brown or purple-violet, or pale ground-colour with a couple of longitudinal purple stripes near the dorsal middle line. Beneath each dorsal bundle of bristles is a purple ring shading off into orange ; the dorsal cirri are dark-purple.

The only specimen from Sta. 268 is uniformly deep purple-violet on the back ; with dark coloured dorsal cirri. The caruncle extends to the 5th segment. The setae are in a very bad condition.

The two small specimens from Sta. 614 agree very well with Horst's description and figures. The back is pale-coloured, with two longitudinal narrow stripes coloured deep-violet. The lateral orange-coloured crescentic markings are also conspicuous. The axis of the gills is orange-coloured in one specimen, lemon-yellow in the other.

Habitat.—Australia, China, Amirante Islands, Bay of Bengal.

Chloeia rosea Potts.

Chloeia rosea, Potts 1909, p. 357, pl. xlv, fig. 3.

"Investigator" Sta. 170, Bay of Bengal, 107 fms.; Sta. 242, Arabian Sea, 56 fms.; Sta. 345, Persian Gulf, 35 fms.; Sta. 395, off Tenasserim, Burma, 50 fms.; Sta. 544, 549 and 505, Bay of Bengal, 10 fms.; the Swatch, Bay of Bengal.

Specific Characters.—Body of a fusiform shape, of a uniform reddish pink colour, even the setae being of the same colour. The branchiae are exceptionally well-developed and overlap the middle line.

"It is very noticeable how closely this species adheres to the *C. fusca* type. The only differences from the original species are but trifling, viz., coloration, structure and arrangement of gills, and the absence of a single type of seta" (Potts).

The specimens from the Bay of Bengal are very plentiful and agree with Potts' description. It is probably a young form of *C. fusca*, or a colour-variety.

Habitat.—Amirante Islands, Persian Gulf, Bay of Bengal.

Genus **NOTOPYGOS** Grube.

Body oval. Caruncle composed of a plaited crest, arising from a horizontal plate, folded along its margin.

Branchiae ramified, not *pinnate*. An accessory dorsal cirrus at the proximal side of each branchia. All bristles bifurcated, smooth or denticulated. Two anal cirri, club-shaped. Anus dorsal, subterminal.

- | | | |
|---|---|------------------------|
| 1. A triangular brownish area on the back | . | <i>N. labiatus</i> . |
| A chequered pattern on the back | . | 2 |
| 2. Crest separated from the wings by a smooth linear pigmented area | | |
| on each side obscured under the lax folds of the wing | . | <i>N. hispidus</i> . |
| Smooth pigmented lateral area of the caruncle always to be seen | | <i>N. variabilis</i> . |

Notopygos labiatus McIntosh.

Notopygos labiatus, McIntosh 1885, p. 19, pl. ii, fig. 6; pl. iv, fig. 2; pl. iia, figs. 5, 6.

"Investigator" Sta. 237, Andaman Sea, 90 fms.; Sta. 258, Laccadive Sea, 102 fms.

Specific Characters.—Body large. On the dorsum a triangular brownish area indicates the middle line at the junction of each segment. Caruncle extending to the fifth body segment. Four large eyes. Bristles very long, stiff and erect. On the first setigerous segments only dorsal and ventral setae serrated, next ventral setae with 2-3 serrations, dorsal setae smooth. Anus dorsal on the 20th-21st segment.

Length: 20-40 mm. Breadth: 5-10 mm., setae included.

There is a number of specimens from Sta. 237 and a large one from Sta. 258 with large eyes more or less coalescent. The long straight, stiff bristles give them an appearance not unlike that of the caterpillars of *Macrothylacia rubi*, but the setae are alabaster-white.

Habitat.—Philippine Islands, Andamans, Laccadive Sea, Hawaiian Islands.

Notopygos hispidus Potts.

Notopygos hispida, Potts 1909, p. 359, pl. xlv, figs. 6, 7 ; pl. xlvi, figs. 3-5.

Notopygos hispidus, Horst 1911, p. 243.

Notopygos hispidus, Fauvel 1917, p. 192 ; 1919, p. 350 ; 1922, p. 493.

? *Notopygos labiatus*, Benham 1915, p. 205.

" Investigator " Sta. 702, 703, Nankauri Harbour, amongst coral.

Specific Characters.—Body elongate. On the dorsum an irregular chequered purple pattern. Caruncle extending to the fifth setigerous segment. The crest is separated from the wings by a smooth linear pigmented area on each side. The lax folds of the wings and crest often come into contact and obscure the area. This is characteristic of the species. Four large black eyes, sometimes almost contiguous. Dorsal setae non-serrated ; ventral setae serrated in first few segments only. Anus dorsal on the 21st segment.

The largest of the two specimens measures 24 mm. in length and 10 mm. in breadth, bristles included, and has 32 segments.

The back is irregularly chequered yellow-white and dark purple. The dorsal cirri are colourless, the cirrophores of the intermediate cirri are of a bright yellow with a purple ring at the base, the cirrostyles are colourless.

On the first setigerous segments, both dorsal and ventral setae are faintly serrated, as in the variety *serratus* Fauvel, 1917, p. 192.

This species and the following one are very likely mere varieties of *N. labiatus*, for the colour, as already noticed by Potts, is very liable to variation. The contractions alter the appearance of the caruncle and too much stress has been put on the serrations of the setae which are often obsolete or very faint.

Habitat.—Red Sea, Indian Ocean, Philippine Islands, Australia.

Notopygos variabilis Potts.

Notopygos variabilis, Potts 1909, p. 360, pl. xlv, fig. 9.

Notopygos variabilis, Fauvel, 1931, p. 9.

" Investigator " Sta. 665, Andamans.

Specific Characters.—Body fusiform. Dorsum sometimes ornamented with a pattern of orange spots, most specimens almost without pigment. The folded regions of the caruncle are separated on each side by a smooth pigmented area which is always to be seen. Four large eyes. Dorsal setae non-serrated, ventral setae serrated in first few segments only or sometimes a few in the ventral bundles of the middle segments with a couple of well marked serrations underneath the hooked apex of the longer limb. Anus dorsal, position segments varying from the 22nd to the 25th.

The specimen from the Andamans is 30 mm. long and 12 mm. broad, with the bristles. It has 29 setigerous segments and the anus lies on the back of the 22nd segment.

The dorsum is colourless. The caruncle agrees with Potts' description, but the stiff, erect, alabaster-white bristles are all smooth, both dorsal and ventral, even in the first setigerous segment, as in some of Potts' specimens.

The extensive variations already noticed by Potts suggest the idea that this species may be only a variety of *N. labiatus*.

Habitat.—Maldives, Andamans, Nankauri (Nicobars).

Genus **EUPHROSYNE** Savigny.

Body short, with few segments. Prostomium elongated and bending over the tip of the snout, partly ventral. Two pairs of eyes, one dorsal, the other ventral. Caruncle with three longitudinal, parallel lobes. A median tentacle and two small lateral ones. Two dorsal cirri on each side. A transverse row of several branchial tufts on each segment. Two cirri.

Tips of branchial divisions tapering

E. myrtosa.

Tips of branchial divisions expanded

E. foliosa.

Euphrosyne myrtosa Savigny.

Euphrosyne myrtosa, Savigny 1820, p. 64, pl. ii, fig. 2.

Euphrosyne myrtosa, Gravier 1901, p. 254, pl. x, figs. 147-149.

Euphrosyne myrtosa, Augener 1916, p. 95.

Euphrosyne myrtosa, Fauvel 1923a, p. 139, fig. 49, k-n; 1930a, p. 11, fig. 1, 1931, p. 8.

Sandy Point, Krusadai I., among rocks.

Specific Characters.—Body ovate, 36-43 segments. Median tentacle blunt, with a broad base. Lateral tentacles very small. 6-8 branchial tufts in each transverse row, with terminal divisions blunt or tapering, not enlarged. Transverse rows of dorsal furcate setae of two kinds: (1) with unequal smooth limbs, and (2) serrated "ringent" bristles. Ventral setae with straight, smooth unequal limbs.

The only small specimen (19 mm.) agrees with those already recorded from Krusadai and Pamban (Fauvel, 1930, p. 11).

Habitat.—Red Sea, Indian Ocean, Malay Seas, South Atlantic (Cameroon), Pacific Ocean (?); Adriatic Sea (?).

Euphrosyne foliosa Audouin & M. Edwards.

Euphrosyne foliosa, Fauvel 1919, p. 350, fig. 1 (Synonymy); 1923a, p. 136, fig. 49, a-g.

Euphrosyne laureata, Horst 1912, p. 11, pl. vi, fig. 10.

Euphrosyne laureata, Pruvot 1930, p. 25, fig. 2.

"Investigator" Sta. 622, Camorta Island, coral reef; Sta. 709, Nankauri Harbour, Nicobars; Pamban.

Specific Characters.—Body ovate, 30-36 segments. Median tentacle thick, cylindrical. Lateral tentacles very slender and shorter. 7-9 branchial tufts in each transverse row, with terminal divisions more or less expanded and hastate. Transverse rows of furcate dorsal setae of two kinds: (1) with unequal smooth limbs and (2) serrated ringent bristles. Ventral setae with smooth unequal limbs.

A single specimen from each station. With the exception of the specimen from Pamban, whose branchiae are in a bad state of preservation, all others agree with the European *E. foliosa*, which is perhaps synonymous with *E. laureata* Savigny, but many other species having been recorded from the Indian Ocean it is impossible to decide which species was described by Savigny.

Habitat.—Atlantic, Mediterranean, Red Sea, Persian Gulf, Indian Ocean, Bay of Bengal, Malay Archipelago.

Family HESIONIDAE Grube.

Head with two pairs of eyes, two or three tentacles and generally two biarticulate palps. Proboscis cylindrical, protrusible, armed or unarmed. Anterior segments (1-4) distinct, or more or less fused; each carrying two pairs of tentacular cirri. Other segments uni- or bi-ramous, the dorsal ramus being often reduced to dorsal cirrus and acicula. Dorsal bristles, when present, simple. Ventral setae generally compound.

1. Two tentacles. Palps absent	<i>Hesione</i> .
Three tentacles. Palps present	2
2. Two pairs of tentacular cirri. Setae simple	<i>Ancistrostylis</i> .
More than 2 pairs of tentacular cirri	3
3. Six pairs of tentacular cirri. Feet biramous. Proboscis unarmed	<i>Podarke</i> .
Eight pairs of tentacular cirri. Body short, cylindrical.	4
4. Dorsal setae present	<i>Leocrates</i> .
Dorsal setae absent	<i>Leocratides</i> . ¹

Genus **HESIONE** Savigny.

Body short, cylindrical. Prostomium bilobed. 4 eyes. 2 very small tentacles. Palp absent. Proboscis unarmed. 8 pairs of tentacular cirri (4 pairs on each side). Parapodia uniramous. Dorsal cirri long, articulate. Setae compound.

***Hesione pantherina* Risso.**

Hesione pantherina, Fauvel 1923a, p. 233, fig. 87 (Synonymy).

Hesione pantherina, Pruvot 1930, p. 27.

Hesione ehlersi, Gravier 1900, p. 175, pl. ix, figs. 14-15.

Hesione splendida, Augener 1913, p. 187 (Synonymy).

"Investigator" Sta. 615, Nankauri Island; Sta. 624, Coral Reef, Nankauri Island; Sta. 630, Nankauri Harbour; Andamans; off Little Andaman; G. Cocos Island, low tide; Inglis Island; off Chilka Lake, Orissa coast, 7-8 fms.; Kilakarai, from weeds; Koweit Harbour, between tide marks; 'Ain Musa, Gulf of Suez, shore collecting.

Specific Characters.—Body very slightly tapering backwards. Segments few (about 16 setigerous) distinct only on the sides. Proboscis smooth, with a large circular opening and a dorsal conical fleshy papilla near the base. Dorsal cirri long, with many short articles borne on a large cirrophore. Ventral ramus large, cylindrical, hollow, with black spines ending in two small retractile conical lobes. Ventral setae heterogomph, with a long sickle-shaped terminal piece, bidentate at the apex with a subapical spine very variable in length. Colour very variable, generally spotted or chequered, with brown rounded or elongated dots, often obsolete or wanting in alcoholic specimens.

Many specimens from Koweit, 'Ain Musa, and Andamans are entirely discoloured, whilst others still show quite conspicuously the colour pattern characteristic of the tiger or the panther.

Several species based on the different shapes and appearances of the colour pattern have been described, but these can be considered only as colour varieties.

¹ For more extensive keys, including other genera of the family, see Chamberlin (1919, p. 185), Horst (1921, p. 74) and Fauvel (1923, p. 232).

Chamberlin (1919, p. 189) and Monro (1926, p. 312) used "the shape of the apex of the chaetal blade and especially the relation of guard to the apical teeth" as likely to give valid specific characters. While using this relation as the basis for his classification, Monro classified the species of *Hesione* into three, or possibly, four groups. I am of opinion that the value of such a character has been overrated, for on specimens of *H. pantherina* from the Persian Gulf and other localities, I more than once found the three types of setae together in the same foot. The relation of guard to the apical tooth seems to vary very much with age and wear.

As many species of Indo-Pacific *Hesione* have been described, it is now impossible to ascertain definitely as to which of these *Hesione splendida* Savigny corresponds. It is, therefore, safer to retain the old name *H. pantherina* for the specimens which agree closely with this well-known and accurately described species.

Habitat.—Atlantic, Pacific and Indian Oceans, Mediterranean Sea.

Genus **LEOCRATES** Kinberg.

Body short, cylindrical, segments few. Prostomium bilobed. 4 eyes. 3 tentacles, Two biarticulate palps. Proboscis with a chitinous jaw in the mid-dorsal and mid-ventral lines. 8 pairs of tentacular cirri. Parapodia biramous. Dorsal ramus small. Dorsal setae simple. Ventral setae compound. Dorsal cirri long, articulate.

Upper jaw-plate composed of two pieces

L. diplognathus.

Upper jaw-plate single

L. claparedii.

Leocrates claparedii (Costa).

Leocrates claparedii, Fauvel 1923a, p. 237, fig. 88; 1930, p. 12.

Leocrates giardi, Gravier 1900, p. 180, pl. x, figs. 17-19.

(?) *Leocrates chinensis*, Kinberg 1857-1910, p. 57, pl. xxiii, fig. 7.

(?) *Leocrates iris*, Grube, 1878, p. 105.

Leocrates spec., Gravelly, 1917, pl. ix, fig. 5.

"Investigator" Sta. 593, Paway I., Bay of Bengal, shore collecting; Sta. 665, Outram Island, Andamans; Sta. 703, Nankauri Harbour; Ceylon Pearl Bank; Koweit Harbour; 'Ain Musa, Gulf of Suez.

Specific Characters.—Median tentacle short, subulate. Lateral tentacles slender, slightly longer than the palps. Facial tubercle large, blunt, more or less acorn-like. Upper jaw-plate single, hooked. Dorsal setae capillary, spinous. Ventral setae with a bidentate sickle-shaped terminal piece.

The above specimens, preserved in alcohol, are discoloured and many are in a poor condition.

As previously stated (Fauvel, 1930, p. 13), this species is very likely synonymous with *L. chinensis* Kinberg, but Kinberg's description is so short and incomplete that it may apply to any species of *Leocrates*.

Habitat.—Mediterranean and Red Seas, Persian Gulf, India, Philippine Islands, China (?).

Leocrates diplognathus Monro.

Leocrates diplognathus, Monro 1926, p. 313, figs. 1, 2.

"Investigator" Sta. 535, Mergui Archipelago, 65 fms.

Specific Characters.—Paired tentacles about twice as long as the palps, which are furnished with very stout basal articles. Facial tubercle more or less conical and not very prominent. The anterior and larger pair of eyes, which are not clearly marked out, arise on a level with the unpaired tentacle. Behind the posterior median furrow the prostomium curves back in a remarkable wing-like pair of folds. The upper jaw-plate is composed of two pieces set together in the form of a bifid fan. Dorsal setae with well marked spines. In the ventral setae the teeth of the blade are large and widely separated. The lamelliform guard approaches the subapical tooth. Dorsum a dark chestnut-brown traversed by intersegmental bands of white.

The two specimens agree closely with Monro's description, both in colour and the shape of the upper jaw-plate. On one of them two elongated, sinuous, white ridges, behind the prostomium (Monro's "wing-like folds") are the everted nuchal organs.

This species is very closely allied to *L. atlanticus* McIntosh from the Atlantic.

Habitat.—Macclesfield Bank, China Sea; Mergui.

Genus **LEOCRATIDES** Ehlers.

Differs from *Leocrates* in the absence of setae in the dorsal ramus which is reduced to an aciculum at the base of the dorsal cirrus.

Leocratides ehlersi (Horst).

Leocrates (Leocratides) ehlersi, Horst 1924, p. 194, pl. xxxvi, figs. 10-12.

"Investigator" Sta. 237, Andaman Sea, 90 fms.; Andamans, 60-250 fms.

Specific Characters.—Prostomium heart-shaped. Two pairs of eyes, the anterior larger. Median tentacle tapering. The frontal tubercle bears on each side, between the base of the palps and tentacular cirri, a cushion-shaped appendage. The dorsal jaw is double, each half consists of a long shaft with an expanded anterior plate. Ventral jaw simple, conical. Parapodia uniramous, only a couple of minute acicula in the base of the dorsal cirrus. Terminal blade of the ventral setae short, hook-shaped, slender with only a single tooth and lacking the secondary process beneath the bifid tip.

Leocratides ehlersi differs from *L. filamentosus* Ehlers only in having a double dorsal jaw.

On one of the two specimens from the Andamans the upper jaw, at first sight, appeared simple, but after dissection of the proboscis, it proved to be double, as described by Horst. On the other specimen, with the proboscis fully extruded, the jaw-plates are very transparent and the fold between their bases could be mistaken for a single jaw on casual inspection.

The uniramous feet and ventral setae agree with *Dalhousiella*, but the proboscis of that genus is unarmed.

According to Horst, the absence of setae in the dorsal ramus is not sufficient to erect a new genus, and he considers *L. filamentosus* and *L. ehlersi* as distinct species of *Leocrates*.

Both these species, however, agree more closely with *Dalhousiella* in the structure of their feet and setae, while their jaws resemble those of *Leocrates*, and I, therefore, agree with Ehlers that these two species should be placed in a distinct genus.

Habitat.—Saleh Bay, Sumbawa; Andamans.

Genus **PODARKE** Ehlers.

Prostomium quadrangular, with three tentacles on its anterior margin. Two biarticulate palps. Four eyes. Proboscis unarmed, with or without filiform papillae. 6 pairs of tentacular cirri. Feet sub-biramous. Dorsal cirri long. Dorsal setae few, often bifurcated. Ventral setae compound.

Podarke angustifrons (Grube.)

(Text-fig. 11).

Podarke angustifrons, Fauvel 1919, p. 371 (Synonymy).*Podarke angustifrons*, Horst 1924, p. 191.*Irma angustifrons*, Grube 1878, p. 108, pl. iv, fig. 7; pl. xv, fig. 12.*Irma latifrons*, Grube 1878, p. 109, pl. vi, fig. 6; pl. xv, fig. 11.(?) *Irma limicola*, Willey, 1905, p. 267, pl. iii, figs. 74-76.

"Investigator" Sta. 622, Camorta Island, rock from shore, inside the reef; Pamban, from oral surface of *Pentaceros*.

Specific Characters.—Prostomium more or less rectangular. Small palps. Median tentacle fusiform, small. Proboscis with numerous long cilia on the anterior margin. Long smooth or faintly ringed dorsal cirri. 2-3 very small furcate dorsal setae with long unequal limbs. Ventral ramus stout with a conical lobe and a shorter one rounded. Ventral cirrus subulate, short (fig. 11, *a*). Ventral setae with a long and slender or a short and broad terminal piece ending in a hook with a subapical spine (fig. 11, *b, c*). Furcate setae (fig. 11, *d*). In life, brown with white rings.

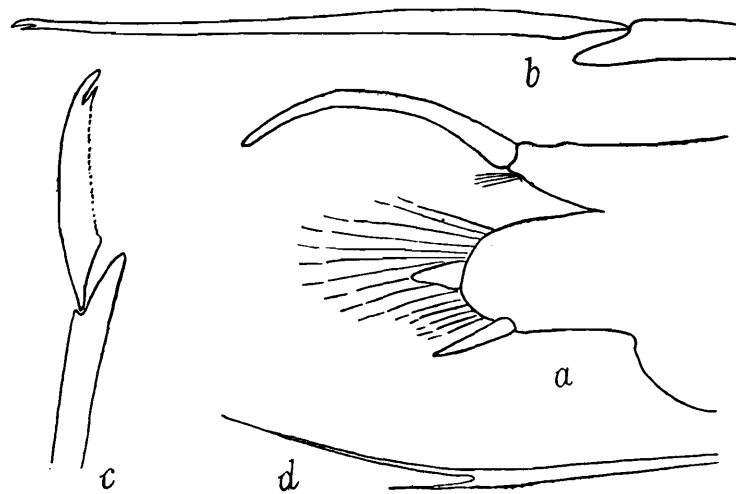


FIG. 11.—*Podarke angustifrons*: *a*. foot. $\times 35$; *b*. long compound bristle. $\times 380$; *c*. short compound bristle. $\times 380$; *d*. forked bristle. $\times 520$.

The single specimen from Pamban is 15 mm. long and 117 mm. broad.

Augener (1913, p. 189) has demonstrated the identity of *Irma angustifrons* and *I. latifrons* Grube by the discovery of a few slender setae at the base of the dorsal cirrus. Thus there is no justification to distinguish *Irma* from *Podarke*, which has priority.

Monro does not consider that Augener is justified in identifying *I. latifrons* with *I. angustifrons*, the prostomium being much broader in the former and the setal blades more slender. But the shape of the prostomium varies greatly according as the proboscis is

extruded or retracted. In the former case it is more than twice as broad as long, whilst it is the reverse in the latter. As regards setal blades, very large and slender ones, as also short and broad ones, may be observed on the same specimen, as shown on fig. 11, *b. c.*

Habitat.—Philippine Islands, Celebes, Bay of Bengal, Ceylon, Persian Gulf, Red Sea, Australia, New Zealand.

Genus **ANCISTROSYLLIS** McIntosh.

Body elongated. Prostomium small. Eyes small or wanting. Three tentacles. Large ovoid palps with very small palpostyles. Proboscis unarmed. Two pairs of tentacular cirri. Dorsal ramus reduced to a cirrus, a slender enclosed aciculum and a stout spine straight or curved. Ventral ramus short, with a bundle of simple capillary setae and, sometimes, a few furcate setae. A long ventral cirrus.

Body rounded, stiff. Head very small, retracted into the first segments. Dorsal spines straight

A. rigida.

Body flat, soft. A distinct neck about the fourth segment. Head larger. Dorsal spines curved . . .

A. constricta.

Ancistrostylis rigida Fauvel.

Ancistrostylis rigida, Fauvel, 1919, p. 373, fig. 4; 1923*b*, p. 16, fig. 3.

Ancistrostylis rigida, Augener 1927*c*, p. 134; 1927*d*, p. 50.

Kynephorus inermis, Ehlers 1920, p. 27; pl. iii, figs. 1-9.

Andamans, 17 fms.; Seven Pagodas, Madras coast, 5-10 fms.; off Black Pagoda, Orissa Coast, 11 fms.

Specific Characters.—Body stiff, rounded dorsally. Head very small, retracted into the first segments. Palps ovoid, with a very short palpostyle and a small papilla. Median tentacle inserted between the palps, lateral tentacles very small, inserted on the palpophores. 4 very small eyes. Parapodia borne on lateral square cushions. Dorsal and ventral cirri fusiform. Dorsal ramus reduced to 1-3, slender enclosed acicula, and a large blunt, faintly curved, or straight spine from the 15-20 setigerous segment backwards. Ventral setae capillary, winged, and with 1-2 furcate setae. Two anal cirri.

The general appearance is wiry and the body seems abruptly truncated forwards owing to the retraction of the head which may even be easily overlooked. The colour is generally a pale yellow with reddish rounded spots between the feet, but it is somewhat variable.

According to Augener (1927), who investigated specimens from Curaçao and from New Pomerania, *Kynephorus inermis* Ehlers from Java is a synonym of his *A. rigida*.

Habitat.—Red Sea, Indian Ocean, East Coast of India, Andamans, Java, New Pomerania, Pacific Ocean, Gambier Islands, Atlantic Ocean, Curaçao.

Ancistrostylis constricta Southern.

Ancistrostylis constricta, Southern 1921, p. 573, pl. xix, fig. 1.

Vizagapatam, Bottom of Channel.

Specific Characters.—Greatest width at the anterior end, a distinct neck at the 4th setigerous segment after which the body becomes flat. Peristomium and three anterior segments longer than the succeeding ones. Flattened palps with a small palpostyle.

Median tentacle twice as long as the laterals which project a little beyond the palps. Dorsal cirri of the first setigerous segment very long and tapering. An enclosed dorsal slender aciculum, and between the 30th and 40th feet, a stout sickle-shaped seta. Minute papillae on the base of the dorsal cirrus. Ventral setae capillary, smooth or faintly serrated and, in the anterior feet, shorter and coarsely serrated setae.

The specimen from Vizagapatam agrees with Southern's description.

This species is readily identified by its flattened soft body with a kind of neck, its rather long tentacles and its stout sickle-shaped dorsal spines.

The extruded proboscis is covered with soft low papillae and round the opening there is a row of larger conical papillae set as in *Nephtys*.

The ventral cirri are subulate and much shorter than the dorsal ones.

Habitat.—Chilka Lake, Vizagapatam.

Family TOMOPTERIDAE Grube.

Pelagic Polychaeta. Body translucent, divided into three parts ; head, trunk and tail. Two diverging tentacles. One anterior pair of cirri armed with a very long acicular bristle. The other feet biramous and achaetous, with foliaceous margin bearing chromophil glands, hyaline glands or rosettes. Proboscis unarmed.

Genus **TOMOPTERIS** Eschscholtz.

Both divisions of the parapodia more or less conical, skirted all round by a membranous wing or pinnule.

Rosettes present, hyaline glands absent	.	.	.	Sub-genus <i>Johnstonella</i> .
Rosettes absent, hyaline glands present	.	.	.	Sub-genus <i>Tomopteris</i> .

Tomopteris mortenseni Augener.

Tomopteris mortenseni, Augener 1927*d*, p. 123, fig. 5.

"Investigator" Sta. 670, Arabian Sea, 200 fms. to surface.

The body of this specimen is provided with a tail which is in a bad condition. The number of feet preceding the tail is 19. The pinnules (wings) skirt the parapodia all round, and are more or less frilled, and bear very large chromophil glands from the fourth foot backwards, with a red spot at their distal end. There is no small pair of processes (?) before the large one bearing the acicular bristles which are longer than the body. The two big eyes are fairly apart. The nuchal organs are short, triangular. The funnel-shaped proboscis has a thick circular rim. Though the bad condition of the feet does not allow of a careful study of the glands, the specimen appears to agree fairly with Augener's species.

Habitat.—South Australia ; Arabian Sea.

Tomopteris sp.

"Investigator" Sta. 462 ; Sta. 463, Sta. 607, Bay of Bengal ; Off Chittagong.

The bad condition of the above specimens does not allow of accurate identification.

The specimen from Sta. 462 is a large form, 40 mm. long and 15 mm. broad, tailless (?), with a pair of bristles longer than the body.

The worm from Sta. 463 is still larger, 75 mm. long and 15 mm. broad, with traces of a broken tail (?) and bristles longer than the body. But the rim around the parapodia is in a very bad condition and the glands are not at all distinct. It may be *T. carpenteri* Quatre-fages, a big species from the South Pacific (?).

The small specimens from Sta. 607 and off Chittagong are too macerated to be identified.

Tomopteris (Johnstonella) aloysii-sabaudiae Rosa.

Tomopteris (Johnstonella) Aloysii-Sabaudiae, Rosa 1908, p. 274, pl. xii, figs. 3-6.

"Investigator" Sta. 670, Arabian Sea, 200 fms. to surface.

I refer, somewhat doubtfully, to Rosa's species, a small *Tomopteris*, 15 mm. long, with a small pair of anterior cirri, second pair with bristles about the length of the body, 24 pairs of parapodia, tail rather long, with rudimental parapodia.

The parapodia have chromophil glands, rosettes as small brown spots and a pointed sting at the lower side. Hyaline glands are lacking. It differs from Rosa's typical specimens in having a first pair of small cirri, but according to Rosa, in young specimens, a circular scar appears to be the base of a fallen cirrus.

The specimen also appears to be allied to *Tomopteris (Johnstonella) australiensis* Augener (1927, p. 127).

Habitat.—West Coast of Mexico, Arabian Sea.

Family TYPHLOSCOLECIDAE Uljanin.

Pelagic Polychaeta, body cylindrical or fusiform, transparent. Prostomium pointed. Nuchal organs projecting. Dorsal and ventral cirri foliaceous. Parapodia very small with only an aciculum and a few small acicular bristles. Anal cirri foliaceous.

Genus **TRAVISIOPSIS** Levinsen.

Prostomium conical, ending in a more or less sharp tip. A large caruncle encircled with two prominent elongated pads (nuchal organs). Dorsal and ventral cirri far apart. A retort-shaped organ in the head.

Travisiopsis lobifera Levinsen.

Travisiopsis lobifera, Levinsen 1885, p. 336, pl. i, figs. 17-20.

Travisiopsis lobifera, Fauvel 1916, p. 73; 1923, p. 229, fig. 86.

Travisiopsis lobifera, Southern 1911, p. 33, pl. i, fig. 4.

(?) *Plotobia simplex*, Chamberlin 1919, p. 155, pl. lxvi, fig. 1.

"Investigator" Sta. 670, Arabian Sea, 200 fms. to surface.

The tip of the prostomium is short. The caruncle is an oval pad encircled by the nuchal organs which are two elongated cushions projecting backwards, not as far as in *T. lanceolata*, as figured by Southern (1911, pl. 1, fig. 3), but somewhat more than in *T. lobifera*, as figured on pl. i, fig. 4. The anterior ends of the nuchal pads do not meet before the caruncle.

The dorsal and ventral cirri are heart-shaped, the latter rather lanceolate.

In the shape of the caruncle, this specimen agrees with *Tr. lobifera*, but the length of the nuchal pads is intermediate between that of *Tr. lobifera* and *Tr. lanceolata*. It may be subject to variations or perhaps influenced by the contraction of the head.

The shape of the cirri agrees with *Tr. lobifera*, whilst in *Tr. lanceolata* they are different, roughly square in outline; with a deep indentation near the area of attachment.

The number of the segments is 21.

Chamberlin (1919, p. 155) described, under the name of *Plotobia simplex*, a Polychaete from the vicinity of Galapagos and Paumotu Islands which fairly agrees with the above specimen in the shape of the prostomium, caruncle, nuchal organs and cirri, but which does not appear to differ materially from *Travisiopsis* and especially from *Tr. lobifera*, the tip of the prostomium being only more filiform and the nuchal organs slightly more elongated.

Habitat.—Atlantic Ocean, Arabian Sea, Pacific Ocean (?).

Family PHYLLODOCIDAE Grube.

Body generally long and slender, segments very numerous. Prostomium conical, oval or heart-shaped. 2 eyes. Four or five tentacles. Proboscis unarmed. Segments 1-3 modified, bearing tentacular cirri. Feet uniramous (exceptionally biramous). Dorsal and ventral cirri foliaceous. Setae compound.

1. Parapodia biramous	<i>Paralacydonia</i> .
Parapodia uniramous	2
2. Body short. Cirri small. Pelagic	<i>Lopadorhynchus</i> .
Body slender. Cirri large	3
3. Two pairs of tentacular cirri	<i>Eteone</i> .
Four pairs of tentacular cirri	4
4. Four tentacles	<i>Phyllodoce</i> .
Five tentacles .	<i>Eulalia</i> .

Genus PHYLLODOCE Savigny.

Body very long and slender, segments very numerous. Prostomium oval or heart-shaped. Four tentacles. Proboscis long and papillose. Four pairs of tentacular cirri borne on three more or less distinct segments. Parapodia uniramous. Dorsal and ventral cirri large, foliaceous. Setae compound.

1. Prostomium rounded. Dorsal cirri red	<i>Ph. castanea</i> .
Prostomium heart-shaped	2
2. Tentacles and tentacular cirri short and ovoid	<i>Ph. quadraticeps</i> .
Tentacles and tentacular cirri subulate	3
3. Numerous and irregular rows of small papillae on the base of the proboscis	4
Papillae on the base of the proboscis arranged in six longitudinal rows on each side	5
4. Dorsal cirri lanceolate	<i>Ph. gracilis</i> .
Dorsal cirri sub-rhomboidal	<i>Ph. malmgreni</i> .
5. Dorsal cirri lanceolate	<i>Ph. tenuissima</i> .
Dorsal cirri lanceolate-falcate	<i>Ph. madeirensis</i> .

Phyllodoce castanea (Marenzeller).

Carobia castanea, Marenzeller 1879, p. 127, pl. iii, fig. 2.

Phyllodoce castanea, Fauvel 1919, p. 359 (Synonymy).

Carobia castanea, Willey 1905, p. 262.

Carobia castanea, Izuka 1912, p. 199, pl. xxi, fig. 3.

Genetyllis castanea, Bergström 1914, p. 158, fig. 53.

Tuticorin Pearl Bank, 12 miles from shore.

Specific Characters.—Prostomium oval or rounded. Tentacular cirri more or less flattened. Dorsal cirri very large, cordate, those on anterior parapodia broader, more rounded than the posterior ones. Ventral cirri reniform. Colour deep red, rusty or chestnut-brown in alcohol.

One of the two specimens is still coloured deep brownish red. In the other the large heart-shaped dorsal cirri are yellowish, thickly dotted with orange-vermilion spots as also the body itself and the ventral cirri.

Habitat.—Red Sea, Persian Gulf, Ceylon, Japan, California, Australia, New Zealand.

Phyllodoce quadraticeps Grube.

Phyllodoce quadraticeps, Grube, 1878, p. 98, pl. vi, fig. 2.

Phyllodoce quadraticeps, Gravier 1900, p. 198, pl. x, figs. 22-24.

Phyllodoce quadraticeps, Fauvel 1930, p. 511.

Sphaerodoce quadraticeps, Bergström 1914, p. 154, fig. 50.

“Investigator” Sta. 618, Camorta Island, Nicobars. Shore collecting.

Specific Characters.—Prostomium nearly square, with a small posterior notch and a very minute occipital papilla. Short knob-like tentacles. Tentacular cirri of the three anterior pairs short, swollen, ovoid, those of the fourth pair subulate. Dorsal cirri thick, rounded, rather small.

The single specimen, long, slender, much coiled, is about 200 mm. in length and only 2-3 mm. broad.

The back appears very dark. It is indeed of a dirty yellow with, on each segment, a broad dark-coloured transverse streak. The thick dorsal cirri are pale yellow, as also the smaller ventral cirri.

It agrees closely with the specimens from New Caledonia which I have examined.

Habitat.—Red Sea, Bay of Bengal, Philippine Islands, New Caledonia, Korea-Sund.

Phyllodoce malmgreni Gravier.

Phyllodoce malmgreni, Gravier 1900, p. 207, pl. x, figs. 29-31.

Phyllodoce malmgreni, Fauvel 1919, p. 360.

Vizagapatam, farther end of the creek, beyond the Ferry.

Specific Characters.—Prostomium heart-shaped. Tentacular cirri long subulate. Papillae of the base of the proboscis more or less conical, scattered in numerous irregular longitudinal rows. Dorsal cirri subrectangular or subrhomboidal.

In the specimen from Vizagapatam, the back is yellowish, with a dark spot on each segment. It was “green in life, with double rows of black spots.” The dorsal cirri, rather variable in shape, are subrectangular, with a conspicuous longitudinal ciliated streak. The

base of the extruded proboscis is covered with many longitudinal rows of 10-15 close-set conical papillae, sometimes a little flattened and alternating. The proboscis of *Ph. lineata* Saint-Joseph is similar, but the cirri are different.

Habitat.—Red Sea, India.

(?) **Phyllodoce gracilis** Kinberg.

(Text-fig. 12.)

Phyllodoce gracilis, Kinberg 1857-1910, p. 55, pl. xxii, fig. 3.

Andamans.

Specific Characters.—Prostomium heart-shaped. Two large eyes. Tentacular cirri long, subulate. Base of the proboscis covered with numerous scattered small papillae. Dorsal cirri small, oval.

I refer to *Ph. gracilis*, somewhat doubtfully, a long slender, much coiled specimen, about 25-30 mm. long and 1 mm. broad. Discoloured in alcohol, it is now greyish-white, with the exception of the dorsal and ventral cirri which are thickly dotted with rusty brown spots.

On the prostomium, which is bluntly rounded anteriorly, lie two large oval red eyes inserted somewhat laterally.

The few left tentacular cirri reach to the 15-16th setigerous segment. The first and second segment are coalescent, the third distinct. Setae are present on the 2nd and 3rd tentacular segments.

The retracted proboscis could not be examined. The dorsal cirri are rather small, inserted on a large cirrophore raised above the foot (fig. 12, *c. b.*). These cirri are ovate-elongate, nearly lanceolate and contain a number of small balls of dark brown pigment (fig. 12, *d. e.*). The ventral cirri are similar, but smaller, though they are longer than the foot (fig. 12, *f. g.*). The setae are typical (fig. 12, *d.*).

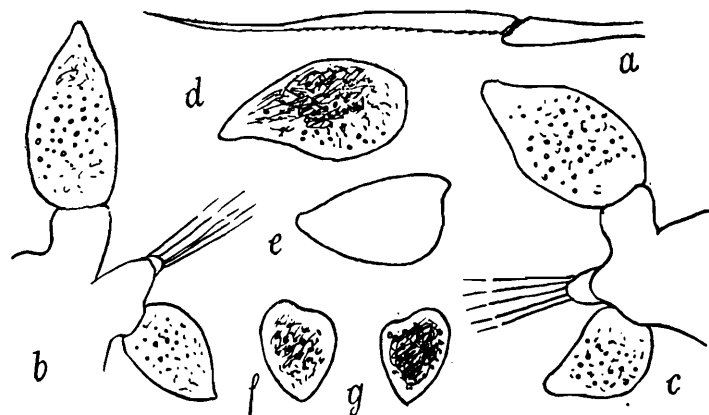


FIG. 12.—*Phyllodoce gracilis*: a. bristle. $\times 520$; b. c. feet. $\times 65$; d. e. dorsal cirri. $\times 65$; f. g. ventral cirri. $\times 65$.

Augener (1913, p. 127, pl. ii, fig. 13) described *Ph. ovalifera* from Australia, which is doubtfully considered as synonymous with *Ph. gracilis* Kinberg.

It agrees tolerably well with the above specimen, but its dorsal cirri are more rounded.

As I could not examine the proboscis without cutting up the unique specimen, the identification must remain doubtful.

Habitat.—Society Islands, Andamans, Australia (?).

Phyllodoce madeirensis Langerhans.

Phyllodoce madeirensis, Langerhans 1879, p. 307, pl. xvii, fig. 44.

Phyllodoce madeirensis, Fauvel 1914 b, p. 111, pl. vi, figs. 5-13; 1919, p. 361, fig. 2 (Synonymy); 1931, p. 10.

Phyllodoce sancti-vincentis, McIntosh 1885, p. 166.

Phyllodoce sancti-josephi, Gravier 1900, p. 196, pl. x, figs. 20-21.

"Investigator" Sta. 175, N. E. of Ceylon, 28 fms.; Sta. 386, Laccadive Sea; Sta. 360 fms., Andamans; off Little Andaman; Mergui Archipelago, 2 fms.; Malacca Straits.

Specific Characters.—Body slender with a long tapering tail. Prostomium heart-shaped, with an occipital papilla. Proboscis with 12 longitudinal rows (6 on each side) of papillae at the base (subgenus *Anaitides*) and, sometimes, a dorsal median row of 4-6 papillae. Dorsal cirri oval, lanceolate or subrhomboidal, very variable in shape. Ventral cirri longer than the foot. Discoloured in alcohol or light brown.

The median dorsal row of a small number of papillae at the base of the proboscis, often mentioned as a characteristic of the species, is far from constant. As already noticed in specimens from the Atlantic, the Mediterranean and the Red Sea, many examples, otherwise typical, are destitute of such median papillae or have only faint indications of them.

The very extensive variability in the shape of the dorsal cirri has led to a confusing synonymy. As such variations are met with in several feet of a single individual (Fauvel, 1914 and 1919, p. 363) the shape of the cirri cannot be considered to be a specific character. The specimen from Malacca Straits labelled *Ph. macrolepidota* Willey (synonymous with *Ph. tenuissima* Grube) has not the colour characteristic of the latter, and is a typical *Ph. madeirensis*.

The cirri of the specimen from Sta. 175 are more lanceolate, as in *Ph. sancti-josephi* which is only a form with sharper cirri, but the posterior cirri are subrhomboidal.

Augener and Willey retain the name *Ph. sancti-josephi* but it is a synonym of *Ph. madeirensis*, which has priority. In view of numerous intermediate grades I do not believe that the former could even be regarded as a variety of the present species.

Habitat.—Atlantic Ocean, Mediterranean, Red Sea, Persian Gulf, Arabian Sea, Bay of Bengal, Philippine Islands, Malay Archipelago, Australia.

Phyllodoce tenuissima Grube.

Phyllodoce tenuissima, Grube 1878, p. 95.

Phyllodoce tenuissima, Augener 1927a, p. 118.

Phyllodoce macrolepidota, Willey (non Schmarda) 1905, p. 265, pl. iii, figs. 70-71.

(?) *Phyllodoce fristedti*, Bergström 1914, p. 152, fig. 49.

"Investigator" Sta. 474, Nicobar Islands, shore collecting.

Specific Characters.—Body very long and slender. Prostomium heart-shaped. Two large eyes. A very small occipital papilla. Proboscis with 12 longitudinal rows of papillae at the base and a dorsal median row of three brown papillae. Dorsal cirri broadly lanceolate, or with the apex truncate, subquadrangular. Ventral cirri about the length of the foot. In life, "bright green, with red and yellow markings"; in alcohol, yellowish with transverse dark-blue iridescent streaks. Dorsal cirri reticulated with dark pigment.

Willey (1905, p. 265) has already noticed the resemblance of this species to *Ph. madeirensis*. The proboscis is similar, and the cirri, despite their variability, are of the same shape.

The only marked differences are a more uniformly slender body and the colouration of the back and of the cirri.

It is probably only a colour variety of the widespread and variable *Ph. madeirensis*.

Habitat.—Philippine Islands, Nicobar Islands, Ceylon, South Australia, New Zealand.

Genus **EULALIA** Oersted.

Body long and slender, segments numerous. Prostomium conical oval or piriform. Two eyes. Five tentacles. Proboscis long and papillose, rarely smooth. Four pairs of tentacular cirri, borne on three more or less distinct segments. Parapodia uniramous. Setae compound.

Dorsal cirri heart-shaped		<i>E. albo-picta</i> .
Dorsal cirri lanceolate		<i>E. magalhaensis</i> .

Eulalia albo-picta Marenzeller.

Eulalia albopicta, Marenzeller 1879, p. 128, pl. iii, fig. 3.

Eulalia albo-picta, Izuka 1912, p. 207.

“Investigator” Sta. 614, Nankauri Harbour.

Specific Characters.—Prostomium broader than long. Median tentacle arising from the middle of the dorsal surface of the prostomium, somewhat longer than the paired ones. Two large round eyes. First pair of tentacular cirri borne on the 1st segment, second and third pairs borne on the 2nd which has a pair of rudimentary parapodia with bristles, fourth pair borne on the 3rd segment. Dorsal cirri cordate with sharply pointed tips and broad bases in anterior segments; they become lanceolate in the posterior part of the body. Ventral cirri cordate, much smaller than the dorsal, shorter than the foot. Irregular transversely elongate white spots on the dorsum.

The single specimen is a female full of eggs.

The back is arched, dark, and has white patches.

The ventral tentacular cirri of the first pair are somewhat flattened, as is often the case with mature *Eulalia viridis*, but they are not foliaceous as in *Pterocirrus*.

The specimen is about 20 mm. in length and about 3-4 mm. in breadth, setae included. It is a little incomplete behind and consists of about 50 segments.

It agrees with the descriptions of Marenzeller and Izuka, but it is broader, owing to the large number of eggs in the body.

Habitat.—South Japan, Nicobar Islands.

Eulalia (Pterocirrus) magalhaensis Kinberg.

Eulalia magalhaensis, Kinberg 1857-1910, p. 55, pl. xxxiii, fig. 1.

Eulalia magalhaensis, Fauvel 1919, p. 364, fig. 3 (Synonymy).

Steggoa magalhaensis, Bergström 1914, p. 129, fig. 35.

Eulalia tenax, Grube 1878, p. 99, pl. vi, fig. 3.

Pterocirrus brevicornis, Ehlers 1904, p. 17, pl. ii, figs. 10-12.

Pterocirrus ceylonicus, Michaelsen 1892, p. 13, figs. 7, 8.

Pterocirrus ceylonicus, Willey 1905, p. 266.

Pterocirrus ceylonicus, Fauvel 1918, p. 336.

Steggoa brevicornis, Augener 1927a, p. 120.

Mergui Archipelago, 2 fms.

Specific Characters.—Prostomium oval. Two large eyes. Tentacles subequal, longer than the prostomium. Three tentacular segments distinct. Ventral cirrus of the second tentacular pair flattened and winged. Proboscis covered with small papillae. Dorsal cirri elongated, lanceolate. Ventral cirri short and blunt. Colour in alcohol dark greenish brown.

In the specimen from Mergui the dorsal cirri are sharply lanceolate, as in *E. tenax*, but, as noticed by Willey, they are broader in Michaelsen's figure.

This species is liable to a great deal of variation in the shape of the cirri and the flattening of the tentacular cirrus.

Bergström and Augener do not acknowledge the identity of *Pt. brevicornis* and *Pt. ceylonicus* and class them into two different genera: *Steggoa* and *Sige* (*Pterocirrus*). I have already discussed this point (1919, p. 366) and cannot agree with these authors, the arguments based on the formula of the tentacular segments being very questionable.

In the above specimen, the extruded proboscis is half torn, which gives to the base a smooth appearance which has often deluded authors dealing with such injured *Eulalia*.

The three tentacular segments are clearly distinct and the ventral tentacular cirrus is flattened, as in my specimens from the Red Sea, Persian Gulf and Australia.

Habitat.—Red Sea, Persian Gulf, Ceylon, Bay of Bengal, Philippines, Australia, New Zealand, South Pacific.

Genus **ETEONE** Savigny.

Body linear, segments numerous. Prostomium triangular, with four small tentacles on the anterior truncate border. Generally two small eyes. Two pairs of tentacular cirri. Dorsal cirrus absent on the second setigerous segment. Proboscis smooth, or with soft papillae and small chitinous tubercles. Dorsal and ventral cirri foliaceous. Setae compound.

Proboscis smooth or with soft papillae (Subgenus *Eteone*).

E. barantollae.

Proboscis with lateral rows of large soft papillae and small spinous tubercles (Subgenus *Mysta*).

E. ornata.

Eteone barantollae, sp. nov.

(Text-fig. 13.)

Banks of the canal near Barantolla, Salt-water Lakes (near Calcutta) Sta. XI.

Specific Characters.—Body filiform, subcylindrical, segments very numerous. Prostomium broader than long, notched on each side. Two very small black eyes. Four small short knob-like tentacles. Proboscis smooth and transparent at the base, and with five longitudinal rows of large, soft, depressed, rounded or squarish papillae anteriorly. The median dorsal row is broader than the lateral ones which are parted, on the ventral side, by a smooth longitudinal stripe. Two pairs of tentacular cirri subulate, somewhat lanceolate and flattened; the ventral larger than the dorsal, reaching backwards to the 4th segment. On the second segment, a setigerous foot, a ventral cirrus, but *no dorsal cirrus*. Average dorsal cirri small, rather thin, rounded or semi-oval, more or less symmetrical, borne on a large and short cirrophore. Feet conical, elongate. Ventral cirri conical or oval, relatively narrow and much shorter than the foot. Setae short, and shaft swollen at the joint. Anal cirri foliaceous, lanceolate. Colour in alcohol, yellowish white, cirri and feet lighter.

The single specimen, much coiled, is about 30-35 mm. in length and 1.5-2 mm. in breadth; it is incomplete posteriorly.

The dorsal cirri, pale and flattened along the sides, are little conspicuous and partly covered by a bulging of the large cirrophore.

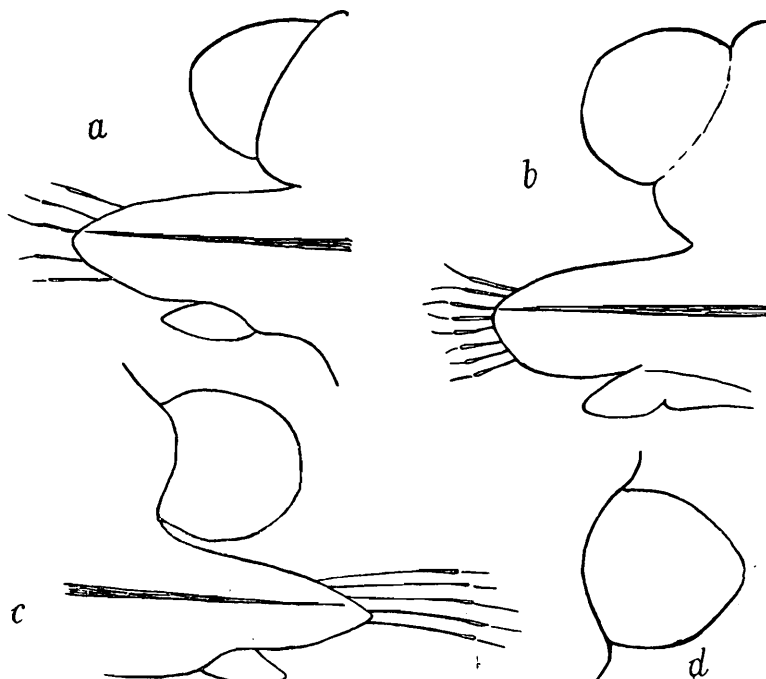


FIG. 13.—*Eteone barantollae*: a. b. an anterior foot, front and back view. $\times 120$; c. foot from midbody. $\times 120$; d. posterior dorsal cirrus. $\times 120$.

The proboscis is analogous to that of *E. foliosa* Quatrefages, but, in general appearance, the body comes nearer to *E. longa* Fabr., and the dorsal cirri are closer to *E. flava* Fabr., but the parapodia are longer and the dorsal cirri are shorter and narrower, whilst the tentacular cirri are more lanceolate and the two pairs of them of different length.

This species comes nearer to *E. longa* than to any other known species.

Habitat.—Barantolla, near Calcutta.

***Eteone (Mysta) ornata* Grube.**

Eteone ornata, Grube 1877, p. 106; 1879, p. 15.

Eteone ornata, Izuka 1912, p. 201.

Mysta maculata, Treadwell 1920, p. 593, figs. 1-4.

Sandheads, 20 fms. Capt. Smyth. August, 1922.

Specific Characters.—"Body elongated, with 3 striking longitudinal rows of violet pigment spots upon a pale-yellowish ground colour, towards the middle part of the body the pigment spots become gradually smaller and blend into a single streak, while in the posterior region of the body they entirely disappear. Dorsal cirrus comparatively small and borne on a distinct stalk, as in *E. armata* Clap. (1868) and *E. siphodonta* D. Ch. (1890). Prostomium roundish-triangular, somewhat broader than long, and longer than peristomium. Eyes two, small and dot-like." (Izuka).

The single specimen is flattened, much coiled. The prostomium is notched on each side, the small eyes are black.

The colour agrees closely with Izuka's description. The dorsal cirri are of a pale colour, conical and borne on a large cirrophore. They are like those of *Eteone* (*Mysta*) *siphonodonta* D. Ch., but the colour of the body is the same as in *Eteone picta* Quatrefages (= *E. armata* Clap). Unfortunately as the proboscis is retracted it could not be compared more closely with the two European species.

Mysta maculata Treadwell does not appear to differ materially from this species.

Habitat.—North Japan Sea, Philippine Islands (?), India.

Genus **PARALACYDONIA** Fauvel.

Prostomium conical ; four small tentacles at the tip. Peristomium achaetous and destitute of tentacular cirri. First setigerous segment uniramous. Succeeding segments biramous, dorsal and ventral divisions widely apart. Dorsal and ventral cirri are not foliaceous. Dorsal setae simple, ventral ones compound. Proboscis unarmed.

Paralacydonia weberi Horst.

Paralacydonia weberi, Horst 1922, p. 221, figs. 1, 2.

Paralacydonia mortenseni, Augener 1924, p. 311, fig. 3 ; 1927b, p. 344.

" Investigator " Sta. 379, off Akyab, Burma, 250 fms.

Specific Characters.—Body flattened, square in section. Tentacles bi-annular. Eyes absent. The buccal segment and the first two setigerous ones bear on their dorsal side a transverse ridge-shaped enlargement and constitute together a kind of shield provided with two shallow grooves behind the head. Parapodia resembling those of *Nephtys*. Dorsal ramus with a low rounded, notched anterior lip ; posterior lip without lobes, a short erect dorsal cirrus and a bundle of simple setae. Ventral ramus with a short rounded posterior lip, an anterior one bilobed, the upper lobe large, triangular, erect, the inferior lobe smaller, rounded, a digitiform ventral cirrus, a fascicle of heterogomph compound bristles and *no inferior simple setae*. In the space between both foot-lobes the border is densely beset with long cilia.

Two specimens from Sta. 379 are 25 and 35 mm. in length and 4 mm. in breadth, feet included.

The head is similar to that of *Paralacydonia paradoxa* Fauvel, from the Mediterranean, and agrees better with Horst's figure 1 than with the figure given by Augener. The parapodia do not differ in the least, only the 1-2 simple inferior setae of the ventral ramus of *P. paradoxa* are missing, and the dorsal shield behind the prostomium extends over the peristomium and the first two segments, instead of the peristomium and the first segment.

Augener mentioned two eye-spots above the first pair of parapodia. In only one of the specimens I noticed such pigment spots ; they are not eyes, but only the pigmented bottom of the nuchal organs. Moreover, there is a V-shaped streak of pigment at the base of the prostomium in front of the two rectangular pads of the shield, with a small rounded external dot. Faint transverse streaks of pigment are noticeable on several segments, on the upper border of the ventral ramus and on both borders of the dorsal ramus.

The general appearance of the animal is somewhat like *Kefersteinia*, but the parapodia are rather like those of *Nephtys*.

Augener later acknowledged the identity of his species with *P. weberi* which has priority. Augener's species differs very little from *P. paradoxa*.

Habitat.—South of Flores, New Zealand, Samoa, Burma.

Genus **LOPADORHYNCHUS** Grube.

Body short, prostomium broad. Two eyes. Four tentacles. Two pairs of large tentacular cirri, and a third rudimentary or wanting, inserted on an achaetous segment fused with the prostomium. Setae simple on the first and succeeding segments; next simple and compound setae. Dorsal and ventral cirri foliaceous. Feet conical with a rounded lamella. Proboscis unarmed.

Lopadorhynchus uncinatus Fauvel.

Lopadorhynchus uncinatus, Fauvel 1916a, p. 57, pl. i, figs. 2, 3; pl. iv, figs. 4-14; 1923a, p. 184, fig. 67.

"Investigator" Sta. 655, reef on N. side of Fuladu Island, Maldives.

Specific Characters.—Body divided into two clearly distinct regions, 25-32 segments. Third pair of tentacular cirri reduced to a small conical process inserted on the base of the second pair. The first two setigerous segments resemble each other; they are *much larger than the succeeding* ones, point forwards, and are armed with stout sigmoid sharp brown hooks. Both are destitute of ventral cirri but have a collar. Yellowish, in alcohol, and dotted with small star-shaped markings.

The only specimen, 6.5 mm. long and 2.5 mm. broad, with 25 setigerous segments, agrees entirely with the European specimens with which I have compared it carefully.

Habitat.—Atlantic Ocean, Mediterranean sea, Maldives.

Family SYLLIDAE Grube.

Body small, slender, elongated. Prostomium generally rounded or quadrangular. Three tentacles, two palps, four eyes. Two pairs of tentacular cirri, borne on the first segment which is achaetous. Proboscis divided into two regions: (1) pharynx, with chitinous walls and one or more teeth and (2) a more or less barrel-shaped proventriculus. Feet uniramous, with a dorsal and a ventral cirrus of which the latter may, however, be absent. Setae generally compound, with a terminal falcate unidentate or bidentate process. Swimming feet with simple, dorsal bristles in sexual forms.

1. Ventral cirri absent

Autolytus.

Ventral cirri present

2

2. Proboscis with a single, large, anteriorly situated tooth

Syllis.

Proboscis with a large tooth accompanied with a trepan

Trypanosyllis.

Genus **Syllis** Savigny.

Palps separate throughout. Tentacles and dorsal cirri moniliform. Opening of the proboscis with papillae only. A single antero-dorsal conical tooth. Proventriculus short.

Ventral cirri present, pinniform, unarticulated. Bristles compound with falcate terminal piece, rarely simple. Reproduction normal or by alternation of generations.

- | | |
|--|------------------------------|
| 1. Only simple setae on every segment (Subgenus <i>Haplosyllis</i>) | <i>S. spongicola</i> . |
| Compound setae | 2 |
| 2. Anterior setae compound, thereafter simple furciform setae | <i>S. gracilis</i> . |
| All setae compound | 3 |
| 3. Dorsal cirri short, fusiform with few articles | <i>S. closterobranchia</i> . |
| Dorsal cirri elongated, with numerous small articles | 4 |
| 4. Terminal piece of the lower setae a large, bent, simple hook . | <i>S. exilis</i> . |
| Terminal piece of all setae bidentate | <i>S. variegata</i> . |

Syllis (Haplosyllis) spongicola Grube.

Syllis (Haplosyllis) spongicola, Fauvel 1923a, p. 257, fig. 95.

Syllis (Haplosyllis) spongicola, Augener 1924, p. 368.

Syllis (Haplosyllis) spongicola, Willey 1905, p. 269, pl. iii, figs. 79, 80.

Syllis hamata, Claparède 1868, p. 195, pl. xv, fig. 2.

Syllis djiboutiensis, Gravier 1900, p. 147, pl. ix, fig. 3.

Syllis djiboutiensis, Fauvel 1919, p. 353.

Kilakarai, from coral reefs ; Tuticorin, Pearl Oyster Banks.

Specific Characters.—Body elongate, tapering. Pharynx long, tooth terminal. Proventriculus long. Dorsal cirri elongated, 20-30 articles. Compound setae absent. Simple, stout, hooked bristles, bidentate, with upper tooth simple or bifid.

Though this species is generally of common occurrence, especially amongst Sponges, only two specimens were collected.

Habitat.—Atlantic, Pacific and Indian Oceans ; Mediterranean and Red Seas.

Syllis gracilis Grube.

Syllis gracilis, Willey 1905, p. 269.

Syllis gracilis, Fauvel 1923a, p. 259, fig. 96 (Synonymy).

Syllis gracilis, Gravely 1927, p. 8.

Andamans ; Tuticorin Harbour.

Specific Characters.—Body slender. Pharynx elongated with anterior tooth. Dorsal cirri short, cylindrical or fusiform with alternately 7-8 and 10-12 articles. Anterior and posterior setae compound ; in the middle region of the body, large simple, ypsiloid, crutch-like setae.

This species is widely distributed in nearly all parts of the world.

Habitat.—Atlantic, Pacific and Indian Oceans ; Mediterranean and Red Seas.

Syllis variegata Grube.

Syllis variegata, Fauvel 1923a, p. 262, fig. 7 (Synonymy).

Syllis variegata, Gravely 1927, p. 8.

Syllis variegata, Pruvot 1930, p. 31.

Syllis compacta, Gravier 1909, p. 165, pl. ix, fig. 11.

Sandy Point, Krusadai Island, among rocks ; Shingle Island, Gulf of Manaar.

Specific Characters.—Body long and slender. Pharynx more or less elongated, with an anterior conical tooth. Dorsal cirri alternately long and short with numerous articles (20-25 and 30-45). Falcate terminal piece of all the setae more or less distinctly bidentate. On the last setigerous segments, a dorsal and a ventral simple acicular seta. Colour very variable.

Only a few specimens.

This species is very variable and often very difficult to distinguish from *S. prolifera*, of which it is probably only a variety, and from *Syllis fasciata*.

Pruvot (1930, p. 31) rightly remarked on the difficulty in classifying the species of the genus *Syllis*.

Habitat.—Atlantic, Pacific and Indian Oceans; Mediterranean Sea.

***Syllis closterobranchia* Schmarda.**

Syllis closterobranchia, Ehlers 1904, p. 19, pl. iii, figs. 1-4.

Syllis closterobranchia, Augener 1913, p. 20, fig. 23 (Synonymy).

Syllis closterobranchia, Fauvel 1919, p. 354; 1930, p. 14.

(?) *Syllis brachychaeta* Schmarda, Augener, 1927a, p. 145.

(?) *Syllis hyalina*, Willey 1902, p. 294.

Rock Pool, Diamond Island.

Specific Characters.—Dorsal cirri are short and fusiform. The compound setae of the middle part of the body are not bidentate.

A single specimen.

Very great confusion prevails regarding the synonymy of this Syllid.

It agrees with *S. alternosetosa* Saint-Joseph in having the falcate terminal pieces of the compound setae bidentate in the anterior and posterior regions of the body, whilst they are unindentate in the middle region, and the dorsal cirri are short and fusiform. Recently Augener (1917, p. 145) considered *S. hyalina*, *S. kinbergiana* Augener, *S. closterobranchia* Ehlers and *S. brachychaeta* as synonymous, and adopted Schmarda's name *S. brachychaeta* for the species, but the involved synonymy cannot be straightened at this stage.

Habitat.—Red Sea, South Africa, Indian Ocean, Australia, New Zealand, Atlantic (?).

***Syllis exilis* Gravier.**

Syllis exilis, Gravier 1900, p. 160, pl. x, fig. 9.

Syllis exilis, Fauvel 1917, p. 195, pl. v, fig. 24; 1930, p. 14.

(?) *Syllis solida* Grube 1878, p. 120, pl. vii, fig. 7.

"Investigator" Sta. 655, Reef on N. side of Fuladu Island, Maldives, from weed-washings; Madras Sta. 1.

Specific Characters.—Body stout convex dorsally. A well marked cephalic hood. Pharynx with a big anterior tooth. Dorsal cirri long and slender with very numerous short articles. The shaft of the lower setae of the anterior and posterior feet is noticeably swollen and the terminal piece is a large, bent, simple hook. The terminal pieces of the upper setae are more elongated, and have an accessory process.

In general appearance it looks like an *Eusyllis*. The dorsal cirri are inserted high above the feet, and alternate as in *E. ceylonica* Augener, but the cirri are articulated and the setae are different.

Habitat.—Red Sea, Indian Ocean, Madagascar, Pacific Ocean, Australia, Gambier Islands, (Philippine Islands ?).

Genus **TRYPANOSYLLIS** Claparède.

Body flattened. Palps well apart. Proboscis with a circular crown of small teeth (trepan) and a single conical dorsal tooth. Tentacles and cirri long, distinctly articulated. Ventral cirri lanceolate. Bristles with rather large sickle-shaped terminal piece.

- | | |
|--|-------------------------|
| 1. Tail with a cluster of stolon buds | <i>T. misakiensis</i> . |
| Tail without cluster of buds | 2 |
| 2. Body very large and flat. Dorsum not conspicuously streaked | <i>T. gigantea</i> . |
| Body smaller. Dorsum streaked with conspicuous violet transverse bands | <i>T. zebra</i> . |

Trypanosyllis zebra Grube.

Trypanosyllis zebra, Fauvel 1923a, p. 269, fig. 101 ; 1930a, p. 15.

Trypanosyllis zebra, Pruvot 1930, p. 35.

"Investigator" Sta. 291, Persian Gulf, 48-49 fms.; Madras, Sta. 7 ; Ceylon Pearl Oyster Bank ; Tuticorin, Pearl Oyster Bank, 12 miles from shore ; Mergui Archipelago ; Andamans, Sta. 25, 32.

Specific Characters.—Body flattened, dorsum somewhat rounded anteriorly. Segments short and numerous. Prostomium broader than long. Dorsal cirri alternately long and short, distinctly articulated. Terminal pieces of the setae bifid, and spinous on the edge. Anteriorly the dorsum is banded with violet-brown bars, two in each segment. Dorsal cirri white or often violaceous or lilac.

The specimens from the Andamans still show the characteristic transverse bands on the anterior segments. Their alternating cirri are rather short : 8-12 and 15-20 articles only, but sometimes they are lilac-coloured as is often the case in European specimens. The terminal pieces of the bristles are boldly bifid.

Habitat.—Atlantic and Indian Oceans ; Mediterranean Sea.

(?) **Trypanosyllis gigantea** (McIntosh).

Trypanosyllis gigantea, Fauvel 1914, b, p. 105, pl. vii, figs. 14-15 ; 1917, p. 200 (Synonymy) ; 1919, p. 355.

Trypanosyllis gigantea, Augener 1924, p. 371 ; 1927, p. 151.

Trypanosyllis gigantea, Benham 1927, p. 56.

Syllis gigantea, McIntosh 1885, p. 193, pl. xxx, figs. 1-3 ; pl. xxxiii, fig. 4 ; pl. xva, fig. 14 ; pl. xxiva, fig. 7.

"Investigator" Sta. 702, Nankauri Harbour, Nicobars.

Specific Characters.—Differs from *T. zebra* in (1) its larger size, (2) absence or presence of only very faint transverse pigmented streaks on the dorsum and (3) the terminal pieces of the bristles being simple hooks.

The specimen from Nankauri is large and much flattened, but very hard and in poor condition, and its identification is accordingly rather doubtful.

I wonder whether *T. gigantea* is not after all a giant form of *T. zebra*. I had considered *T. richardi* Gravier and *T. taeniaeformis* Haswell as synonymous with *T. gigantea*. But Augener and Benham do not agree with this opinion because of the differences in colour and in the end-pieces of the bristles. *T. richardi* has the dorsum streaked with purple, and the setae have bidentate terminal pieces; in this respect it comes very close to *T. zebra*. *T. taeniaeformis* is an intermediate form.

In regard to colour, there are many variations and it can hardly be accepted as a specific character. The larger size is not of much account and may vary in relation to the colder habitat or the Antarctic or deep-sea specimens. Many European species are much larger in the Arctic Seas than on the coasts of France or England or in the Mediterranean; but sometimes it is just the reverse.

As regards the terminal pieces of the bristles, age and wear must be considered, and on the same foot of a specimen of *Trypanosyllis*, I found both unindentate and bidentate end-pieces, while the condition in others was intermediate.

Nevertheless, *T. gigantea* may provisionally be maintained as a distinct species, but *T. richardi* is probably synonymous with *T. zebra*.

Habitat.—South Atlantic, South Pacific and Indian Oceans.

***Trypanosyllis misakiensis* IZUKA.**

Trypanosyllis misakiensis, Izuka 1912, p. 185, pl. xx, figs. 2-6.

Madras Coast Sta. 1. Two specimens.

Specific Characters.—Body elongate, depressed; dorsum slightly convex. Segments short and numerous. Prostomium bilobed. All the three tentacles nearly equal. Dorsal cirri annulated, borne on a prominent cirrophore. Bristles stout, falcate, the end-piece bifid, with a basal spur (3 teeth according to Izuka). The posterior extremity of the worm is capable of producing successive crops of collateral sexual buds showing an external structure similar to that of the mother individual.

One of the specimens is 22 mm. long and 2 mm. broad, with 130 segments before the bud of 8 stolons. The last segment bears a stolon with 23 setigerous segments and 4 eyes. Under this terminal bud lies another, of about the same size, and a third slightly smaller, two still smaller and three rudimentary buds gradually decreasing in size. The small stolon is more ventral and anterior.

The dorsal cirri alternate irregularly with 12-15 and 20-25 short articles.

The shaft of the bristles is enlarged on one side and the falcate end-piece is provided with an accessory tooth removed from the apex. The sharp basal spur gives the terminal piece a false tridentate appearance.

The other individual seems more elongated, but is much coiled.

Under the conical pygidium the penultimate segment buds forth 16 stolons, one large and well developed, 3 smaller, 4 more tiny and 8 still more rudimentary gradually decreasing in size. On the six larger stolons, cirri and anal cirri are well formed. Segments and anal cirri are distinct on three others whilst the smaller ones are mere buds with incipient simple setae.

Both specimens are milk-white, without any pigment pattern.

They agree entirely with Izuka's description and figures.

Of the other species of *Trypanosyllis* bearing a cluster of numerous terminal buds, *T. gemmipara* Johnson is a larger worm, with more numerous segments, dorsal cirri with more numerous articles and transverse pigment bands on the dorsum. The bristles are similar. *T. crosslandi* Potts differs only in the larger number of segments. The three species are probably synonymous, and if this view is correct, the name, *T. gemmipara* will have precedence.

Habitat.—Japan, Madras Coast.

Genus **AUTOLYTUS** Grube.

Ventral cirri absent. Palps little developed, attached to the ventral surface of the cephalic lobes. Cirri not articulated, filiform, present on every segment. Proboscis sinuous, with a crown of teeth. Proventriculus ovoid. Falcate bristles with short bifid tips. Sexual generation shows dissimilar males and females (*Polybostrichus* and *Sacconereis*).

Autolytus orientalis Willey.

Autolytus orientalis, Willey 1905, p. 270, pl. iv, figs. 81-84.

Autolytus orientalis, Augener 1926b, p. 454, fig. 5.

Chandipore, near Balasore, low tide, on Chaetopterid tubes.

Specific Characters.—About 30 "setigerous segments in the anterior or parent individual. The parapodia contain two acicula and numerous, upwards of 20, compound falcigerous setae; the head of the shaft is lacinate and the appendix is minutely bidentate and minutely fringed. The dorsal cirri are rather short, lanceolate, petaloid, with strong basal articulation. The second dorsal cirrus, *i.e.*, the cirrus of the first setiger, is the longest. The rounded reduced palps, joined together in the middle line along their own length, are only visible from below. The pharynx is long and has a sigmoid flexure; it is armed in front with a circle of 44 denticles, larger and smaller irregularly alternating. The proventriculus shows 28 glandular rows" (Willey).

In both specimens from Chandipore the parent stock has about 30 setigers. One bears one stolon and the other two. They agree with Willey's description and figures.

Augener has figured the free swimming male stolon or *Polybostrichus*.

Habitat.—Ceylon, Orissa.

Sacconereis sp.

Andamans. Tow-netting from Macpherson Strait, Andamans—Surface.

In the absence of the parent stock this female stolon or *Sacconereis* cannot be ascribed to its *Autolytus* species. In this genus the species are mainly characterised by the trepan, or crown of small pharyngeal teeth, but as the sexual stolons—*Sacconereis* and *Polybostrichus*—are not provided with a trepan, they can very rarely be identified when free from the parent stock.

The above *Sacconereis*, 7.5 mm. long, has four large red eyes, the anterior pair being ventral. It bears three tentacles and two pairs of tentacular cirri shorter than the tentacles.

Six large ventral clusters of yellow eggs extend along eleven segments, from the seventh, which are provided with fascicles of very long and slender capillary setae. Next comes a

long and narrow region of 26-28 segments with short setae, stout short ovoid dorsal cirri and no ventral cirrus.

In the middle epitokous region, the dorsal cirri are larger and under the dorsal fascicle of capillary setae lie short ventral setae with a very small rounded terminal piece, which is often wanting.

Family NEREIDAE Johnston.

Body elongated, rounded or somewhat flattened. Prostomium with four eyes. Two subulate tentacles. Two massive two-joined palps. Four pairs of tentacular cirri. Proboscis armed with a pair of horny jaws and, generally, a series of horny teeth (paragnaths) which may be arranged in eight groups. Feet biramous, except in *Lycastis*, after the second foot. Dorsal and ventral cirri. Dorsal ramus with 2-3 lobes, ventral ramus with two fillets and one lobe. Setae compound, spinigerous and falcigerous. Generally an epitokous, *Heteronereis*, mature form.

The following key, slightly modified, is after Gravelly. It does not include *Gymnionereis* Horst and Chamberlin's new genera *Kainonereis* and *Uncinereis* which are insufficiently characterised.

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|--|--|
| 1. Branched gills on some of the anterior segments. Paragnaths absent | 2. |
| No branched gills | 3. |
| 2. Branchial filaments situated below the dorsal cirrus | <i>Dendronereides</i> . |
| Branchial filaments inserted on the dorsal cirrus | <i>Dendronereis</i> . |
| 3. Paragnaths absent | 4. |
| With soft paragnaths only | 6. |
| With both soft and horny paragnaths. | <i>Leonnates</i> . |
| With separate conical horny paragnaths only | (<i>Nereis</i>) 8. |
| With separate conical and transverse paragnaths or arranged in transverse lines in group VI | 9. |
| Horny paragnaths of three forms : conical, transverse and pectinate | <i>Pseudonereis</i> . |
| 4. Feet uniramous | <i>Lycastis</i> . |
| Feet biramous | 5. |
| 5. Buccal segment with feet and setae | <i>Micronereis</i> . |
| Buccal segment without feet or setae | <i>Leptonereis</i> . |
| 6. Eyes absent ; neuropodium with well developed ventral ligule and setigerous lobe ; ventral cirri double, the two parts arising from a common base | <i>Ceratocephale</i> . |
| Eyes present ; neuropodium and ventral cirrus normal | 7. |
| 7. Dorsal ligule of neuropodium absent ; setae of the usual three kinds | <i>Tylorhynchus</i> . |
| Dorsal ligule foliaceous, all setae homogomph spinigerous | <i>Tylonereis</i> . |
| 8. All groups of paragnaths complete | <i>Nereis</i> , subgenus <i>Neanthes</i> . |
| The mid-dorsal and sometimes also the dorso-lateral groups missing on the proximal ring | <i>Nereis</i> S. str. |
| All dorsal groups missing except the dorso-laterals of the proximal ring | <i>Nereis</i> , subgenus <i>Cirronereis</i> . |
| All groups both dorsal and ventral missing on the proximal ring | <i>Nereis</i> , subgenus <i>Ceratonereis</i> . |
| The dorso-laterals alone present on the proximal ring, none on the distal | <i>Nereis</i> , subgenus <i>Eunereis</i> . |

9. All groups complete *Perinereis*.
 The mid-dorsal missing on the proximal ring *Arete*.
 10. The mid-dorsal missing on the distal ring *Pisonoe*.
 All dorsal groups missing on the distal ring and at least the mid-
 dorsals (sometimes all, both dorsal and ventral) on the proximal
 ring *Platynereis*.

Genus **LYCASTIS** Savigny.

Feet uniramous. Proboscis without paragnaths.

- Dorsal setae present. Dorsal cirri much enlarged and flattened *L. meraukensis*.
 Dorsal setae missing. Dorsal cirri more elongated and little enlarged *L. indica*.

Lycastis meraukensis Horst.

Lycastis meraukensis, Horst 1918, p. 246.

Mergui; Bangkok, Siam.

Specific Characters.—Head broader than long, rounded, trapezoidal, provided with a median longitudinal groove. Eyes situated laterally, in the posterior margin of the head; the external of each pair is the largest and is placed somewhat more anteriorly than the internal. Antennae short, conical. Palps with a stout basal part and a small, papilli-form, distal joint. Maxillae short and stout. The longest tentacular cirrus reaches to the 2nd or 3rd segment. Dorsal cirri enlarged and flattened, leaf-like, overlying each other (in small specimens they are slender and pointed). A fascicle of 8-10 dorsal slender setose bristles (missing in the posterior body-region). Neuropodium cylindrical with heterogomph spinigerous and falcigerous bristles, the terminal piece of which is rather short and broad and ciliated.

The specimen from Bangkok is a large one broken into two parts and much coiled, it is about 150-200 mm. in length, with a breadth of 22 mm. The dorsal cirri are large, triangular overlying each other, as in a Phyllodocid. The dorsal setae, which are very slender and numerous, are sometimes missing on the posterior feet.

The smaller specimen, from Mergui (43 mm. only and 4 mm. broad), is without colouration except on the prostomium which is brownish. The posterior segments (about 50) are regenerated. The dorsal setae are nearly homogomph, hardly hemigomph, instead of faintly heterogomph, as stated by Horst.

This species is closely allied to *L. ouanaryensis* Gravier which presents a great range of variation in the shape and size of the dorsal cirri and the presence or absence of dorsal setae, as I had the opportunity to observe in specimens from Guiana.

Habitat.—New Guinea, Mergui, Bangkok.

Lycastis indica Southern.

(Pl. II, figs. 1-2).

Lycastis indica, Southern 1921, p. 578, pl. xix, fig. 2.

Lycastis indica, Horst 1924, p. 4.

Lycastis indica, Fauvel 1930a, p. 19.

Salt Lake, Calcutta ; Salt Canal near Salt Lake, Calcutta ; R. Hughly ; Sibpur, near Calcutta (water fresh at both high and low water) ; Varkalay, Travancore ; Miragamari Creek, Khulna dist., Bengal ; Mormugao Bay ; Kowarah ; Kilakarai ; Vizagapatam Backwater and in mud opposite the Vizagapatam railway station.

Specific Characters.—Longitudinal groove of the head ending in a pit ; eyes lying almost in a line and provided with lenses, presence of much reddish brown pigment in the anterior region of the body, increasing in redness and density towards the tail. Dorsal cirri rather narrow and elongated, especially in the posterior feet. Dorsal setae missing or very few. Terminal piece of falcate setae long and narrow, but thick.

The very large number of specimens of various sizes has enabled me to ascertain the variability of several characters held as specific by Southern, and which are really of very little importance, such as colour, the pit on the head which is as often absent as not (pl. ii, fig. 1), the eyes nearly in a line or arranged in a widely open trapezium, the number of teeth in the jaws and the length of the dorsal cirri.

More reliable features are the nearly constant absence of slender dorsal setae, and the persistence of numerous falcate bristles in the posterior feet. But in a small specimen from Cochin Backwater, Southern noted the presence of a single slender hemigomph seta with the dorsal spine, and I have myself observed one or two such dorsal setae on a small individual from Salt Lakes, near Calcutta (pl. ii, fig. 2). According to Horst, small specimens of *L. meraukensis* lack the notopodial bristles and their dorsal cirri are slender and pointed as in *L. indica*. The distinctive characters of both species : breadth of the cirri and presence or absence of dorsal setae are thus far from reliable.

Southern himself noted the striking similarities between *L. indica* and *L. ouanaryensis*. The distinctions between the two forms are, as mentioned above, very slight indeed. These forms and the closely related *L. meraukensis* may be only varieties.

In numerous specimens of *L. ouanaryensis*, from French Guiana, I observed (1923*b*, p. 39) extensive variations as regards eyes, tentacular cirri and shape and size of the dorsal cirri.

Fresh- and brackish-water Polychaetes, it appears, are liable to much variation and anomalies, very probably in connection with differences in the salinity.

Habitat.—Calcutta, Madras, brackish waters of India, Macassar.

Genus **TYLONEREIS** Fauvel.

Feet biramous. Dorsal ligule foliaceous. All setae homogomph spinigerous. Proboscis with papillae, without paragnaths.

Ventral setigerous lobe trilobed

T. bogoyawlenskyi.

Ventral setigerous lobe bilobed

T. fauveli.

Tylonereis bogoyawlenskyi Fauvel.

Tylonereis bogoyawlenskyi, Fauvel 1911, p. 373, pl. xix, figs. 1-7.

Tylonereis bogoyawlenskyi, Gravely 1927, p. 11, pl. x, figs. 18, 19.

Krusadai Island (digging in sand and mud) ; Tuticorin Beach ; Kilakarai, from coral reefs ; Pam-ban backwater (digging in mud and sand).

Specific Characters.—Prostomium broader than long, notched. Tentacles short. Proboscis with conical soft papillae : I=0 or 3 ; II=0 or 1 ; III=8-10 ; IV=a group of 4-5

on each side ; V=0 ; VI=one large papilla on each side ; VII=2 on each side ; VIII=0 or a row of depressed knobs. Feet biramous, setae long homogomph spinigerous, all alike. Dorsal and ventral cirri very small. Dorsal ligule triangular, foliaceous. Dorsal fillet (setigerous lobe) elongated, expanded at the tip in the anterior segments, bifid in the posterior ones. Ventral setigerous lobe trilobed, next bilobed in the posterior feet. Ventral lower ligule decreasing in size backwards. A pair of anal cirri. In life, of a bright pink colour, with a transverse brown line on each segment at the anterior end and a dark-red mid-dorsal line. Burrows in mud.

The large number of specimens, especially from Pamban and Kilakarai, has enabled me to add a note on the variability in the number of papillae on the proboscis, in the shape of the posterior feet and in the length of the bristles. In the anterior feet and in those of the middle part of the body the ventral setigerous lobe is conspicuously trilobed, but in the posterior feet it is only bilobed or very indistinctly trilobed.

The long slender terminal piece of the homogomph setae is of about the same length in the dorsal and in the inferior ventral setae, but it is sometimes more or less markedly shorter in the dorsals, even on any specimen selected at random.

As mature males and females were available it was clear that the variations observed were not sex-linked.

The original single type-specimen came from the Persian Gulf. Gravely (1927, p. 11, pl. x, figs. 18, 19) recorded others from Krusadai Island, and the species appears to be common in the Indian waters.

Habitat.—Persian Gulf, Gulf of Manaar.

***Tylonereis fauveli* Southern.**

Tylonereis fauveli, Southern 1921, p. 582, pl. xix, fig. 3.

Tylonereis fauveli, Fauvel 1930a, p. 19.

“Investigator” Sta. 520, Mergui Harbour, 7 fms.

Specific Characters.—Differs only from *T. bogoyawlenskyi* in having the ventral setigerous lobe bilobed instead of trilobed, in the anterior, middle and posterior feet.

One of the three large specimens from Mergui is a male.

The ventral setigerous lobe of the anterior feet is clearly divided into two flattened lanceolate lobes, very unlike the three more or less filiform terminations of the same setigerous lobe in *T. bogoyawlenskyi*.

In the posterior part of the body the differences are less striking for, in *T. bogoyawlenskyi*, the ventral setigerous lobe gradually becomes bilobed, or more or less distinctly trilobed, without any reference to size or sex. According to Southern, *T. fauveli* should, moreover, be characterised by its dorsal setae with terminal pieces much shorter and less tapering than those of the ventral setae. I have noticed such short dorsal setae in a specimen from Pamban (1930a, p. 19), but, on the other hand, I have also noticed it in some typical specimens of the other species, whilst no such differences could be observed in specimens from Mergui, and in one instance on a few posterior feet only. The only constant and important difference between the two species lies in the structure of the ventral lobe. As both species were met with in the same locality (Pamban) they cannot be local varieties.

Habitat.—Chilka Lake, Pamban, Mergui.

Genus **LEONNATES** Kinberg.

Proboscis with both soft and horny paragnaths. Falcate bristles with a convex denticulated border.

Leonnates jousseaumei Gravier.

Leonnates jousseaumei, Gravier 1901, p. 160, pl. xi, figs. 34-37.

Leonnates jousseaumei, Fauvel 1911, p. 180; 1919, p. 400; 1930, p. 19, fig. 5.

Leonnates jousseaumei, Horst 1924, p. 150.

"Investigator" Sta. 528, Mergui Archipelago, shore collecting; Karachi; Koweit Harbour.

Specific Characters.—Body stout, a little flattened. Maxillary ring of the proboscis with small horny paragnaths, $I=0$ or 1. Oral ring with soft conical papillae, $V=0$. Parapodia: dorsal ramus with three elongated ligules and a long dorsal cirrus. Ventral ramus with two lanceolate fillets and a longer ligule. Ventral cirrus subulate. Spinigerous setae all homogomph. Falcate homogomph with a terminal piece hooked at the tip and boldly serrated on the convex border. They are present on the first setigerous segments in both the ventral bundles of every foot and the dorsal ramus of the posterior feet.

Habitat.—Red Sea, Persian Gulf, Gulf of Manaar, Arabian Sea, Bay of Bengal, Macassar Straits.

Genus **DENDRONEREIS** Peters.

Proboscis with only soft papillae. Prostomium deeply indented in front. Dorsal cirrus of a number of anterior segments bearing numerous branchial filaments. Ventral division of the feet multifid in the mid-body segments, more simple in the posterior ones. Setae all homogomph spinigerous.

Branchial cirri pinnate	<i>D. arborifera</i> .
Branchial cirri bipinnate	<i>D. aestuarina</i> .

Dendronereis arborifera Peters.

Dendronereis arborifera, Ehlers 1868, p. 578, pl. xxii, figs. 33-42.

Dendronereis arborifera, Fauvel 1919, p. 399, pl. xv, figs. 5-8.

Vizagapatam backwater, channel connecting it with the sea; southern shore of channel; farther end of the creek beyond the ferry; harbour.

Specific Characters.—Prostomium deeply cleft between the diverging tentacles partly connected with the ovoid palpophores. Four eyes. Proboscis with soft conical papillae on both rings. Dorsal cirri bearing lateral simple branchial filaments from the 8-10th to the 18th-22nd segment. In the anterior feet, dorsal division with two triangular lobes, ventral division with 4-6 conical lobes and a few papillae. In the posterior feet, dorsal division bilobed, ventral division with a single large triangular lobe and a small ventral cirrus. Dorsal and ventral setae all of them homogomph spinigerous, nearly alike.

There are several specimens in good condition, a few of them with the proboscis extruded. According to Ehlers, who gave the first accurate description of this species, the proboscis is destitute of papillae. On a specimen from Madagascar, with half extruded proboscis, I also failed to detect any; they had probably fallen off, for on the specimens from Vizagapatam they are present on both rings but sometimes absent in one or more groups.

About the 8-9th or 10th setigerous segment the dorsal cirrus bears one, two or three filaments on each side. In the succeeding segments, the gill filaments are very long and numerous; after the 18-20th, they suddenly decrease and rapidly disappear altogether. These gill filaments are filiform and simple.

Behind the branchial region the appearance of the feet is altered, the papillae disappear, the dorsal ramus decreases to two smaller ligules whilst the ventral ramus becomes less complex, its lobes gradually fading into a single large blunt triangular setigerous lobe with a short ventral cirrus.

Habitat.—Mozambique, Madagascar, India (Vizagapatam).

Dendronereis aestuarina Southern.

Dendronereis aestuarina, Southern 1921, p. 598, pl. xx, fig. 4.

Komarakan Backwater, Travancore; Madras; Taléh-Sap (Gulf of Siam).

Specific Characters.—Prostomium deeply indented in front, between the diverging tentacles shorter than the tapering palps. Four large eyes. Proboscis with soft conical papillae on the basal ring. Maxillary ring devoid of papillae. Dorsal cirri bearing lateral pinnate gills. The branchiae commence on the 14-15th foot. In the anterior feet the ventral division has a large number (15-19) of lobes of which some form a fringe behind the setae. In the posterior feet the dorsal division is bilobed and the ventral division consists of two foliate lobes, a conical lobe between them, the ventral ligule and the ventral cirrus. Homogomph setae with long finely serrated terminal piece, which becomes shorter in the upper division of posterior feet.

The specimen from Taléh-Sap is an atokous female, full of eggs, 40 mm. in length and 5 mm. in breadth. The branchiae exist from the 15th setiger to the 22nd, eight pairs; the three first are only simple fringes on the dorsal cirrus. In the succeeding ones the filaments on each side are pinnate. It agrees with Southern's description. On another specimen there are nine pairs of branchiae.

Habitat.—Gangetic Delta (in brackish water), Madras; Travancore; Taléh-Sap (Gulf of Siam).

Genus **DENDRONEREIDES** Southern.

(*Emended.*)

Proboscis armed only with soft paragnaths. Dorsal setigerous lobe absent in first and second feet. In some of the anterior feet branchiae are present in the form of numerous filaments *situated below the dorsal cirrus*. They are provided with vessels. Setae of two kinds, falcate homogomphs and spinose heterogomphs. In all the feet, except the anterior ones, there is a peculiar gland opening to the exterior beneath the dorsal cirrus. *The ventral ligule is absent*. In the post-branchial region the foot is greatly simplified.

According to Southern, the dorsal filaments are not provided with blood-vessels. Nevertheless, on many specimens, I was able to see clearly one or two well-developed vessels in the branchial filaments. When the filaments are contracted the empty blood-vessels are no longer noticeable, which probably explains Southern's statement.

Dendronereides heteropoda Southern.

(Pl. II, figs. 3-9.)

Dendronereides heteropoda, Southern 1921, p. 603, text-fig. 10, *a, b*; pl. xxi, fig. 6, *a-n*.

Basra (Shat-el-Arab), 70 miles from sea (water quite fresh. In mud adhering to anchor) 4 fms. H. J. Walton; Diamond Isles, Rock Pool (Capt. Stewart); Barantolla, banks of Salt Lake Canal, Calcutta; Calcutta, from the bottom sand in an unfiltered water-tank; Thana, Bombay (J. W. Caunter).

Specific Characters.—Body long and slender. Prostomium broad, cleft between the small tentacles. Four eyes. Palps blunt, ovoid. Proboscis with a number of papillae on the maxillary ring, on the oral ring: V=3; VI=2-3 on each side; VII-VIII=two irregular rows. Anterior feet with dorsal and ventral cirri, 2-3 dorsal ligules and 3-4 ventral lobes (pl. ii, figs. 5, 6). Branchial region from 8th to 40-50th setigerous segments, with clusters of more or less branched bunches of gills inserted below the dorsal cirrus, above the dorsal ligule, ventral division trilobed. In the posterior abbranchiate feet dorsal and ventral division reduced each to a single lobe (pl. ii, fig. 4). Homogomph spinigerous setae and homogomph falcate setae with smooth terminal piece. Anterior region of the body rusty red in colour. At the back of the head a narrow transverse band or two elongate spots of brown pigment.

The specimens from Basra, Diamond Isles and Barantolla are atokous and middle-sized. They are more or less long anterior fragments.

Two specimens from Calcutta are very long subepitokous males filled with sperms. Two others from Bombay are also epitokous males.

Those from Barantolla and Basra were in brackish- or nearly fresh-water, as was the case with Southern's specimens.

In the epitokous males the eyes are larger with a whitish lens. The transverse streak and pigment spots behind the prostomium are absent. The size of the body is nearly double, 85-135 mm. instead of 66. The branchiae are more numerous, more branched and exist on a greater number of feet till the 35th, 40th, 50th, well developed (pl. ii, figs. 7-9) and a few filaments may even persist up to the 60th foot. Behind the branchial region the feet become longer and much more simple (pl. ii, fig. 4). The setae are very numerous, very long and slender, with a false appearance of simple capillary bristles. The ventral setae are slightly shorter, and mixed up with a few falcate bristles.

Further back the feet and bristles again become shorter and the body is reduced to an elongated soft, white pouch swollen with sperm.

The pygidium is an enlarged knob with two large anal cirri and a few short papillae.

Habitat.—Vicinity of Calcutta, Bombay, Diamond Isles, Shat-el-Arab.

Genus **NEREIS** Cuvier.

Feet biramous. Proboscis with horny paragnaths arranged in distinct groups. Setae spinigerous and falcigerous.

1. Basal ring of proboscis with horny paragnaths
Basal ring destitute of paragnaths
2. A few simple hooked bristles
Without simple hooks

- 2.
- 15 (Subgenus *Ceratonereis*).
- 3.
- 4.

- | | |
|--|-----------------------------------|
| 3. Simple hooks ventral | <i>N. anchylochaeta.</i> |
| Large dorsal simple hooks | <i>N. onychophora.</i> |
| 4. Groups of paragnaths of the basal ring disposed in a nearly continuous belt | 5. |
| Groups of the basal ring distinct | 6. |
| 5. Spinigerous bristles only | <i>N. chingrighattensis.</i> |
| Spinigerous and falcigerous bristles | <i>N. cricognatha.</i> |
| 6. Dorsal homogomph falcigerous bristles in the posterior feet | 11. |
| Without dorsal homogomph falcigerous bristles | 7. |
| 7. A single row of paragnaths in groups VII-VIII | 8. |
| Several rows of paragnaths in groups VII-VIII | 9. |
| 8. Dorsal division of posterior feet trifid. Falcate terminal pieces elongated. VI=1+1 | <i>N. glandicincta.</i> |
| Dorsal division of posterior feet bifid, with diverging ligules. Falcate terminal pieces short. VI=a cluster | <i>N. unifasciata.</i> |
| 9. Inferior bilobed dorsal ligule borne on an elongated base. Falcate terminal pieces long. VI=4-5 | <i>N. talehsapensis.</i> |
| Dorsal division normal | 10. |
| 10. Lobes of posterior feet sharp and diverging. Dorsal division of anterior feet trilobed. Falcate appendages short | <i>N. chilkaensis.</i> |
| Posterior feet not modified. Falcate appendages curved | <i>N. indica.</i> |
| 11. Terminal piece of posterior dorsal homogomph falcigerous, bristles smooth | 12. |
| Terminal piece of posterior dorsal homogomph falcigerous bristles boldly bi- or tri-dentate | 13. |
| 12. Dorsal ligule of posterior feet enlarged | <i>N. coutierei.</i> |
| Dorsal ligule of posterior feet not enlarged | <i>N. trifasciata.</i> |
| 13. A single row of few paragnaths on groups VII-VIII | 14. |
| Several rows of paragnaths on groups VII-VIII | <i>N. zonata-persica.</i> |
| 14. Prostomium notched anteriorly | <i>N. kauderni.</i> |
| Prostomium not notched anteriorly | <i>N. jacksoni.</i> |
| 15. Prostomium deeply cleft. Dorsal cirri very long. Falcate terminal pieces elongated | <i>N. (Ceratoneis) mirabilis.</i> |
| Prostomium not notched | 16. |
| 16. Lobes of the feet ending in long whip-like processes | <i>N. flagellipes.</i> |
| Lobes of the feet normal | 17. |
| 17. With falcigerous bristles | <i>N. tripartita.</i> |
| Falcigerous bristles absent in posterior feet | <i>N. microcephala.</i> |

Subgenus **NEREIS** *sens. strict.*

Nereis anchylochaeta Horst.

Nereis anchylochaeta, Horst 1924, p. 155, pl. xxx, figs. 8, 9.

Nereis anchylochaeta, Fauvel 1931, p. 20, pl. ii, figs. 8-12.

"Investigator" Sta. 702, Nankauri Harbour, amongst corals. Malacca Straits.

Specific Characters.—Arrangement of the paragnaths : Group I, 3 in a longitudinal line ; II, a crescentic row ; III, 3 in a line ; IV, a few large in a line ; V, 0 ; VI, 0 or 1 ; VII-VIII, a single row of 2-3. Dorsal division of the anterior feet with three subequal ligules.

In the middle and posterior feet, very large simple hooks in the upper and lower ventral bundles and small compound heterogomph falcigerous bristles.

In the specimen from Nankauri the groups VI are missing. In that from the Malacca Straits there is a single paragnath in each group VI. Horst has already noted VI 0 or 1.

The simple hooks are only large falcate bristles whose terminal piece is fused with the shaft. All transitional stages are met with between the clearly compound bristles and the large simple hooks.

This species is closely allied to *Ceratonereis pachychaeta* Fauvel and *C. erythraensis* Fauvel (1919, p. 403, pl. xv, figs. 22-25; 407, pl. xv, figs. 26-30). In the former the maxillary ring is very similar, but the large bristles are not yet quite simple, in the latter there is only one single simple hook in the upper ventral bundle and the maxillary ring is different, the groups I and II having more numerous clusters. Moreover both species are true *Ceratonereis* destitute of paragnaths in the oral or basal ring. But *N. anchylochaeta* presents a very marked reduction of the oral ring, the groups V-VI generally missing and VII-VIII reduced to 2-3 paragnaths.

Habitat.—Malay Seas, Amboina, Malacca Straits, Nicobars.

***Nereis onychophora* Horst.**

Nereis onychophora, Horst 1918, p. 248; 1924, p. 161, pl. xxxi, figs. 12-14.

Nereis caenocirrus, Chamberlin 1919, p. 209, pl. xxxiii, figs. 7-8; pl. xxxiv, figs. 1-6; pl. xxxv, figs. 1, 2.

“Investigator” Sta. 571, Jack and Una Islands, shore collecting. Two atokous specimens.

Specific Characters.—Prostomium broad. Two pairs of large eyes. Proboscis, arrangement of the paragnaths: I, 1-3; II-IV, crescentic clusters; III, a transverse cluster of 3-4 rows; V, 0; VI, 4-5 in a round group; VII-VIII, 2 irregular rows. Dorsal division of the anterior feet with two subequal ligules and a small dorsal cirrus. Dorsal ligule enlarged in the posterior feet, with subterminal cirrus. In the middle and posterior feet only a single dorsal simple, large, hooked bristle and an aciculum. In the ventral ramus spinigerous bristles and small falcigerous.

Horst's and Chamberlin's specimens were epitokous and they did not, therefore, describe the posterior feet with their much enlarged dorsal ligule, which is very conspicuous on the above atokous specimens 30 mm. long and 1 mm. broad.

In the anterior feet the dorsal division contains a few homogomph spinigerous setae. About the 20th setigerous segment appears a large homogomph bristle with a short, oval, smooth terminal piece. The ventral division bears homogomph and heterogomph spinigerous setae and small heterogomph falcigerous. About the 70th segment the large falcate bristle is replaced by a large bent hook with a blunt or knob-like tip which remains single with the dorsal acicula.

The above specimens agree with the previous descriptions, the differences being due to the atokous condition.

Habitat.—Malay Archipelago, Marshall Islands, Mergui.

Nereis chingrighattensis, sp. nov.

(Text-fig. 14.)

Creek in Salt Water Lake, near Chingrighatta, N. Annandale.

Specific Characters.—Body cylindrical, tapering posteriorly, 80-100 segments. Prostomium not notched. Two pairs of black eyes disposed in a rectangle or a wide opened trapezium. Tentacles subulate, shorter than the large, conical, diverging palps. Peristomium somewhat longer than the succeeding segment. Tentacular cirri short, the posterior ones reaching backwards to the 4-5 setiger. Jaws pale, curved with 6-8 teeth. Paragnaths conical, yellow, or nearly colourless. I, a cluster of 4-5; II, a crescentic group; III, a transverse group of about 3-4 rows; IV, an oblique group of 3-4 rows; V, 0; VI, on each side, a transverse row of 15-20 with a few smaller outer denticles; VII-VIII, 2-3 irregular rows (fig. 14*a, b*). Feet short, both rami subequal. Dorsal cirri subulate, shorter than the dorsal ligule. Dorsal ramus with three ligules, two subequal, triangular and a

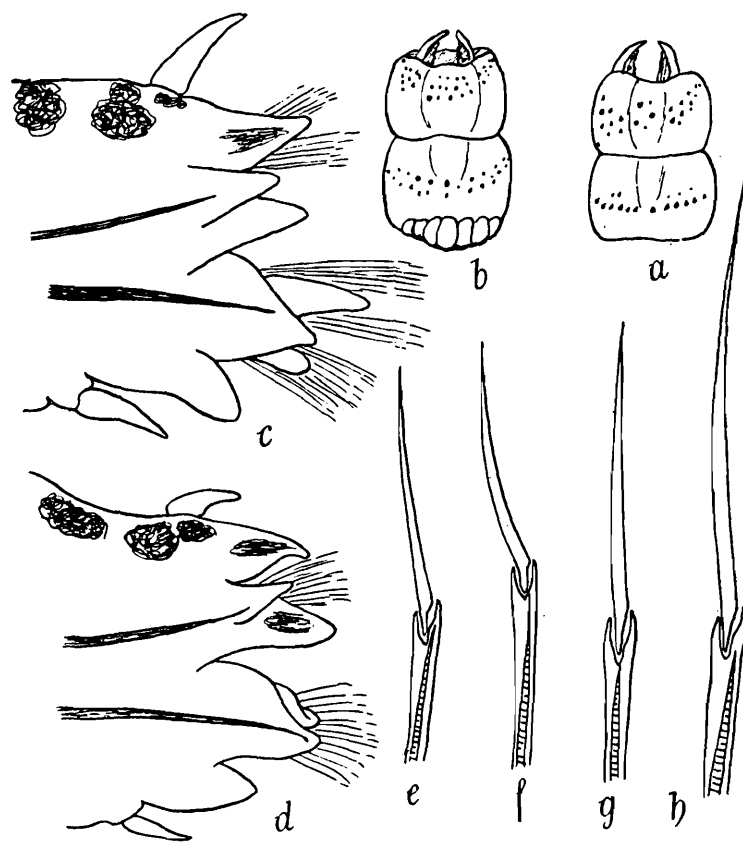


Fig. 14.—*Nereis chingrighattensis*: *a, b*. proboscis, ventral and dorsal view, enlarged; *c*. 10th foot $\times 35$; *d*. 66th foot $\times 35$; *e, f*. lower ventral heterogomph spinigerous setae from 65th and 30th feet $\times 380$; *g, h*. ventral hemigomph spinigerous setae from 30th and 65th feet $\times 380$.

shorter conical one. Ventral ramus about the same length as the dorsal, with two fillets, the posterior one conical, the anterior one divided into two unequal lobes. Inferior ligule blunt. Ventral cirrus short, subulate. In the posterior feet the median ligule of the dorsal ramus decreases in size and the ventral fillets are nearly similar, the anterior being entire or faintly bilobed. Setae numerous, slender, transparent, *all of them spinigerous*. Dorsal setae homogomph, the ventral setae homogomph with long terminal piece and shorter hemigomph. Lower ventral, long hemigomph and short heterogomph (fig. 14*e-h*). Falcigerous setae are wanting in both rami. Two long anal cirri.

Length, 50 mm., breadth 2-3 mm. feet included.

Colourless in alcohol with the exception of 2-3 large yellow glands in the feet.

Out of the four specimens two are complete, while the others consist of fragments only. The species is mainly characterised by its numerous very slender and transparent setae, all of them spinigerous, a rare occurrence in Nereidae and especially in the genus *Nereis*.

The falcigerous bristles are here replaced by spinigerous with a terminal piece a little shorter, but tapering like the others. The dorsal and upper ventral bristles are homogomph with long terminal piece. The lower ventral setae are slightly hemigomph. The short spinigerous setae, supplying the place of the falcigerous, are hemigomph or faintly heterogomph, especially the inferior ones (Fig. 14e-h).

The proboscis recalls that of *Nereis cricognatha* and *N. nuntia*.

The paragnaths, all of them conical, are more or less pale yellow or transparent and colourless, very little conspicuous. In the specimens before me those of the maxillary ring are larger than those of the oral ring.

The group I is generally composed of a cluster of 4-5 denticles. The groups II and IV are crescentic and the group III, a transverse cluster of 3-4 rows, nearly meets the groups IV, so that the paragnaths form a nearly continuous belt on the maxillary ring, as in *N. cricognatha*. The groups VI are made of a long transverse row of conical denticles fused with the group VII. In front of this row sometimes a few paragnaths form a second row. The group V seems to be wanting, but the groups VI nearly meet on the middle line. The groups VII-VIII include 2-3 more or less irregular rows (fig. 14a-b).

When the groups VI are not in two rows they recall those of *N. nuntia*. If they were more plentiful they would be like those of *N. cricognatha*, but the feet and setae are quite different.

The posterior feet are not so much elongated or modified. In the anterior feet there are three nearly equal dorsal ligules; the median ligule gradually decreases in size but still remains more or less conspicuous in the posterior feet.

The ventral ramus has two fillets of which one is simply conical whilst the other is divided into two unequal diverging lobes, so that this part of the ventral division has a trifid appearance.

In the posterior feet the bifid fillet shortens gradually and becomes faintly bilobed. The ventral ligule is short and blunt and the ventral cirrus is small and subulate.

The parapodial glands are very conspicuous in the dorsal ligule and above the feet.

Habitat.—Chingrighatta.

***Nereis cricognatha* Ehlers.**

Nereis cricognatha, Ehlers 1904, p. 29, pl. iv, figs. 3-7.

Nereis cricognatha, Augener 1913, p. 163; 1924, p. 334; 1927, p. 133.

Nereis cricognatha, Horst 1924, p. 158.

Nereis cricognatha, Fauvel 1930a, p. 24.

Nereis arenaceodentata, Moore, Benham, 1916, p. 134, pl. xlv, figs. 1-3.

Shores of R. Hughly at Budge Budge (*Anmandale*).

Specific Characters.—The proboscis carries numerous horny paragnaths arranged in groups nearly fused together and forming a belt around the oral as well as the maxillary ring. Dorsal division of feet with two subequal ligules. The posterior feet are not materially modified, the dorsal upper ligule being only larger than the lower, but not swollen or foliaceous: the dorsal filiform cirrus is inserted at the base. The ventral falcigerous terminal pieces are all long, knife-like with a small curved hook at the tip; they are homogomph. There are no dorsal falcigerous bristles on the posterior feet.

The specimens are colourless, with brownish-red, or nearly orange-coloured, paragnaths. Group I, 2-3; II-III-IV are coalescent; V, 3, 4 or 5; VI, round clusters of 5 or 6; VII-VIII, a broad belt more or less fused with V-VI forming a nearly complete ring.

The falcate bristles agree with Ehlers' fig. 5. As already noted by Ehlers, this species is very closely allied to *N. caudata* Claparède, differing only in its less crowded groups V, VI, its shorter dorsal cirri and its longer and less markedly heterogomph falcigerous terminal pieces.

The proboscis of *N. succinea* is nearly similar, but the feet and bristles are different.

Owing to the presence of all groups of paragnaths *N. cricognatha* falls into the subgenus *Neanthes*.

Habitat.—New Zealand, Bass Straits, Philippine Islands, India (Krusadai, Hughly).

***Nereis glandicineta* Southern.**

Nereis glandicineta, Southern 1921, p. 589, pl. xxiii, fig. 9.

Banks of the canal near Barantolla, Salt Water Lakes, near Calcutta. Vizagapatam, channel connecting backwater with the sea, farther end of the creek beyond the ferry, shore of channel and harbour. Taléh-Sap, Gulf of Siam, Sta. 13, 22. (*N. Annandale.*)

Specific Characters.—Head narrow in front, wide behind, with two short tentacles in front. Four eyes varying considerably in size, according to the state of maturity. Proboscis: group I, 4-10 unequal; II, 6-13 large curved; III, transversely elongated band in 3-4 rows; IV, 6-12 large teeth; V, 0; VI, one small denticle on a large rounded papilla; VII-VIII, a single row of few minute teeth (occasionally missing altogether). Jaws slender, many-toothed. Posterior feet not materially altered. Dorsal ramus with three slender lobes persisting in the posterior feet. Ventral ramus with setigerous lobe trifold in the anterior and middle feet, bifid in the posterior ones. There are no posterior dorsal homogomph falcate bristles. Ventral falcigerous setae heterogomph, with long knife-like ciliate terminal piece. A girdle of glands on each segment.

Most of the numerous specimens are atokous; a few females full of eggs and a fragment of a male filled with sperms are not modified, but two other males from Vizagapatam (May-June, 1926) are subepitokous. The dorsal cirri are crenate, the atokous setae are still mixed with the oar-shaped swimming bristles. The anterior feet are as yet hardly modified.

The armature of the proboscis is very variable, especially as regards the basal ring. Groups VI typically consist each of a very small denticle borne on a rounded raised papilla, but often the paragnath is missing, leaving only the papilla in its place. The paragnaths of the groups VII-VIII are reduced to a single row of a few denticles, small, transparent and very difficult to detect; frequently they are missing altogether, as in the subgenus

Ceratonereis. The condition of the proboscis showing a tendency to shed the paragnaths of the oral ring and to develop papillae instead, approximates this species to *Leonnates* whose feet are also provided with numerous elongated sharp-pointed diverging lobes. In *Leonnates* the falcigerous bristles have broad, convex, serrated end-pieces, whilst in *N. glandicincta* the corresponding setae, with their long knife-like terminal piece, are short spinigerous rather than genuine falcigerous.

The physical conditions in Taleh-Sap, such as variable salinity of water, agree with those met with in Garia, Calcutta and in Vizagapatam.

Habitat.—Garia (vicinity of Calcutta), Vizagapatam, Taleh-Sap (Gulf of Siam).

***Nereis unifasciata* Willey.**

Nereis unifasciata, Willey 1905, p. 271, pl. iv, figs. 85-88.

Nereis unifasciata, Ehlers 1917, p. 237.

Nereis unifasciata, Horst 1924, p. 153, pl. xxxi, figs. 3, 4.

Nereis unifasciata, Fauvel 1927b, p. 429; 1930, p. 522, fig. 4.

Pearl Oyster Bank, Tuticorin, 12 miles from shore.

Specific Characters.—Longer tentacular cirri reaching backwards to 7-12th segment. Proboscis: group I, 3 to 6, in a longitudinal line; II and IV, crescentic clusters; III, a rectangular cluster of 3 rows; V, O; VI, oval or square cluster of 2-4 irregular rows; VII-VIII, a single row of 6-7 large paragnaths. Anterior feet with short rounded lobes, two in each division. In the middle and posterior-feet dorsal ramus with two subequal triangular diverging ligules, ventral ramus with a conical setigerous lobe and a narrow, blunt inferior ligule. Heterogomph ventral falcigerous bristles with a short sickle-shaped terminal piece. There are no posterior dorsal homogomph falcigerous bristles. A dark brown collar across the whole of the dorsum of the second setigerous segment (in the living specimen). Rusty brown glands in the feet and in a line across each segment.

The specimen from Tuticorin agree closely with the figures and description of Willey. The lower ventral spinigerous bristles are also rather hemigomph than clearly heterogomph. A few of the ventral falcigerous bristles are very large, as in many species of *Ceratonereis*.

Horst's specimens were epigamous. He figures the terminal piece of the falcigerous setae as more elongated.

In spite of a great resemblance to *N. trifasciata*, *N. unifasciata* is readily distinguished by the absence of posterior dorsal homogomph falcigerous bristles.

Habitat.—Ceylon, Tuticorin, Philippine Islands, Moluccas, New Caledonia, Suez Canal.

***Nereis talehsapensis*, sp. nov.**

(Pl. II, figs. 10-17.)

Taléh-Sap, Gulf of Siam. (Jan. 1916, *N. Annandale*).

Specific Characters.—Body stout, cylindrical, tapering posteriorly. 80 segments and more. Prostomium short and broad. Four eyes, middle-sized, arranged in a wide-opened trapezium. Two small tentacles separated from each other, at their base, by the anterior rounded border of the prostomium. They are about as long as the palpopores. Palps short, large, conical, diverging. Peristomium larger than the following segment. Upper

tentacular cirri long and slender, the posterior ones reaching backwards to the 7-11th setigerous segment. The inferior ones, subequal, hardly overreaching the second setigerous (pl. ii, fig. 10). Jaws clearly denticulated. Paragnaths conical: 1, 2, behind each other; II-IV, crescentic clusters; III, rectangular cluster of 3-4 rows; V, 0; VI, on each side, 4-5 large ones cross-wise or in an irregular cluster; VII-VIII, 3-4 irregular rows of large conical denticles (pl. ii, figs. 11, 12). Parapodia elongated with somewhat slender divisions, posterior feet hardly altered (pl. ii, figs. 15-17). In the anterior feet, dorsal ramus with a long cirrus, three sharp pointed ligules, the upper one *shorter than the two inferior ones borne on an elongated common base* (pl. ii, fig. 16). Ventral ramus with two unequal lobes or fillets, the anterior conical and the posterior rounded and much shorter, an inferior ligule as long as the conical fillet, a slender and short ventral cirrus. In the posterior feet (pl. ii, fig. 15) the median dorsal ligule disappears after having progressively decreased in size; the upper ligule is not enlarged. Dorsal setae homogomph spinigerous; upper ventral setae homogomph spinigerous and long hemigomph falcigerous, lower ventral setae hemigomph spinigerous (pl. ii, fig. 14) and heterogomph falcigerous with an elongated terminal piece, ciliated and ending in a curved hook connected to the edge by a ligament (pl. ii, fig. 13). There are no dorsal homogomph falcigerous bristles in the posterior feet. Acicula rather pale. Two long filiform anal cirri. About 15-20 mm. in length and 3-4 mm. in breadth, feet included.

Discoloured in alcohol.

One of the specimens is complete, the others are more or less incomplete.

This species is readily characterized by its anterior feet with three slender dorsal lobes, of which the two lower ones are borne on a very elongated common base thus ending in two equal elongated, digitiform ligules (pl. ii, fig. 16). Farther back, the median ligule decreases in size (pl. ii, fig. 17). In the 30th foot, it is already much shorter than the lower one which is noticeably longer than the uppermost ligule. In the 50th foot the median ligule is still more reduced, but otherwise the foot is hardly modified. Only in the last feet, the 70th, for example, the dorsal ramus protrudes largely above the ventral ramus but its appearance is not materially altered (pl. ii, fig. 15).

The bristles are plentiful and slender. In the anterior feet the lower ventral setae are clearly heterogomph; further back they are rather hemigomph, sometimes even nearly homogomph in the posterior feet (pl. ii, fig. 14) or with a three-point articulation as in *Nereis irrorata* Malmgren.

The armature of the proboscis recalls that of *Nereis pelagica* L., indeed a rather common disposition, but the feet and setae are quite different. Instead of the short triangular sickle-shaped terminal pieces of *N. pelagica* there are in this species ciliated elongate, nearly straight pieces ending in a hook bent down on the edge, as in *Nereis kerguelensis* Mc Int. (pl. ii, fig. 13). Lastly, there are no homogomph dorsal falcigerous bristles in the posterior feet.

Habitat.—Taléh-sap (Gulf of Siam).

***Nereis chilkaensis* Southern.**

Nereis chilkaensis, Southern 1921, p. 584, pl. xxii, fig. 8.

S. end of Lake Chilka, N. E. Madras; Mouth of Madachua Bay; Ennur Backwater, Madras; Madras Harbour; Pamban beach, in dead corals (*B. N. Chopra* and *H. S. Rao*). Febr. 1925.

Specific Characters.—Head considerably narrower in front than behind. Prostomium projecting a little in front between the tentacles. Palps large and stout. Posterior tentacular cirri reaching back to 6-8th and even 12th segment. Proboscis: group I, 6-10; II, 18-20; III, a cluster of 26-34; IV, triangular cluster; V, 0; VI, irregular curved row of 3-7, on each side; VII-VIII, two alternating irregular rows. Anterior feet, dorsal division with a long cirrus, three ligules, ventral division with a fillet produced outwards into two conical lobes, a blunt ligule and a short ventral cirrus. In the posterior feet, the dorsal division is relatively larger and more prominent than the ventral division but the upper ligule is not enlarged and foliaceous. Falcate heterogomph setae with moderately long terminal pieces, smooth at the tip, spinose below. There are no dorsal homogomph falcigerous bristles in the posterior feet. Dorsum deeply coloured with purplish brown pigment, dark in front and growing paler behind.

The size varies between 40 and 100 mm. and the number of segments is about 80.

Although a specimen from the Pamban beach is a female full of eggs it is still atokous.

I can fully endorse Southern's opinion as regards considerable variation in this species. Sometimes the ventral falcigerous bristles are reduced in number to one or two large ones, and when these large bristles are missing only spinigerous setae remain.

Habitat.—Madras, Chilka Lake, Ennur Backwater, Pamban.

***Nereis trifasciata* Grube.**

Nereis trifasciata, Grube 1878, p. 74.

Nereis trifasciata, Ehlers 1901, p. 106, pl. xii, figs. 1-7.

Nereis trifasciata, Augener 1922, p. 177, fig. 3.

Nereis unifasciata (non Willey), Fauvel 1919, p. 397; 1921, p. 7, pl. i, figs. 8, 9.

"Investigator" Sta. 650, Fehendu, Maldives.

Specific Characters.—Long tentacular reaching backwards to about the 7th segment. Proboscis: group I, 0; II and IV, crescentic clusters; III, rectangular cluster; V, 0; VI, a small cluster of 3 to 6, on each side; VII-VIII, a single row of 2-7 small paragnaths. Anterior feet with short rounded lobes, two in each division. In the middle and posterior feet, dorsal ramus with two subequal triangular ligules, ventral ramus with a blunt setigerous lobe and a narrow conical inferior ligule. Dorsal cirri longer than the foot. Heterogomph ventral falcigerous bristles with a short sickle-shaped smooth or ciliated terminal piece. In the posterior feet, a dorsal homogomph falcigerous bristle with more or less elongated straight terminal piece. Dark brown transverse streaks on the anterior segments. Dorsal glands in the feet.

The specimens from Sta. 650 tally very well with those from Djibouti and from Madagascar, which I described under the name of *N. unifasciata*. Although these specimens were provided with posterior dorsal falcate setae, not mentioned by Willey, I thought that such setae had only been overlooked. But the survey of the above described *N. unifasciata* from Tuticorin proves Willey's species to be altogether devoid of such bristles. Both forms, though very much alike, can be readily distinguished by the presence or absence of these posterior dorsal bristles.

Habitat.—Red Sea, Madagascar, Maldives, Philippine Islands, Juan Fernandez.

Nereis indica Kinberg.

Nereis indica, Kinberg 1865, p. 160.

Nereis indica, Willey 1905, p. 270.

Nereis indica, Fauvel 1930a, p. 24.

Nereis sp. near *ezoensis*, Gravely 1927, p. 13, pl. x, fig. 22.

Waltair beach (S. W. Kemp).

Specific Characters.—Proboscis : group I, 1 or 0 ; II, two curving rows ; III, a lozenge-shaped cluster ; IV, triangular clusters ; V, 0 ; VI, on each side, a rounded cluster of 4-6 ; VII-VIII, 1 or 2 large rows and a row of numerous minute denticles. Tentacular cirri short. Dorsal ramus of the anterior feet trilobed. Posterior feet not modified, their upper ligule is not strongly enlarged. Ventral heterogomph falcigerous bristles with sickle-shaped terminal pieces. There are no posterior dorsal homogomph falcigerous bristles.

Habitat.—Bangka Straits ; Gulf of Manaar.

Nereis coutierei Gravier.

Nereis coutierei, Gravier 1901, p. 167, pl. xi, figs. 36-41.

Nereis coutierei, Fauvel 1911, p. 384, pl. xix, fig. 17 ; 1919, p. 397 ; 1927b, p. 428 ; 1930a, p. 22.

“Investigator” Sta. 655, Andamans weed washings ; Addu Atoll, weed washings.

Specific Characters.—Body slender, size small. Prostomium not notched. Proboscis : group I, 1 ; II and IV, small clusters ; III, a small transverse cluster ; V, 0 ; VI, on each side, a small rounded cluster of 5-7 ; VII-VIII, a single row of 6-8 far apart. In the anterior feet, dorsal ramus with two conical equal ligules and a long dorsal cirrus. Ventral setigerous lobe blunt, rounded. In the posterior feet, the dorsal ligule is enlarged into a rounded crest. Ventral heterogomph falcigerous bristles with short sickle-shaped terminal piece. Dorsal homogomph falcigerous bristles not boldly denticulate in the posterior feet.

Only two small specimens, one of them doubtful, are in the collection.

Habitat.—Red Sea, Persian Gulf, Suez Canal, Gulf of Manaar, Andamans.

Nereis zonata Malmgren.

var. ***persica*** Fauvel.

Nereis zonata-persica, Fauvel 1911, p. 385, pl. xix, figs. 10-16, 18-23 ; pl. xx, fig. 24-25 ; 1919, p. 398 ; 1927b, p. 428.

Nereis zonata-persica, Pruvot 1930, p. 47, pl. iii, figs. 65-68.

Eight miles south of Pamban, 1889, 18 fms. ; Mormugao Bay.

Specific Characters.—Body rounded. Proboscis : group I, 0 or 1 ; II-IV, crescentic clusters ; III, transverse cluster of 2-3 rows ; V, 0 ; VI, a rounded or oval cluster of 6-10, on each side ; VII-VIII, an anterior row of rather large denticles and 2-5 irregular rows of small and numerous denticles. Dorsal ramus with a long cirrus and two conical subequal ligules. Ventral setigerous lobe short, rounded. Posterior feet not materially modified, dorsal ligule not enlarged. Ventral heterogomph falcigerous bristles with short sickle-shaped terminal piece. In the posterior feet, large homogomph falcigerous bristle with bi-or tri-dentate end-pieces.

The specimen from Mormugao Bay is somewhat doubtful, its homogomph posterior falcigers being smooth. But Pruvot (1930, p. 48) noticed such smooth terminal pieces with typical ones in specimens from New Caledonia.

Habitat.—Red Sea, Persian Gulf, Madagascar, India, New Caledonia.

***Nereis kauderni* Fauvel.**

Nereis kauderni, Fauvel 1921, p. 8, pl. i, figs. 1-7; 1930a, p. 22; 1930b, p. 525.

Nereis falcaria, Gravely 1927, p. 12, pl. x, fig. 20.

Nereis mortenseni, Augener 1923a, p. 21, figs. 7-14; 1924, p. 319, fig. 4.

(?) *Ceratonereis falcaria*, Willey 1905, p. 272, pl. iv, fig. 89.

"Investigator" Sta. 655, Goifurfehendu Atoll, Maldives, weed washings; Tuticorin, Pearl Oyster Bank, 12 miles from shore.

Specific Characters.—Body small, cylindrical, slender. Prostomium notched between the tentacles. Tentacular cirri short. Proboscis: group I, 0; II, a more or less irregular row; III, a variable cluster; IV, a crescentic group; V, 0; VI, on each side, a small cluster of very minute paragnaths; VII-VIII, a single row of 8-9 paragnaths. Dorsal cirri longer than the foot. Dorsal ramus with two conical subequal ligules. Ventral setigerous lobe blunt. In the posterior feet, the dorsal ligule is much reduced. Ventral heterogomph falcigerous bristles with sickle-shaped ciliate terminal piece. In the middle and posterior feet, 1-2 large homogomph falcigerous bristles with prominent bi- or tri-dentate terminal piece. A pattern of elongated transverse pigment spots on the anterior segments.

This species is rather variable, especially in regard to the shape of the posterior feet the dorsal ligule of which may be more or less reduced, in the length of the dorsal cirri and the size of the paragnaths. Its identity with *Ceratonereis falcaria*, is doubtful as in the latter species, according to Willey, paragnaths are missing on the oral ring, but as they are sometimes only slightly conspicuous they may have been overlooked (?). I have already discussed the affinities of *N. kauderni* with *N. jacksoni* (1930a, p. 22, 1930b, p. 525). Both species are at least very closely allied.

Habitat.—Indian Ocean, Madagascar, Red Sea, Ceylon, Maldives, Pacific Ocean, New Zealand, New Caledonia, Australia.

***Nereis jacksoni* Kinberg.**

Nereis jacksoni, Kinberg 1865, p. 69.

Nereis jacksoni, Augener 1922, p. 18; 1924, p. 317; 1927, p. 130.

Nereis jacksoni, Pruvot 1930, p. 44.

Nereis jacksoni, Fauvel 1930b, p. 524.

Nereis denhamensis, Augener 1913, p. 156, pl. iii, fig. 51.

Nereis denhamensis, Fauvel 1917, p. 204, pl. vi, figs. 45, 46.

Nereis heirissonensis,* Augener 1913, p. 159, pl. iii, fig. 52.

(?) *Ceratonereis falcaria*, Benham (*non* Willey), 1916, p. 136, pl. xlvi, figs. 4-10.

"Investigator" Sta. 650, Maldives, Addu Atoll; Andamans; Kilakarai.

Specific Characters.—Body small, cylindrical, slender. Prostomium not notched between the tentacles. Tentacular cirri short. Proboscis: group I, 0; II, two curved rows; III, a transverse cluster; IV, crescentic clusters; V, 0; VI, on each side, a small cluster

of very small paragnaths ; VII-VIII, a single row of about 7 wide apart. Dorsal ramus with two conical subequal ligules. Dorsal cirri longer than the foot. Ventral setigerous lobe blunt. In the posterior feet, the dorsal ligule is more or less reduced. Ventral heterogomph falcigerous bristles with sickle-shaped ciliate terminal piece. In the middle and posterior feet, 1-2 large homogomph falcigerous bristles with prominent bi- or tri-dentate terminal piece.

This species differs from *N. kauderni* in having its prostomium not notched between the tentacles, otherwise the two species can hardly be distinguished from each other. They show the same variability in colour, the length of the dorsal cirri and in the posterior feet whose dorsal ligule is often very much reduced to a small conical knob under the dorsal cirrus, or sometimes hardly modified. The paragnaths are occasionally so very small and pale that they seem to be missing and can only be detected by a careful examination. The latter condition brings it closer to *Ceratonereis* and, according to Augener, the paragnaths are sometimes missing on the oral ring.

As regards the main distinctive feature, viz., the condition of the prostomium notched between the antennae in *N. kauderni* and not notched in *N. jacksoni*, it is necessary to remark that many intermediate forms are often met with, which are difficult to assign to either of the two species. The peculiar homogomph dorsal falcate bristles are very similar in *N. kauderni*, *N. jacksoni*, *N. zonata-persica* and *N. funchalensis*, the last two species differing from the first mainly in having several rows of paragnaths in groups VII-VIII. These four species are perhaps only varieties of one and the same form.

Habitat.—Bay of Bengal, Pacific Ocean, Australia, New Zealand, New Caledonia.

Subgenus **Ceratonereis**.

Paragnaths missing on the oral ring.

Nereis (Ceratonereis) mirabilis Kinberg.

Ceratonereis mirabilis, Kinberg 1865, p. 70.

Ceratonereis mirabilis, Ehlers 1887, p. 117-120, pl. xxxviii, figs. 1-6.

Ceratonereis mirabilis, Gravier 1901, p. 172, pl. xi, fig. 12.

Ceratonereis mirabilis, Fauvel 1917, p. 207 (Synonymy).

Ceratonereis mirabilis, Gravely 1927, p. 13, pl. x, fig. 21.

Ceratonereis tentaculata, Kinberg, Augener, 1913, p. 168.

Ceratonereis tentaculata, Horst 1924, p. 180, pl. xxxv, figs. 4-7.

“Investigator” Sta. 650, Fehendu Island, Maldives ; Krusadai and Shingle Islands ; Pamban, from coral reefs ; Andamans ; Kilakarai, from coral reefs ; North Andaman, littoral fauna.

Specific Characters.—Prostomium deeply cleft between the tentacles. Palps elongated. Tentacular cirri and dorsal cirri very long. Proboscis : group I, 0 ; II and IV, triangular clusters ; III, a transverse cluster of several rows. Dorsal ramus with two long slender, subequal ligules. Posterior feet little modified. Spinigerous setae homogomph and heterogomph. Falcigerous setae heterogomph, with long straight ciliated terminal piece becoming shorter and more sickle-shaped in the posterior feet. Dorsal homogomph falcigerous bristles in the posterior feet.

All the specimens are small and atokous. According to Gravely, the species is not uncommon in Krusadai and Shingle Islands.

It is easily recognized by its deeply cleft prostomium, the very great length of its dorsal and tentacular cirri and the slender elongated ligules of the dorsal division of the feet. The posterior dorsal homogomph falcigerous bristles have a sickle-shaped terminal piece.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Amboina, New Caledonia, New Zealand, Honolulu, Australia, Atlantic Ocean, Brazil, West Indies.

***Nereis (Ceratonereis) tripartita* Horst.**

(Text-fig. 15.)

Nereis (Ceratonereis) tripartita, Horst 1924, p. 183, pl. xxxvi, figs. 1, 2.

Andamans, in coral.

Specific Characters.—Tentacular cirri reaching backwards to the 8-9th segment. Proboscis: group I, 0; II-IV, triangular clusters of numerous small, pale paragnaths; III, a large transverse cluster of several rows. In the anterior feet, a dorsal cirrus longer than the foot, two subequal sharp conical dorsal ligules. Ventral setigerous lobe short and blunt, ventral cirrus long and slender (fig. 15*a*). Posterior feet not increased. Homogomph and

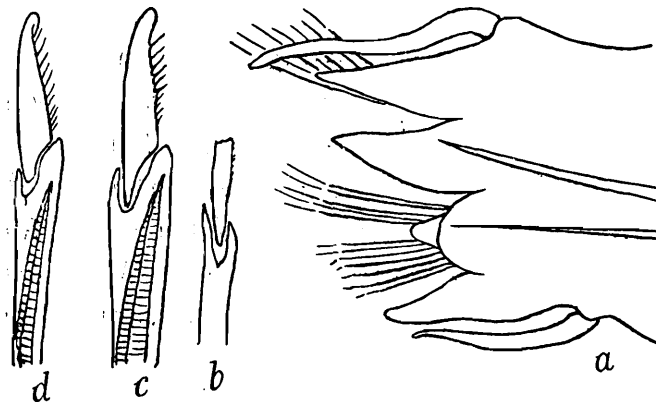


FIG. 15.—*Ceratonereis tripartita*: *a*, 9th foot $\times 45$; *b*, heterogomph spinigerous bristle from a posterior foot $\times 400$; *c*, upper ventral falcigerous bristle from 9th foot $\times 400$; *d*, lower ventral falcigerous bristle from 9th foot $\times 400$.

heterogomph spinigerous bristles (fig. 15*b*). Ventral heterogomph falcigerous bristles with sickle-shaped ciliate terminal piece (fig. 15*c-d*); some of them very stout, but compound. There are no posterior dorsal homogomph falcigerous bristles. A single atokous specimen, Horst's specimens were all epitokous and he did not, therefore, describe the proboscis.

Habitat.—Malay Archipelago, Andamans.

***Nereis (Ceratonereis) microcephala* Grube.**

(Text-fig. 16.)

Nereis (Ceratonereis) microcephala Grube, 1878, p. 65.

Taléh-Sap, Gulf of Siam (*N. Annandale*).

Specific Characters.—Prostomium small, not notched between the tentacles. Four black eyes arranged in a widely opened trapezium. Tentacles shorter than the palpopores which are very large, blunt, conical, and diverging. Two inferior pairs of tentacular cirri shorter than the upper ones which reach backwards to the 7-8th segment. Proboscis:

maxillary ring small, oral ring (devoid of paragnaths) much larger. Paragnaths pale yellow. Group I, 0; II, crescentic clusters of 2-3 rows; III, a broad and short transverse cluster of 3-4 irregular rows; IV, several curved rows. The posterior feet are not modified. In the anterior feet (fig. 16, *b*), dorsal ramus with two triangular subequal ligules and dorsal

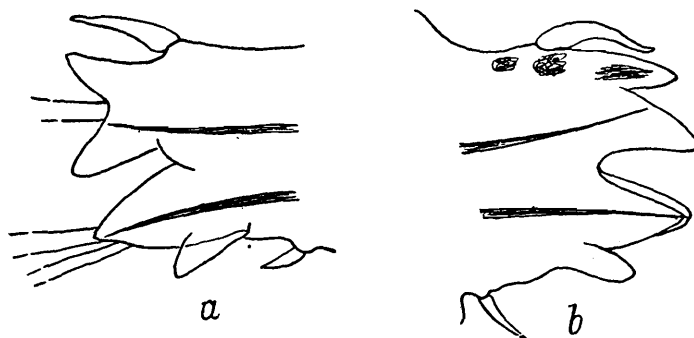


FIG. 16—*Ceratonereis microcephala*: *a*. foot from midbody. $\times 60$; *b*. 20th foot. $\times 60$.

cirrus about the length of the ligules. Ventral setigerous lobe conical, as long as the dorsal ramus, ventral ligule blunt and much shorter. Ventral cirrus small, much shorter than the ventral ligule (fig. 16, *b*). Dorsal and upper ventral spinigerous bristles homogomph, lower ventral ones heterogomph. All setae long and slender. Falcigerous homogomph ventral setae present in the anterior feet, missing in the posterior ones.

The single specimen collected agrees very well with Grube's description as regards the proboscis and the feet, which are unfortunately not figured. According to Grube, the setae are slender (*tenerae*) and the *falcigerae* are missing in the posterior feet as noticed above.

The species differs from *C. tripartita* in (1) the shape of the feet which are shorter and more blunt, (2) its very much shorter ventral cirrus, and (3) the absence of posterior ventral falcigerous bristles and its more slender setae. The armature of the proboscis is the same in both species.

Habitat.—Philippine Islands, Taléh-Sap (Gulf of Siam).

Nereis (Ceratonereis) flagellipes, sp. nov.

(Pl. III, figs. 1-8.)

"Investigator" Sta. 76, 25 miles south of Barwa Beacon; Ganjam Coast, 93 fms.

Specific Characters.—Prostomium broader than long, not notched between the tentacles. Four rather large eyes, with a lens, arranged in a widely opened trapezium. Tentacles about the length of the palpophores. Palps stout, ovoid. Tentacular cirri rather short, the longest reaching backwards to the 6th setigerous segment. Peristomium hardly longer than the succeeding segment (pl. III, fig. 1). Jaws very pale yellow, transparent, with 5-6 teeth, the inferior ones blunt. Paragnaths missing on the oral ring. On the maxillary ring they are sharp conical, transparent, little conspicuous. Group I, 0 (or 1?); II, small clusters of 3-4; III, a transverse row of 3; IV, small clusters of 2-5 (pl. III, fig. 2). Parapodia: on the 5-6 first setigerous segments the dorsal cirrus is more or less of the same length as the dorsal ligule. The dorsal and the ventral ramus are divided each into two elongated conical ligules whose tip is already slightly filiform in the upper dorsal one. The ventral cirrus is shorter (pl. III, fig. 3). In the succeeding feet, the dorsal ligules become flagelliform (whip-like) and much longer than the cirrus. In the ventral ramus the

setigerous lobe is much elongated and divided at the tip into two filiform appendages corresponding to the two fillets. The ventral ligule is whip-like and nearly as long as the dorsal ligules, and the ventral cirrus is much shorter (pl. III, fig. 4). Behind the 20th foot, the ligules still increase in length, especially the ventral one, and are more or less coiled (pl. III, fig. 5). (The posterior feet are unknown). The dorsal bristles are slender homogomph spinigerous (pl. III, fig. 6). The upper ventral bristles are long and slender homogomph spinigerous and heterogomph falcigerous (pl. III, fig. 7); the lower ventral ones are hemigomph or faintly heterogomph falcigerous and long heterogomph falcigerous ones (pl. III, fig. 8).

Of this interesting species, unfortunately, only a single anterior fragment was collected; it is 32 mm. in length and 2 mm. broad (feet included) and has 36 segments.

The proboscis is extruded. Owing to their great transparency the paragnaths are not easily detected. They seem to be missing in group I. Several tentacular cirri have fallen off. The ventral ones are shorter than the basal ring of the proboscis, the anterior dorsal one reaches backwards to the 6th setigerous segment. Between the tentacles protrudes a small prostomial knob (pl. III, fig. 1).

The species is well characterised by the highly anomalous shape of its parapodial ligules stretching into long curling whips inside of which vascular loops extending to the tip are easily detected through the translucent walls (pl. III, figs. 4-5).

On the third setigerous segment the dorsal cirrus is longer than the dorsal ligule which is still relatively short. On the 5th and 6th foot the dorsal ligule is very tapering and longer than the dorsal cirrus (pl. III, fig. 3). In the succeeding segments this dorsal ligule, still more elongated, is already whip-like; the ventral ligule stretches also, but not to such an extent. On the 20th foot, all the ligules are flagelliform, more or less coiled, whilst dorsal and ventral cirri are comparatively short (pl. III, fig. 4). The shape of the ventral setigerous lobe is very peculiar; instead of the two usual more or less marked fillets there is a long cylindrical process divided at the tip into two long cirriform appendages, very likely representing the two fillets the common base of which is curiously stretched out.

These processes are, all of them, very much longer and more whip-like than the large, already peculiar, dorsal cirri of *Ceratonereis mirabilis*.

The structure of the feet in the 34th and 35th feet (pl. III, fig. 5) is the same. Unfortunately the animal is incomplete behind, and the shape of the posterior feet remains unknown.

The bristles are very slender and delicate. The dorsal and upper ventral setae are homogomph spinigerous.

The rather scarce lower ventral spinigers are hemigomph or faintly heterogomph. The ventral falcigerous bristles are heterogomph. Those of the anterior feet have elongated knife-like terminal pieces (pl. III, fig. 8); on the succeeding feet the terminal pieces are shorter, more bent and conspicuously ciliated (pl. III, fig. 7).

This very singular species belongs, from the armature of its proboscis, to the subgenus *Ceratonereis*, but, even in the other genera of the family of Nereidae, I know of no described species having such a peculiar shape of the feet.

It is unfortunate that this species has to be based on a unique and incomplete specimen.

Habitat.—Ganjam Coast.

Genus **PERINEREIS** Kinberg.

Horny paragnaths on both rings of the proboscis. Paragnaths of group VI transverse, ridge-shaped or a transverse row of more or less flattened denticles. Parapodia biramous.

- | | |
|---|----------------------------|
| 1. Groups VII-VIII absent | <i>P. suluana</i> . |
| Groups VII-VIII present | 2 |
| 2. A transverse row of many small denticles in the groups VI | 3 |
| Only one or two large flattened paragnaths in each group VI | 4 |
| 3. Groups I and II absent | <i>P. neo-caledonica</i> . |
| Groups II present | <i>P. nuntia</i> . |
| 4. Two transverse paragnaths in each group VI | 5 |
| A single transverse paragnath in each group VI | 7 |
| 5. A single paragnath in group V | <i>P. singaporiensis</i> . |
| A triangular patch of three paragnaths in group V. | 6 |
| 6. Paragnaths of groups VI narrow and little flattened | <i>P. aibuhitensis</i> . |
| Paragnaths of groups VI broad and flattened | <i>P. vancaurica</i> . |
| 7. Group V missing | <i>P. cavifrons</i> . |
| A triangular patch of three paragnaths in group V, or a single large one | 8 |
| 8. A cluster of 4-12 paragnaths in group I. Posterior feet enlarged | <i>P. nigropunctata</i> . |
| One, two or three paragnaths behind each other in group I. Posterior feet not materially enlarged | 9 |
| 9. Tentacular cirri reaching backwards to the 5-6th setigerous segment | <i>P. cultrifera</i> . |
| Tentacular cirri reaching backwards to the 7-9th setigerous segment | <i>P. helleri</i> . |

Perinereis suluana Horst.

Perinereis suluana, Horst 1924, p. 175, pl. xxxiii, fig. 9.

Perinereis suluana, Monro 1926, p. 318.

"Investigator", Andamans, 17 fms.

Specific Characters.—Proboscis: group I, 2-3 in a line; II-IV, clusters; III, a transverse cluster of 3-4 rows; V, 0; VI, a single ridge-shaped paragnath on each side. *Groups VII-VIII absent*. Posterior dorsal ligule large but not flag-like. Falcigerous setae with a short terminal piece.

The single specimen in the collection is complete.

The prostomium is white with three longitudinal brown streaks. In the anterior part of the body, the dorsum is dark-brown with a narrow white line across the middle of each segment. Further on the white line divides the segment into two unequal brown bands, the anterior one narrower. In the posterior part of the body the pigment is reduced to two or three transverse, narrow patches.

The colour and pattern agree with Monro's description.

The posterior tentacular cirri, rather slender and streaked with brown pigment, reach backwards to the 4th setigerous segment.

The palps, longer than the tentacles, are stout and nearly cylindrical. The eyes are large, black, with a lens, and set in a square.

The species is easily identified by the absence of the groups VII-VIII, but I believe I have observed a very small denticle on the right side of VIII (?)

In the posterior feet, the dorsal ligule is larger and protrudes above the ventral ramus but is not foliaceous and flag-like.

Habitat.—Sulu Archipelago, Darros Island in the Amirantes, Andamans.

***Perinereis singaporiensis* Grube.**

Perinereis singaporiensis, Grube 1878, p. 84.

Perinereis singaporiensis, Horst 1924, p. 169, pl. xxxiv, figs. 1-2.

Perinereis singaporiensis, Pruvot 1930, p. 55, pl. iii, figs. 62-64.

"Investigator" Sta. 571, Jack and Una Islands, Mergui—shore collecting; Diamond Island, Rock Pool Reefs.

Specific Characters.—Proboscis: group I, 1-3; II, a rhomboidal cluster of 8-9; III, a transverse tristichous group; IV, crescentic groups, V, 0; VI, 2 transversely elongated paragnaths on each side (with one or two conical ones between them?); VII-VIII, two or three rows. Terminal piece of the falcigerous bristles rather long, little curved and ciliated. Posterior feet not increased, but dorsal ligule stout and protruding above the ventral ramus.

The specimen from Jack and Una Islands being incomplete behind I could not verify whether the posterior feet were enlarged or not. Horst does not mention this peculiarity and Pruvot figured one with a long massive dorsal ligule. I failed to detect the small conical accessory denticles of group VI, mentioned by Horst and by Pruvot.

Habitat.—Singapore, Malay Archipelago, Jack and Uua Islands, Diamond Island, New Caledonia.

***Perinereis vancaurica* (Ehlers).**

Nereis vancaurica, Ehlers 1868, p. 503, pl. xx.

Nereis vancaurica, Fauvel 1923 b, p. 34 (Synonymy).

Nereis languida, Grube 1867, p. 13, pl. ii, fig. 1.

Perinereis horsti, Gravier 1901, p. 182, pl. xi, fig. 47.

Perinereis nancaurica, Augener 1922 a, p. 23.

"Investigator" Sta. 571, Jack and Una Islands—Shore collecting.

Specific Characters.—Proboscis: group I, 1, 2; II, crescentic clusters; III, a square cluster; IV, triangular clusters; V, 3 set in a triangular patch; VI, on each side, two transverse elongated paragnaths; VII-VIII, 3 rows. Tentacular cirri reaching backwards to the 4-5th setigerous segment. Terminal pieces of falcigerous bristles straight and ciliated. Posterior feet not enlarged. There is sometimes an accessory denticle on group V.

The single specimen collected is normal, with two very broad paragnaths on each group VI.

Habitat.—Nankauri, Philippine Islands, New Zealand, Red Sea, Atlantic (French Guiana).

Perinereis cultrifera Grube.

Perinereis cultrifera, Fauvel 1914 b, p. 190, pl. xvi, figs. 1-13; 1923a, p. 352, fig. 137 (Synonymy) 1930 b, p. 527.

Perinereis floridana, Ehlers, Gravier 1901, p. 185, pl. xi, fig. 48.

Perinereis perspicillata, Grube 1878, p. 90, pl. iv, fig. 10.

Perinereis striolata, Grube, Pruvot 1930, p. 60.

Perinereis helleri, Grube 1878, p. 81.

Perinereis helleri, Pruvot 1930, p. 62.

Perinereis camiguina, Grube 1878, p. 87.

Perinereis obfuscata, Grube 1878, p. 86.

Perinereis obfuscata, Horst 1924, p. 173, pl. xxxiv, figs. 5, 6.

Specific Characters.—Proboscis: group I, 1, or a few in a line, or a small cluster; II-IV, clusters; V, 1 or a triangular patch of three; VI, a single broad flattened paragnath on each side; VII-VIII, 2-3 rows. Tentacular cirri of variable length. Falcigerous setae with short sickle-shaped terminal pieces. Posterior feet not modified.

Perinereis cultrifera is a species liable to extensive variation, especially as regards the armature of the proboscis, the length of the cirri and the shape of the dorsal ligule.

The paragnaths of group I are most frequently only two or three set in a longitudinal line, but they may be reduced to a single one or increased in number to 8-10 forming a small patch. Group V is generally formed of a triangular patch of three large denticles, but may be reduced to a single large one, as in the form *floridana*. Individual variations of two or four denticles arranged irregularly are sometimes met with.

Many of the so-called species are mere varieties of the typical *P. cultrifera*. They are not even local races, for most of them are found wherever *P. cultrifera* is plentiful, but are somewhat rare. Intermediate forms are frequent which connect together these varieties.

In the English Channel, and on the coasts of Normandy and Brittany, I have more than once found several of the so-called exotic species.

Strangely enough, whilst in certain localities only the typical form is met with, in stations only a few miles distant the proportion of anomalous specimens which exhibit characters of known varieties, individual sports or monstrosities is rather high.

The principal varieties, or subspecies, of *Perinereis cultrifera* are tabulated in the following key.

- | | |
|--|---|
| 1. Group V, a triangle of 3 paragnaths | 2 |
| Group V, a single paragnath | 4 |
| 2. Group I, 1 to 3 in a longitudinal line | 3 |
| Group I, a small cluster of 4-8 | <i>P. perspicillata</i> . |
| 3. Tentacular cirri reaching backwards to the 5-6th setigerous segment | <i>P. cultrifera</i> . |
| Tentacular cirri reaching backwards to the 7-8th setigerous segment | <i>P. helleri</i> (= <i>P. camiguina</i>). |
| 4. Group I, 1 or 2 in a line | <i>P. floridana</i> . |
| Group I, a small cluster of 4-5 | 5 |
| 5. Tentacular cirri reaching backwards to the 3rd setigerous segment | <i>P. obfuscata</i> . |
| Tentacular cirri reaching backwards to the 9th setigerous segment | <i>P. striolata</i> . |

In all these forms the posterior feet are not materially modified. The dorsal ligule, in fact, protrudes over the ventral division, but is not enlarged into a large flag-like process bearing the dorsal cirrus near its tip, as in *P. novae-hollandiae* Kinberg, *P. pseudocamiguina* Augener, *P. nigropunctata* Horst, *P. macropus* and *P. marionii* of the coasts of Europe.

Perinereis cultrifera Grube.

var. **typica**.

"Investigator" Sta. 616, Camorta Island; Sta. 625, Camorta I, Nicobars; Sta. 657, Andamans; Sta. 666, Andamans, on coral and mud reef; Port Blair, Andamans; Diamond Harbour, Rock-Pool Reef; Cape Comorin.

Group I, 1-3 in a line; V, a triangular patch. Tentacular cirri reaching to the 5-6th segment.

All the specimens in the collection are atokous.

In one specimen from Sta. 666 the groups VI present an anomaly which is not of very rare occurrence; there is only one large transverse paragnath on one side, as is normally the case, and two on the other side.

Habitat.—Cosmopolitan—Atlantic, Pacific and Indian Oceans.

Perinereis cultrifera Grube.

var. **floridana** Ehlers.

Cape Comorin. A single specimen in poor condition.

Group I, 1-2 in a line; V, a single large paragnath.

Habitat.—Atlantic Ocean, English Channel, India, Malay Archipelago.

Perinereis cultrifera Grube.

var. **perspicillata** Grubé.

Mormugao Bay.

Group I, a small cluster of 4-8 paragnaths; V, a triangle of three.

A single small atokous specimen.

Habitat.—Philippine Islands, Singapore, Persian Gulf, New Caledonia, Coasts of France.

Perinereis cultrifera Grube.

var. **helleri** Grube.

Perinereis helleri, Grube 1878, p. 81.

Perinereis helleri, Chamberlin 1919, p. 127, pl. xxxv, fig. 8.

Perinereis helleri, Horst 1924, p. 172, pl. xxxiv, figs. 3, 4.

Perinereis camiguina, Grube 1878, p. 87.

Perinereis camiguina, Augener 1922 b, p. 23.

Pamban Beach, in dead corals; Tuticorin, shore collecting; Bombay Harbour, shore collecting; Mergui; Tor, Sinai Peninsula.

Group I, 2, one behind the other; V, a triangular group of 3 large paragnaths. Tentacular cirri reaching backwards to the 8-9th segment.

The numerous specimens in the collection are atokous. They agree quite well with Grube's and Horst's descriptions, and Gravelly's specimens from Krusadai (figured 1927, pl. x, fig. 26) also belong to the same variety of *P. cultrifera*.

Perinereis helleri differs from the typical *P. cultrifera* only in having longer tentacular and dorsal cirri.

The armature of the proboscis is identical. Sometimes, in the groups VII-VIII, the anterior one of the three rows is more distinct and its paragnaths are larger than in the two others, but such an arrangement is not infrequent in the typical form. The length of the dorsal cirri varies from one specimen to another.

In short the only difference between *P. cultrifera typica* and *P. helleri* is in the length of the tentacular cirri, a character of very little value. Nevertheless, according to Monro, there is also a small difference in group III.

Grube and Horst do not mention *P. cultrifera* from the Philippines and Malay Archipelago. They overlooked the identity of both forms which Monro rightly considered as mere varieties, though of late he considers them specifically distinct.

Habitat.—Philippine Islands, Malay Archipelago, Indian Ocean, Red Sea, New Zealand.

***Perinereis aibuhitensis* Grube.**

Perinereis aibuhitensis, Grube 1878, p. 89, pl. v, fig. 3.

Perinereis aibuhitensis, Horst 1924, p. 168, pl. xxxiii, figs. 4-6.

Channel, Vizagapatam Harbour; farther end of the creek beyond the Ferry, Vizagapatam; southern shore of the Channel, Vizagapatam; Mormugao Bay.

Specific Characters.—Group I, 2 in a line; II-IV, clusters; III, a transverse cluster of 3 rows and, on each side, 3-4 in a longitudinal line; V, 3 arranged in a triangle; VI, on each side, two stout obtusely conical hardly flattened paragnaths; VII-VIII, 3 rows. Fal-cigerous bristles with long, straight terminal piece. Dorsal ligule of the posterior feet short and thick.

Most of the specimens are atokous. In a sub-epitokous female the feet are modified after the 23rd setigerous segment. On two epitokous males the first modified foot is the 21st. The dorsal cirri are crenulated. The anterior dorsal cirri are swollen. The epitokous lamellae of the feet, with the exception of the first and last ones of the modified region, are well developed, but oar-shaped setae have not yet replaced the atokous bristles. All round the anus there is a rosette of papillae. Two specimens present anomalies in groups VI. On one there are two paragnaths on the left and three on the right. In another otherwise typical specimen there are four denticles, hardly flattened, short, conical, set in two alternate rows in the left group VI and three, in a transverse row, on the right one. There are also frequent variations in group V: four arranged in a quadrangle or in two rows, or five instead of the typical three paragnaths.

The examples illustrate the too frequent individual anomalies in the proboscis of the Nereidae.

Habitat.—Philippine Islands, Batavia, Macassar, India, China.

***Perinereis nigro-punctata* Horst.**

Perinereis nigro-punctata, Horst 1924, p. 171.

Perinereis marjorii, Southern 1921, p. 595, pl. xxiii, fig. 10.

Perinereis yorkensis, Augener 1922 a, p. 24, fig. 6, a-e.

"Investigator" Sta. 615, Nankauri, shore-collecting ; Diamond Isle, Rock-Pool ; Cape Comorin.

Specific Characters.—Proboscis : group I, cluster of 5-12 paragnaths ; II-IV, triangular and crescentic clusters ; III, a transverse group ; V, 3 large teeth arranged in a triangle ; VI, on each side, a single large semi-circular tooth ; VII-VIII, a double row. Falcigerous bristles with short sickle-shaped terminal pieces. Dorsal ligule greatly enlarged in the posterior feet. Three transverse black spots on the dorsum of the anterior segments. A V-shaped band behind the eyes.

All the specimens are atokous.

The proboscis agrees generally with Horst's specimens from the Malay Archipelago, and Southern's description, but I found a few anomalies. In one case I observed four paragnaths set in a lozenge-shaped area in group I, and 6 in a rounded cluster on another. On group V, there were four paragnaths in a square, instead of three in a triangle. In the groups VII-VIII the two rows of denticles were sometimes rather irregular.

The proboscis recalls that of *P. cultrifera* var. *perspicillata*. It differs from it in having two rows in the groups VII-VIII instead of three.

The chief difference between the two species, however, lies in the shape of the posterior feet which have the dorsal ligule greatly enlarged and nearly flag-like, and the dorsal cirrus set near the tip.

I fail to find any distinctive feature between *P. marjori* and the earlier species *P. nigro-punctata* ; the colour of the two species is also identical.

Habitat.—Malay Archipelago, Australia, Chilka Lake, Cape Comorin, Nankauri.

***Perinereis cavifrons* Ehlers.**

Nereis (Perinereis) cavifrons, Ehlers 1920, p. 47, pl. i, figs. 6-10.

Matlah River, Gangetic Delta, Sta. 8 (S. W. Kemp), Dec. 1916 ; Mormugao Bay, (S. W. Kemp).

Specific Characters.—Proboscis : group I, 2-3 paragnaths one behind the other. II-IV, crescentic clusters ; III, a cluster ; V, 0 ; VI, on each side, a rather narrow transverse paragnath ; VII-VIII, 2-3 irregular rows. Tentacular cirri reaching backwards to the 6th segment. Dorsal cirri about the length of the dorsal ligule. Posterior feet not modified. Falcigerous bristles with short terminal pieces.

Ehler's specimen being an epitokous female he did not describe the posterior feet. The above specimens are both atokous and agree with the former description as regards the head, proboscis, anterior feet and bristles.

Habitat.—Java, India.

***Perinereis neocaledonica* Pruvot.**

Perinereis neocaledonica, Pruvot 1930, p. 50, pl. iii, figs. 77-79.

Arabian Sea.

Specific Characters.—Body of large size, about 350 segments. Prostomium broader than long, notched between the tentacles. Palps short, globular. Proboscis : groups I and II missing ; III and IV, a dense cluster of very numerous and very minute denticles,

the three groups nearly coalescent ; V, 1, 2 or 3 large paragnaths ; VI, on each side, a transverse row of about 20 conical or slightly flattened paragnaths ; VII-VIII, a belt of numerous very small denticles reaching to the groups VI. A similar patch of small denticles, sometimes continuous with the former, lies behind the large paragnaths of group V. Jaws large, dark and smooth. Tentacular cirri very short. Dorsal cirri short. In the anterior feet, dorsal ramus with two ligules. Dorsal ligule of the posterior feet much enlarged, flag-like, with the small dorsal cirrus inserted near the tip. Heterogomph falcigerous bristles with a large shaft and a small terminal piece, easily deciduous.

This species was first recorded from New Caledonia by Pruvot who described a unique atokous specimen. I had the opportunity to examine a male sub-epitokous specimen from New Hebrides, collected with the " Palolo " worm.

The two specimens from the Arabian Sea are atokous. They are respectively 145 and 165 mm. long with a breadth of 5-6 mm., feet included, and with upwards of 350 segments. Pruvot's specimen was 220 mm. and had 352 segments.

According to Pruvot, the prostomium is notched between the tentacles. In one of the above specimens the prostomium is clearly notched ; but in the other there is only a mere fold having the appearance of a triangular slit, and when the tentacles are held apart the unfolded anterior border of the prostomium stretches loosely between them. In the specimen from the New Hebrides the prostomium was slightly notched. These examples illustrate the unreliability of this character the importance of which has sometimes been overrated.

The armature of the proboscis agrees with Pruvot's description and figures. Only, in group V, there are three large paragnaths in one specimen, and a single one in the other. There were three, set in a triangle, in the specimen from the New Hebrides. But the two extra denticles may belong to the group VI which are nearly contiguous (?)

The paragnaths of the transverse rows of groups VI, in different specimens, are all mixed together conical, or slightly flattened, or conical and flattened.

The most striking features of this curious *Perinereis* are the absence of groups I and II and the clusters of very numerous and tiny denticles behind the normal paragnaths of groups V and VI. In respect to the last feature, a similar arrangement exists also in *P. marionii* Aud. Edw., a closely allied species, with flag-like posterior dorsal ligules, in which groups I and II are present.

In the variety *conodonta* of *P. macropus* Claparède (Fauvel, 1927, p. 410, fig. 139) the broad flattened paragnaths of group VI are superseded by an irregular row of conical, or slightly flattened denticles, as in *P. neo-caledonica*. Similar variations are also met with in the groups VI of *P. nuntia*.

Nereis caeruleis Hoagland (1920, p. 68) is also closely related, but it has a normal group I, and the posterior feet are unknown.

Habitat.—New Caledonia, New Hebrides, Arabian Sea.

***Perinereis nuntia* Savigny.**

Perinereis nuntia, Fauvel 1919, p. 410 (Synonymy).

Specific Characters.—Proboscis : group I, 0, or 1-3 behind each other ; II, clusters ; III, rectangular patch ; IV, triangular clusters ; V, 0, 1, 2 or 3 set in a triangle ; VI, on

each side, a single curved row of 5-18 conical, or flattened, or conical and flattened mixed together; VII-VIII, 3 rows of large spikes more or less flattened and sometimes 2-3 rows of smaller ones. Tentacular cirri reaching backwards to the 3rd-16th setigerous segment. Dorsal cirri of variable length. Parapodia with dorsal ligules blunt, conical or tapering. In the posterior feet the dorsal ligule is enlarged.

This wide-spread species, fairly common in warm seas all over the world, is also liable to extensive variations, and has been described under many names.

These varieties may be tabulated as follows:—

1. Group V missing	3
Group V present	2
2. Group V', 1 paragnath	4
Group V, 3 in a triangle	5
3. Tentacular cirri reaching backwards to the 10-15th segment; dorsal cirri longer than the dorsal ligule. Paragnaths of VI mixed	var. <i>djiboutiensis</i> .
Tentacular cirri reaching to the 3rd-5th segment; dorsal cirri shorter than the dorsal ligule. paragnaths of VI flattened	var. <i>heterodonta</i> .
4. Group I, 1-3	var. <i>vallata</i> .
Group I, 7-13	var. <i>majungaensis</i> .
5. Tentacular cirri reach to the 10th-16th segment. Paragnaths of groups VI all conical	var. <i>nuntia</i> , <i>typica</i> .
Tentacular cirri reaching to the 7-8th segment. Paragnaths of groups VI flattened or mixed	var. <i>brevicirris</i> .

The varieties *djiboutiensis* Fauvel (1919, p. 420) and *majungaensis* Fauvel (1921, p. 11) are not present in the collection.

Between the varieties of this unsettled species many specimens are intermediate, and so gradual are the transitions that they cannot be assigned definitely to any variety.

***Perinereis nuntia* (Savigny).**

var. *typica*.

Lycoris nuntia, Savigny 1820, p. 33, pl. iv, fig. 2.

Neanthes nuntia, Gravier 1901, p. 164.

Neanthes nuntia, Fauvel 1911, p. 382.

Perinereis nuntia, Fauvel, 1919, p. 415 (Synonymy).

'Ain Musa, Gulf of Suez; Tor, Sinai Peninsula; Koweit Harbour, Persian Gulf; Bandra, near Bombay (Caunter). Pamban Backwater; Chandipore, near Balasore, Orissa Coast; "Investigator" Sta. 624, Nankauri Island, shore collecting.

Specific Characters.—Proboscis: group I, 0, 1 or 2; II-IV, clusters; III, rectangular patch; V, 3 set in a triangle; VI, on each side, a curved row of 5-12 conical; VII-VIII, 2 anterior rows of large ones and 2-3 rows of smaller ones. Tentacular cirri and dorsal cirri long. Dorsal ligules sharp-pointed.

All the specimens are atokous and most of them typical, but a specimen from Pamban presents anomalies in the armature of the proboscis. There are four paragnaths in group V, 3 set in a triangle, and the fourth in front. Group VI on the left is normal with a row of 9 conical denticles, but on the right there are 3 small conical paragnaths and 4 broad ridge-shaped ones.

The typical form was formerly included in the subgenus *Neanthes* but the discovery of its different varieties and of such frequent anomalies, and of its other affinities, shows that it really belongs to the genus *Perinereis*.

Habitat.—Red Sea, Persian Gulf, Indian Ocean.

***Perinereis nuntia* (Savigny).**

var. ***brevicirris*** Grube.

Nereilepas brevicirris, Grube 1867, p. 19, pl. ii, fig. 2.

Nereis mictodonta, Marenzeller 1879, p. 118, pl. ii, fig. 2.

Nereis mictodonta, Izuka, 1912, p. 148, pl. xvi, figs. 1-6.

Perinereis heterodonta var. *mictodontoides*, Augener, 1913, p. 177.

Krusadai Island, Gulf of Manaar ; Tuticorin Beach and Harbour ; Cape Comorin ; Chaupathi, Malabar Hill, Bombay ; " Investigator " Sta. 615, Nankauri Island.

Specific Characters.—Proboscis : group I, 1 to 3 ; II and IV, crescentic and triangular clusters ; III, a rectangular patch with 2-3 denticles on each side ; V, 3 set in a triangle (sometimes 4) ; VI, on each side, a transverse row of 8-10 conical or flattened, more or less mixed together ; VII-VIII, 3 irregular rows and sometimes a few more. Tentacular cirri reaching to the 5th-8th segment. Dorsal cirri short. Dorsal ligules blunt, conical.

There are numerous specimens from Krusadai, most of which are atokous. Only a few are epitokous or sub-epitokous females.

Habitat.—Red Sea, India, Nicobars, Saint Paul Island, Japan, Australia, Malay Archipelago ; New Caledonia.

***Perinereis nuntia* (Savigny).**

var. ***heterodonta*** Gravier.

Perinereis heterodonta, Gravier 1901, p. 179, pl. xi, fig. 46.

Perinereis heterodonta, Fauvel 1911, p. 394 ; 1919, p. 419.

Tor, Sinai Peninsula (R. B. S. Sewell).

Specific Characters.—Proboscis : group I, 1-2 ; II, 2-6 very small ; III-IV, irregular clusters ; V, 0 ; VI, on each side, a row of 10-18 flattened, cutting ; VII-VIII, 3 irregular rows of large flattened spikes. Tentacular cirri reaching to the 3rd-6th segment, or more. Dorsal cirri short. Dorsal ligules blunt, conical.

All the specimens are atokous.

Habitat.—Red Sea, Persian Gulf.

***Perinereis nuntia* (Savigny).**

var. ***vallata*** Grube.

Nereis vallata, Grube 1857, p. 159.

Nereis vallata, Ehlers 1901, p. 110 (Synonymy).

Neanthes latipalpa, Kinberg Willey, 1905, p. 200, pl. xiii, fig. 9.

Lycoris quatrefagesi Grube 1887, p. 79.

Perinereis vallata, Fauvel 1919, p. 418 (Synonymy).

Perinereis vallata, Augener 1913, p. 175.

Chaupathi, Fort, Malabar Hill, Bombay—under rocks in sand.

Specific Characters.—Proboscis: group I, 1-3; II-III-IV, clusters; V, 1, set far back; VI, on each side, a transverse row of 8-15 paragnaths, conical, flattened or both mixed together. VII-VIII, 3 alternate rows of spikes somewhat flattened. Tentacular cirri reaching to the 3rd-6th segment. Dorsal cirri short. Dorsal ligules blunt.

One of the few atokous specimens is anomalous, the groups VI are irregular, and VII-VIII are missing on one side.

Habitat.—Red Sea, India, Cape of Good Hope, Madagascar, Australia, New Zealand, Chili, Philippine Islands.

Genus **PSEUDONEREIS** Kinberg.

Paragnaths of the proboscis of three kinds: conical, pectinate and transverse. Posterior feet enlarged.

- | | |
|--|----------------------------|
| 1. Groups VI, on each side, a single broad flattened paragnath | <i>Ps. gallapagensis</i> . |
| Groups VI, on each side, one or several rows of paragnaths | 2 |
| 2. Posterior dorsal homogomph falcigerous bristles present | <i>Ps. anomala</i> . |
| Posterior dorsal homogomph falcigerous bristles absent | <i>Ps. rotnnestiana</i> . |

Pseudonereis gallapagensis Kinberg.

Pseudonereis gallapagensis, Kinberg 1857-1910, p. 52, pl. xx, fig. 3; 1865, p. 174.

Pseudonereis gallapagensis, Gravier 1909, p. 629, pl. xvi, figs. 15-20.

Paranereis elegans, Kinberg 1857-1910, p. 53, pl. xx, fig. 8.

Nereis variegata, Grube, 1857, p. 164.

Pseudonereis variegata, Fauvel 1921, p. 13 (Synonymy); 1927 c, p. 527.

Pseudonereis ferox Hansen, Fauvel 1914, p. 120, pl. vii, figs. 13-17.

Diamond Isles, Rock-Pool Reef; Andamans; Mormugao Bay; Wallai station.

Specific Characters.—Proboscis: group I, 1-2; II-III, dense rows of small pectinate paragnaths; IV, rows of pectinate denticles and a few conical paragnaths in front; V, 1; VI, on each side, a single large triangular or flattened paragnath; VII-VIII, two rows of laterally or longitudinally flattened spikes alternating. Tentacular cirri reaching backwards to the 3rd-8th segment. Falcigerous setae with short sickle-shaped terminal piece. Homogomph dorsal, falcigerous bristles absent. Dorsal ligule of the posterior feet enlarged.

All the specimens are atokous.

The length of the tentacular cirri is very variable reaching from the third to the eighth setigerous segment backwards.

The length of the tentacular cirri was considered as a distinctive character for separating *Ps. gallapagensis* and *Ps. variegata*, but individual variations regarding this character are a sufficient proof of the identity of the two species. The difficulty, however, is in regards to the name. Kinberg's figure 3, pl. xx, of *Pseudonereis gallapagensis* was issued in 1857, but the description appeared only in 1865. On the other hand, Grube's description of *Nereis variegata* is of the same year (1857), but is rather meagre as regards the proboscis, and is not accompanied by any figure. The question of priority is rather puzzling.

Habitat.—Atlantic (Cameroon, San-Thomé, Cape of Good Hope, Brazil), Indian Ocean (Madagascar, India), Pacific (Gallapagos, Peru, Chili, Magellan).

Pseudonereis anomala Gravier.

Pseudonereis anomala, Gravier 1901, p. 191, pl. xii, figs. 50-52.

Pseudonereis anomala, Fauvel 1911, p. 395.

Pseudonereis anomala, Gravelly 1927, p. 15, pl. x, fig. 25.

Pamban ; Shingle Island, Gulf of Manaar ; Cape Comorin ; Kilakarai, from coral rocks ; Mormugao Bay.

Specific Characters.—Proboscis, group I, 1-3 ; II-III-IV, several rows of small pectinate paragnaths ; V, 0 ; VI, on each side, a transverse row of 6-10 conical paragnaths ; VII-VIII, a single row of large paragnaths, more or less flattened. Tentacular cirri long. Posterior dorsal ligules elongated, with dorsal cirrus near the tip. Posterior homogomph dorsal, falcigerous bristles with rather short faintly curved terminal piece.

In a specimen from Cape Comorin the paragnaths of the groups VI (7 on one side, 9 on the other) are arranged in two irregular rows as they sometimes occur. There is a large paragnath in the group V, but this is a less frequent anomaly.

As in *Ps. gallapagensis*, the pectinate denticles of the VI are larger than those of groups I, II and III and a few conical paragnaths lie in front of them.

Habitat.—Red Sea, Persian Gulf, Arabian Sea, Malay Archipelago, Australia (Abrolhos), Madagascar.

Pseudonereis rotnestiana Augener.

Nereis (Pseudonereis) rotnestiana, Augener 1913, p. 184, fig. 20, *a-c* ; pl. iii, fig. 46.

Andamans.

Specific Characters.—Proboscis : group I, 0, 1, 2 ; II-III, 4-5 rows of pectinate denticles ; IV, 4-5 rows of pectinate denticles and a few conical paragnaths in front ; V, 0 ; VI, on each side, a transverse row of 6-10 conical paragnaths ; VII-VIII, two alternating rows. Tentacular cirri reaching backwards to the 6th-9th setigerous segment. Dorsal ligule of the posterior feet enlarged, with dorsal cirrus near the tip. Falcigerous bristles with short sickle-shaped terminal piece. Homogomph dorsal falcigerous bristles absent.

The specimen from the Andamans is atokous. The head is dark-coloured. The tentacles are close to one another. The tentacular cirri reach to the 6th setigerous segment. The dorsal cirri are long.

The armature of the proboscis differs from Augener's specimen only in having the paragnaths of groups VI grouped in a cluster, instead of in a line, thus approximating more closely to *Ps. masalacensis*, but in this species the posterior feet are not enlarged, and possess dorsal homogomph falcigerous bristles.

Habitat.—South Australia, Andamans.

Genus **PLATYNEREIS** Kinberg.

Horny paragnaths arranged in pectinate rows of minute denticles. All dorsal groups on the maxillary ring, and at least the mid-dorsals (sometimes all, both dorsal and ventral) on the oral ring generally missing.

1. Dorsal cirrus of the 7th setigerous segment much longer than the others

P. abnormis.

Dorsal cirrus of the 7th setigerous segment normal

2

2. *Heteronereis*-stage with boldly pectinate oar-shaped setae, simple in the last segments

P. polyscalma.

- Heteronereis*-stage with oar-shaped setae all compound, and not conspicuously pectinate

P. dumerilii.

Platynereis dumerilii Aud. & M. Edwards.

Platynereis dumerilii, Fauvel 1911, p. 397, pl. xx, figs. 26-32; pl. xxi, figs. 46-52 (Synonymy); 1923a, p. 359, fig. 141.

Platynereis insolita, Gravier 1901, p. 197, pl. xii, fig. 53.

Platynereis insolita, Gravely 1927, p. 16, pl. x, fig. 23.

"Investigator" Sta. 614, Nankauri Harbour—surface; Sta. 616, Camorta Island, shore collecting; Andamans, Sta. 30 and 32; Pedro shoal, 25 fms.; Addu Atoll, weed-washings; Madras, St. 7; Pamban, from weeds; Kilakarai, coralline rocks and from weeds.

Specific Characters.—Proboscis: paragnaths very minute, often pale and little conspicuous. Group I, O; II, O; III, a small transverse cluster in two rows; IV, several transverse pectinate rows; V, O; VI, on each side, 1-2 concentric curved rows; VII-VIII, 5-7 clusters of small pale denticles (very variable). Tentacular cirri long, extending to the 10th-15th setigerous segment. Posterior feet not enlarged. Falcigerous bristles with short, hooked, sickle-shaped terminal pieces. Dorsal homogomph falcigerous setae with more elongated terminal piece in the posterior feet.

A few specimens are epikocous, or sub-epitokous. A female *Heteronereis* was collected at Sta. 614 with *P. polyscalma*.

This wide-spread species is liable to a great deal of variation in regard to the armature of the proboscis. Many so-called exotic species are probably mere varieties, if at all really distinct.

Habitat.—Atlantic, Pacific, and Indian Ocean (Cosmopolitan).

Platynereis abnormis (Horst).

Nereis abnormis, Horst 1924, p. 163, pl. xxxii, fig. 6.

Nereis abnormis, Augener 1926 b, p. 448.

Nereis abnormis, Fauvel 1930, p. 23.

Pamban, from weeds.

Specific Characters.—Proboscis: group I, O; II, a small concave row of paragnaths; III, O; IV, a crescentic row of paragnaths; V, O; VI, a triangular group of paragnaths; VII-VIII, 5 small, transverse groups of paragnaths, three of them in the median part and one on each side.

Tentacular cirri long. A very long dorsal cirrus on the 7th setigerous segment. Falcigerous setae with sickle-shaped terminal pieces bent in the form of a hook with a dorsal prominence. Posterior dorsal homogomph falcigerous bristles.

The three specimens from Pamban are atokous, and resemble *Pl. dumerilii* except in their characteristic very long dorsal cirrus of the 7th setigerous segment. The falcigerous setae are also similar.

Horst only examined the *Heteronereis*-stage and noted that the head greatly resembles that of *Pl. dumerilii* in the epitokous condition. The arrangement of the groups VII-VIII of the proboscis is also characteristic of the genus *Platynereis*. This species was later recorded

from Ceylon by Augener in the same stage, and he mentioned two long filiform cirri on the eighth segment of the posterior region which I could not observe on a broken *Heteronereis*-stage from Krusadai and which are not present on the atokous specimens.

Habitat.—Malay Archipelago, Ceylon, Krusadai, Pamban.

Platynereis polyscalma Chamberlin.

Platynereis polyscalma, Chamberlin 1919, p. 219, pls. xxx, xxxi.

Platynereis polyscalma, Horst 1924, p. 186.

Platynereis polyscalma, Fauvel 1931, p. 23, pl. iii, figs. 1-6.

Heteronereis sp., Horst 1911, p. 113.

(?) *Platynereis integer*, Treadwell 1920, p. 595, figs. 1-4.

"Investigator" Sta. 614, Nankauri Harbour, surface; Andamans.

Specific Characters.—Atokous condition still unknown. *Heteronereis*: Prostomium snout-like, protruding, broadly rounded in front. Tentacles small, ventral, pointing backwards; the palps have a similar disposition but concealed under the head and lowered over the mouth. Four enormous eyes with lenses, the anterior pair much larger than the posterior, and nearly wholly ventral in position. Proboscis: group I, O; II, chitinous areas destitute of paragnaths; III, pectinate cluster; IV, crescentic clusters of small pectinate denticles; V, O (or 1?); VI, on each side; a round or oval cluster of numerous pectinate paragnaths; VII-VIII, a row of several oval clusters.

Tentacular cirri reaching backwards to the 6th-9th segment. Anterior dorsal cirri of the male swollen, the succeeding ones crenulated. Two large anal cirri with a filiform tip and a rosette of papillae (male). Swimming bristles compound, with long oval blades bearing on one side, below the apex, very long and spine-like marginal teeth projecting at an angle. In the last segments simple setae with ribbed blade.

About a score of male and female *Heteronereis* were collected, swimming at the surface, at Nankauri, and a single male is from the Andamans.

The head agrees with Horst's and Chamberlin's figures and descriptions. It is very peculiar, though not unlike *Pl. dumerilii* in the same condition, but here the size of the eyes and the turning down of the tentacles and palps under the prostomium are still more exaggerated.

Horst and Chamberlin figured the tentacular cirri annulated. In several specimens the cirri are of the same appearance as those of Syllids, but in a few they are hardly apparently annulated while in others they are quite smooth. This false annulated appearance is only due to contraction as it sometimes happens in other Nereids.

On the male specimens, the anterior dorsal cirri, especially the 6th and 7th, are enlarged below the tip in the form of the head of a bird. The epitokous transformation commences on the 15th setigerous segment. The dorsal cirri are then crenulated. The inferior ventral ligule has three processes and the dorsal lamella of the ventral cirrus is bifurcated. The last 15-16 segments resemble a kind of narrow slender tail, but the resemblance is rather delusive as the segments are all provided with epitokous bristles and lamellae; only the ventral division is much smaller.

The anus is surrounded by a rosette of minute papillae and the pygidium bears two anal cirri inserted on a large base and ending in a long filiform tip.

The swimming bristles are very peculiar. The homogomph shaft bears a long oval transparent blade, and appears to be transversely ridged under the tip. But this is again a delusive appearance as these ridges are but long sharp comb-like spines of the distal border projecting at an angle and more or less turned down on the blade. The dorsal and ventral setae are slightly different. In the last posterior segments these compound setae are superseded by simple setae ending in a more or less broad blade strongly obliquely ridged, and a few narrow transversely ribbed simple setae.

The different kinds of setae have been figured by Chamberlin and Fauvel (1931, pl. iii, figs. 4-6). Neither Horst nor Chamberlin was able to give an accurate account of the armature of the proboscis. As it is always retracted it can only be investigated by dissection, but as the paragnaths are small and often transparent it is a rather difficult task.

With the rich material on hand I was able to dissect several specimens with the following results:—

- (a) I, O ; II, O ; III and IV, pectinate clusters ; V, O (or a very small one ??) ; VI, on each side, a small cluster of densely set conical denticles ; VII-VIII, several distinct clusters of pectinate paragnaths.
- (b) I, O ; II, O ; III-IV, pectinate clusters ; V, 1 small denticle ; VI, on each side, a round pectinate cluster ; VII-VIII, several pectinate clusters.
- (c) I, O ; II, a mere yellow chitinous area ; III-IV, pectinate clusters ; V, O ; VI, on each side, a pectinate cluster ; VII-VIII, several pectinate clusters.

Sometimes the groups II-III-IV are fused together into a contiguous chitinous area, as is often the case in the *Heteronereis* condition.

As already stated, the head resembles that of the epitokous *Platynereis dumerilii* and still more that of *Pl. coccinea* Delle Chiaje.

The armature of the proboscis is characteristic of the genus *Platynereis*, and agrees tolerably with that of *Pl. fusco-rubida* Grube, of which it is perhaps the *Heteronereis* condition (??).

Gravier (1901, p. 177, figs. 1-11) described a very peculiar *Heteronereis* from the coast of California, which seems to be very closely related to *Pl. polyscalma*. Through the kindness of M. Gravier, I was able to examine his three male specimens and to compare them with those from Nankauri. In general appearance, and in the nature of the head, eyes, tentacles, palps and tentacular cirri they are identical, but in the Californian specimens the tail is not so markedly slender. The pygidium, very accurately figured by Gravier, bears a triangular dorsal process ending in a more or less tapering tip and flanked, on each side, with a shorter similar triangular lobe. On the ventral side there are three conical papillae on each side, whilst in *Pl. polyscalma* the pygidium bears a small rosette of minute papillae and two long anal cirri enlarged at the base. The epitokous feet, very well figured by Gravier, have a contorted ventral ligule, somewhat crooked but not three-lobed, and the lamella enclosing the base of the ventral cirrus is only divided into a single lobe above the cirrus (instead of two as in *Pl. polyscalma*) and a large inferior hardly sinuous lobe. The paragnaths (very small and hardly conspicuous) do not appear to be pectinated, but it is not easy to ascertain their exact divisions. On the oral ring they are especially difficult to detect. They appear to form a few oval clusters ?

The bristles are alike and there is the same dimorphism between the dorsal and the ventral setae: the dorsal ones with long slender spines, the ventral ones less pectinate, or only denticulate, but in the posterior feet the simple setae are missing. The ventral compound blades are also homogomph. The dorsal ones have a long joint nearing anchylosis but without actually attaining that condition. These two closely related species are then differentiated by (1) their posterior region, (2) their pygidium, (3) the epitokous ventral ligules (more or less lobed) and (4) the posterior simple or compound bristles.

Pl. integer Treadwell from the Philippines is also very similar but the description is not sufficiently clear to allow of its being referred to one or the other of those two species.

Habitat.—Java, Weim Island, Nicobars, Andamans, Funafuti, Gilbert Islands.

Nereis sp.

Pamban, from coral reefs.

A small *Heteronereis*, 15 mm. long and 2 mm. broad, feet included, 1 mm., feet not included, in the anterior Nereid region.

The prostomium is slightly notched in front. The very large eyes are contiguous on each side. The tentacular cirri reach to the 2nd-3rd segment. The epitokous transformation commences on the 16th setigerous segment. The posterior segments are not yet epitokous and bear very long dorsal cirri. Although the lamellae are still rudimentary, swimming bristles are present with a few dorsal spinigers.

The posterior feet bear large dorsal homogomph falcigerous bristles with strongly bidentate terminal piece, such as those present in *N. jacksoni* and *N. kauderni*.

The eggs filling the body are very large and deformed as a result of the pressure. Their diameter is equal to one-fourth or one-fifth of the breadth of the body.

The dorsal bidentate falcigerous bristles and the notched prostomium suggest that this *Heteronereis* might belong to *N. kauderni*, but as the proboscis is retracted and not easy to dissect without badly damaging the specimen, the state of the armature was not ascertained.

Family NEPHTHYDIDAE Grube.

Body elongate, subtetragonal in cross-section. Segments short and numerous. Prostomium small, flattened, polygonal. Four small tentacles. Proboscis with terminal bifid papillae and longitudinal rows of soft papillae. Two horny jaws inside the pharynx. First foot rudimentary. Parapodia biramous, both divisions widely apart, provided with membranous lobes and simple setae; a branchia coiled between the two rami. A single anal cirrus.

Genus *Nephtys* Cuvier.

The characters of this genus are those of the family.

- | | |
|---|------------------------|
| 1. Branchiae long, slender, coiled | 2 |
| Branchiae short, falciform or foliaceous | 3 |
| 2. Ventral ligule cirriform, gill-like. Bifurcate, lyriform setae present | <i>N. dibranchis</i> . |
| Ventral ligule not gill-like. Bifurcate lyriform setae absent | <i>N. malmgreni</i> . |

- | | |
|--|---------------------------|
| 3. Posterior bristles boldly serrated | <i>N. gravieri</i> . |
| Posterior bristles long, slender, capillary | 4 |
| 4. Branchiae missing in the posterior half of the body . | <i>N. oligobranchia</i> . |
| Branchiae present in the posterior part of the body . | <i>N. polybranchia</i> . |

***Nephthys dibranchis* Grube.**

Nephthys dibranchis, Grube 1877, p. 536.

Nephthys dibranchis, Ehlers 1904, p. 14.

Nephthys dibranchis, Augener 1922 *d*, p. 17, fig. 5; 1923 *b*, p. 15; 1924, p. 297; 1927 *a*, p. 116.

Nephthys dibranchis, McIntosh 1885, p. 161, pl. xxvi, figs. 8, 9; pl. xxvii, fig. 5.

Nephthys spiribranchis, Ehlers 1917, p. 235, pl. xvi, figs. 5-7.

"Investigator" Sta. 175, Laccadive Sea, 731 fms.; Sta. 291, Persian Gulf, 48 fms.; Sta. 631, Nankauri Harbour, 19-30 fms.; Madras St. 3. Off Puri, Orissa, 4 fms.; Vizagapatam Harbour and bottom of Channel.

Specific Characters.—Branchiae from the 5th setigerous segment; reduced or missing in the posterior segments. In the segments of the mid-body they are long, coiled inwards with a long dorsal cirrus. Setigerous lobe conical, lamellae short, a long slender gill-like ventral ligule and a short ventral cirrus.

Setae long; slender and bifurcate, lyriform bristles.

In the specimens from Sta. 175 and 291, the protracted proboscis bears 22 longitudinal rows of 6-8 papillae. Two specimens from Vizagapatam have only 14 longitudinal rows and a long mid-dorsal one. Of the three specimens from Madras, one has 22 rows and another only 14. Ehlers mentioned 22 rows. Augener observed 14 and 28 on different specimens. Probably in this species, as in others, the number of rows of papillae of the proboscis is rather variable. Moreover, when the rows are not quite straight, but more or less alternate or overlap, it is not easy to estimate the numbers of these rows of papillae definitely.

In the many specimens there is a conspicuous pair of eyes, but these are indistinct in others.

The prostomium is hexagonal with four small subequal tentacles.

The ventral cirrus of the first foot is small, the dorsal one is rudimentary; sometimes they are better developed.

The branchiae begin on the fifth foot, rather small at first, then increase in size, and about the 18-20th foot they are long, stout, coiled inwards, or sometimes nearly straight, with a rather long, slender dorsal cirrus at the base.

Both dorsal and ventral rami are widely apart, with conical setigerous lobes and rather small rounded lamellae. On the upper side of the ventral division arises a long slender process, simulating a second gill; this is only a prominent filiform ligule, which is characteristic of the species. In the posterior region of the body, this gill-like process gradually dwindles, as also the branchiae, whilst the dorsal cirrus remains elongated.

The bristles are long, stiff, yellow or golden, and there is also a row of shorter bifurcate setae, as in *N. lyrochaeta* Fauvel and *N. inermis* Ehlers.

N. lyrochaeta is a nearly allied species with a small narrow nearly cirriform process of the anterior lamella of the ventral ramus, but the process in this species is not an elongated

gill-like appendage as in *N. dibranchis*. The lamellae of the feet are also different. Of *N. inermis* Ehlers, I had the opportunity to investigate specimens from the Red Sea and was able to verify the entire absence of papillae on the proboscis, and found the jaws which Ehlers had not observed.

Habitat.—New Guinea, Arafura Sea, Laccadive Sea, India, Persian Gulf, New Zealand, Australia, South America.

***Nephthys gravieri* Augener.**

Nephthys gravieri, Augener 1913, p. 123, fig. 6, pl. ii, fig. 5 ; 1927 *a*, p. 116.

"Investigator" Sta. 325, Bay of Bengal, 843 fms. ; Off Puri, Orissa, 4-4½ fms.

Specific Characters.—Setigerous lobes conical, blunt, anterior lamellae missing or much reduced, dorsal posterior lamella oval, ventral larger and more rounded. Branchiae broad, short, oval, with a small dorsal cirrus and a bent process at its base. Anterior bristles barred and short, posterior ones very long, boldly serrated on the concave border.

The specimen from Sta. 325 has 22 longitudinal rows of papillae on its extruded proboscis. It is full of sperms. In the other specimen the small, short and broad gills are not materially reduced in the posterior feet.

Habitat.—South Australia, Bay of Bengal.

***Nephthys* prox. *malmgreni* Théel.**

(?) *Nephthys malmgreni* Théel, Fauvel 1923 *a*, p. 371, fig. 145.

"Investigator" Sta. 332, Andaman Sea, 279 fms. ; Sta. 379, off Akyab, Burma, 250 fms.

Only two anterior fragments with the proboscis retracted ; one is full of sperms.

The ventral cirrus of the first foot is longer than the posterior tentacles, the dorsal one is very small. Dorsal and ventral setigerous lobes are sharp conical, the dorsal and ventral anterior lamellae are mere rounded folds shorter than the foot, the posterior lamellae are only a little longer. The gills are long, cylindrical, coiled inwards, or straight, with a short conical dorsal cirrus. The anterior setae are barred, the posterior ones are nearly smooth.

These specimens resemble *N. malmgreni*, but the dorsal posterior lamella does not appear to be bilobed.

***Nephthys polybranchia* Southern.**

Nephthys polybranchia, Southern 1921, p. 607, pl. xxiv, fig. 11.

Chilka Survey ; Madras, St. 3 ; Whaupoo, 8 miles below Shanghai, water quite fresh, stiff mud ; Taleh-Sap, Gulf of Siam, Sta. 24, 31 (N. Annandale).

Specific Characters.—Prostomium with four tentacles on the anterior border, two small eyes. Ventral cirrus of the first foot very small, the dorsal one quite rudimentary. Setigerous lobes bluntly conical. Dorsal lamellae shorter than the setigerous lobe, ventral lamellae a little longer, both rami widely apart, but not very divergent. A small gill on the second foot, well developed from the 7th to about the 30th segment, where it becomes short, broad, foliaceous with a median ridge and the dorsal cirrus is reduced to a small knob. They persist nearly to the end of the body. The camerated or barred setae are

restricted to the anterior feet and replaced in the middle and posterior feet by long slender capillary setae with slightly flattened blades, very finely serrated along one edge.

The condition of the branchiae appears to be somewhat variable. Generally they are more elongated and narrow in the anterior feet; posteriorly broad, flattened and foliaceous, but sometimes nearly all of them are short and broad, or broad alternating irregularly with more slender ones.

In the median and posterior gills there is a single vascular loop, as stated by Southern, but in the anterior ones there are several conspicuous loops.

This species is much like *N. palatii* Gravier, and differs in its shorter parapodial lamellae and generally (not always) broader branchiae; the setae are similar.

It is a brackish-water form.

Habitat.—Chilka Lake, Madras, Taléh-Sap, Shanghai.

***Nephtys oligobranchia* Southern**

Nephtys oligobranchia, Southern 1921, p. 610, pl. xxiv, fig. 12.

“Investigator” Sta. 98, 9 miles south-east of Santapalli Light-house, Vizagapatam Coast, 20 fms.; Bay of Bengal, 922 fms.; Calcutta, canal near Salt Lake; Cochin Backwater, near Ernakulam; Vizagapatam, bottom of Channel; Mergui; Taleh-Sap, Gulf of Siam; Tai-Hu; Kiangsu; off mouth of Moo Loo Creek and north-east end of Tong Dong Ding Backwater (N. Annandale).

Specific Characters.—“Differs from *N. polybranchia* in the distribution of the branchiae which occur fully developed on the 6th foot, and disappear on the 20th to the 23rd foot, whereas in *N. polybranchia* the branchiae are large on the 5th foot and persist almost to the end of the body; in that the branchiae contain a double vascular loop whereas there is only a single loop in *N. polybranchia*; in that the posterior lamellae of the feet are considerably surpassed by the spiral lobe” (Southern).

According to Southern, this species further differs from *N. polybranchia* in having 14 rows of papillae on the proboscis, as compared with 22. But in two specimens from Taleh-Sap, with the proboscis extruded, I found about 22 papillae, certainly more than 14. As I have already remarked this character is not entirely reliable.

The branchiae are rudimentary on the first 6 setigerous segments, well developed and foliaceous from the 7th to the 20th, then much smaller up to the 23rd-24th where they suddenly disappear.

In the specimens from Sta. 98 the breadth and size of the branchiae vary irregularly.

As there are also several vascular loops in at least the anterior branchiae of *N. polybranchia*, differences on that account are not of much value. *N. oligobranchia* may thus be only a variety of the former species. Both live in water of variable salinity.

Habitat.—Chilka Lake, Cochin Backwater, Mergui, Taleh-Sap, Kiangsu.

Family GLYCERIDAE Grube.

Body elongated tapering at both extremities, segments numerous bi- or tri-annulate. Prostomium conical, ringed, with four small tentacles at the tip. Proboscis long, cylindrical or club-shaped, beset with papillae and armed with horny jaws. Parapodia biramous

sometimes uniramous in the anterior region. Branchiae compound, simple, or wanting, often retractile. Dorsal setae simple, ventral setae compound. Two anal cirri.

- | | |
|--|------------------------|
| 1. Body not clearly divided into regions. Four horny jaws (Glycerinae) | <i>Glyceria</i> . |
| Body clearly divided into regions. Jaws and paragnaths numerous (Goniadinae) | 2 |
| 2. Body divided into two regions | 3 |
| Body divided into three regions | . <i>Goniadopsis</i> . |
| 3. Lateral V-shaped paragnaths on the base of the proboscis | . <i>Goniada</i> . |
| Lateral V-shaped paragnaths absent | <i>Glycinde</i> . |

Subfamily Goniadinae.

Body divided into two or three regions. Jaws and paragnaths numerous.

Genus **GONIADA** Audouin & M. Edwards.

Body divided into two regions, the posterior one broader and flattened. Proboscis beset with papillae. Two big horny jaws and a number of paragnaths. On each side of the base of the proboscis a longitudinal row of V-shaped paragnaths (chevrons). Anterior parapodia uniramous, those of the posterior region biramous. Branchiae absent. Dorsal setae simple, ventral setae compound.

- | | |
|---------------------------------------|----------------------|
| Dorsal setae few, stout, acicular | <i>G. emerita</i> . |
| Dorsal setae long, slender, capillary | <i>G. annulata</i> . |

Goniada emerita Audouin & M. Edwards.

Goniada emerita, Fauvel 1914 b, p. 211, pl. xix, figs. 7-10; 1923 a, p. 391, fig. 154.

Goniada emerita, Ehlers 1868, p. 718, pl. xxiv, figs. 49-51.

(?) *Goniada australensis* Quatrefages, Augener 1927 a, p. 197, fig. 9.

(?) *Goniada japonica*, Izuka 1912, p. 232, pl. xxiii, figs. 1-6.

Vizagapatam, farther end of the creek beyond the Ferry.

Specific Characters.—About 6-12 V-shaped paragnaths (chevrons) on each side of the proboscis. Two large toothed jaws and a continuous ring of small paragnaths. 60-70 anterior feet uniramous with a dorsal cirrus, a setigerous process with three ligules, a thick short ventral cirrus, an aciculum and a bundle of compound setae. The succeeding parapodia biramous; dorsal ramus with a conical cirrus, foliaceous in posterior segments, a blunt setigerous process with an aciculum and 2-3 straight, stout, blunt acicular bristles; ventral ramus with a posterior and two anterior tapering ligules, a stout ventral cirrus and a bundle of compound spinigerous setae. In the posterior region both rami are widely apart.

The single specimen is complete, with the proboscis semi-extruded; it is 100 mm. long. The anterior region is 43 mm. long (proboscis not included) and 2 mm. wide. The posterior region is 3 mm. broad. The colour, especially in the posterior part, is brownish. The prostomium has 9 rings, of which the basal ones are larger.

There are 6 V-shaped paragnaths (chevrons) on the right side of the proboscis and only 5 on the left. There are 70 segments in the anterior region with uniramous feet, but in the following 6-7 feet the dorsal rami are not so large or so far apart with the result that the enlarged flattened region appears to begin only about the 78th foot.

In *G. emerita*, from the Atlantic, the number of V-shaped paragnaths may vary from 7 to 12 and the number of uniramous feet from 60 to 70.

The dorsal setae, and the shape of the different feet are similar in the specimen from Vizagapatam.

G. japonica Izuka does not seem to differ materially, and *G. australiensis* Quatrefages and of Augener is probably also synonymous.

Habitat.—English Channel, Mediterranean, Atlantic, India, Japan ? Australia ?

***Goniada annulata* Moore.**

(Pl. III, figs. 9-16.)

Goniada annulata, Moore 1905, p. 549, pl. xxxvi, figs. 45-48.

(?) *Goniada echinulata*, Grube 1869, p. 39.

"Investigator" Sta. 321, south of Ceylon, 660 fms.

Specific Characters.—Body divided into an anterior cylindrical region and a posterior somewhat flattened one. Prostomium conical, indistinctly annulate. Eyes appear to be absent. Four small lanceolate tentacles. Proboscis very long, cylindrical, thickly covered with stiff, pointed hooked papillae (pl. iii, fig. 15) set on numerous (18-20) parallel muscular ridges. Those on the ventral side are smaller, depressed and often two pointed (pl. iii, fig. 16). Two horny jaws with a large hook and 3-4 smaller teeth. 5-6 double X-shaped ventral paragnaths and about 15 smaller dorsal ones. A series of about 20 V-shaped paragnaths on each side of the base of the proboscis (chevrons).

The anterior region consists of 48 segments, 27 of which are uniramous, and the succeeding 21 are already provided with capillary dorsal setae, less developed than in the posterior region where the feet are conspicuously biramous with both the rami widely apart. In the anterior feet, the dorsal cirrus is heart-shaped, foliaceous and pedunculate (pl. iii, fig. 9). The setigerous lobe has three conical tapering ligules, the two anterior ones subequal, the posterior shorter. There are a thick ventral cirrus, an aciculum and a bundle of numerous compound heterogomph bristles with a long slender end-piece faintly serrated. A small dorsal ramus with two unequal ligules, an aciculum and 5-6 very slender capillary bristles are gradually developed from the 28th foot backwards (pl. iii, fig. 11).

In the posterior depressed region the dorsal ramus consists of a large heart-shaped foliaceous dorsal cirrus, a short setigerous lobe with an aciculum, an anterior pointed ligule and a conical, shorter posterior one, and a bundle of slender simple capillary setae; in the ventral ramus, two triangular subequal anterior ligules, a broader and shorter triangular posterior ligule, an aciculum, a bundle of compound spinigerous setae and a conical ventral cirrus (pl. iii, figs. 12-13).

The single specimen is complete but much coiled, about 50 mm. long (60 mm. with the proboscis) and 2.5 and 3 mm. broad. The anterior and posterior regions are not sharply divided. The colour of the body is whitish, with rusty brown specks.

The papillae of the proboscis are very peculiar, and are inserted on a low conical more or less lobed broad base (pl. iii, fig. 14). The larger ones, on the dorsal side, end in a straight or backwardly bent spine (pl. iii, fig. 15). Those on the ventral side are smaller, depressed and often bidentate (pl. iii, fig. 16).

The specimen agrees with *G. annulata* Moore.

Habitat.—Gulf of Georgia, North Pacific, Ceylon.

Goniada sp.

“Investigator” Sta. 343, Gulf of Oman, 609 fms.

Two specimens of *Goniada*, with the proboscis extruded, are unfortunately in a condition which does not allow of a more definite identification. They are very hard and brittle and appear to have been dried up. There is about a score of V-shaped paragnaths on each side of the proboscis.

In the anterior feet the dorsal cirrus is somewhat falciform. There are three elongated ventral ligules. In the mid-body and posterior segments with biramous feet the dorsal setae are capillary.

The specimens recall *G. norvegica* Oersted, or *G. distorta* Moore (1903, p. 461). The ventral setae are very long and slender, as in the case of epitokous bristles in Moore's species.

Subgenus **GONIADOPSIS** Fauvel.

V-shaped paragnaths absent on the sides of the proboscis. Body divided into three distinct regions: (1) an anterior, with uniramous parapodia, short cirri and stout falcigerous setae, (2) an intermediate, with uniramous parapodia, long cirri and spinigerous setae and (3) a posterior, with biramous parapodia, dorsal acicular setae and long spinigerous ventral setae.

Goniada (Goniadopsis) incerta, sp. nov.

(Pl. IV, figs. 1-10.)

“Investigator” Sta. 380, off Akyab, Burma, 530 fms.

Specific Characters.—Anterior and intermediate regions narrowly cylindrical, posterior region broader. Prostomium sharp, conical, ringed, with four small tentacles at the tip and two very small black widely separated eyes at the base (pl. iv, fig. 1). Proboscis cylindrical, apparently smooth, but covered with very minute globular papillae. There are no V-shaped paragnaths. Anterior region of 23-24 setigerous segments (pl. iv, figs. 2, 3), with uniramous parapodia including a broad short foliaceous dorsal cirrus, a setigerous process with three ligules, one posterior and broadly triangular, and two anterior, finger-shaped and subequal; a thick, short club-shaped ventral cirrus, an aciculum and two bundles of stout compound setae, with a short, rather broad, ciliate terminal piece (pl. iv, figs. 9, 10). Middle region of about 30 (?) segments (pl. iv, fig. 5), with uniramous parapodia including a long finger-shaped dorsal cirrus, a setigerous process with three ligules, one posterior, triangular and two anterior, slightly longer; a ventral cirrus twice or thrice as long, an aciculum and two bundles of more slender compound setae, and with a long tapering delicately spinose terminal piece. Posterior region with conspicuously biramous feet (pl. iv, figs. 7, 8) including, in the dorsal ramus, a short cirrus, a bilobed setigerous process, with an aciculum and 2-3 short acicular setae, blunt at the tip; in the ventral ramus a triangular posterior ligule, two anterior, slightly longer finger-shaped ligules, a large blunt conical ventral cirrus, an aciculum and two bundles of compound spinigerous setae like those of the middle region.

The single specimen is a female full of eggs, broken into two fragments, with probably a few segments missing between the anterior and the posterior fragments. It is 50 mm.

long and 1.5 to 2 mm. broad. The proboscis is half extruded (pl. iv, fig. 1). It does not show any trace of V-shaped paragnaths (chevrons) at the base. This organ being filled with eggs (nearly to the bursting point), it was not advisable to dissect it. The state of the jaws and paragnaths could not be ascertained. Externally it is covered with very minute papillae.

The rings of the prostomium are rather indistinct and not easy to count; there seem to be only eight of them (?).

The anterior fragment includes 56 segments, of which the first 22 feet belong to the uniramous region, with broad, short, rounded or nearly square foliaceous dorsal cirrus and large falcigerous bristles (pl. iv, figs. 2, 3, 9 and 10). On the 23rd-24th segment long and short falcigerous bristles are mixed together. On the 25th foot the setae are all spinigerous.

The middle region extends from the 25th foot to, at least, the 56th, where the specimen is broken. The feet are still uniramous on the 37th segment (pl. iv, fig. 5), but the dorsal setae appear on the 48-50th where the dorsal and especially the ventral cirri are still very long and characteristic of the middle region (pl. iv, fig. 6).

The posterior fragment belongs entirely to the posterior region and an intermediate fragment is presumably missing, for the first segments of this fragment have already a large dorsal ramus with two or three stout acicular bristles, a bilobed setigerous process and a short dorsal cirrus. The ventral cirrus is not appreciably longer than the ventral ligules, and both divisions of the foot are widely separated (pl. iv, figs. 7, 8). The feet of this posterior region somewhat recall those of *Goniada emerita*.

This species is closely allied to *G. agnesiae* Fauvel, from the Krusadai Island. But the terminal pieces of the falcigerous anterior bristles are longer and densely ciliated. In *G. agnesiae* the cirri of the intermediate region are shorter and the setigerous process is not trilobed; in the posterior region both dorsal and ventral processes are bilobed instead of trilobed.

G. longicirrata Arwidsson (1898, p. 47) is also closely related but in this species the dorsal division in the posterior feet is of a different type.

Habitat.—Akyab, Burma.

Genus **GLYCINDE** Müller.

Body divided into two regions. Proboscis beset with papillae. Two big horny jaws and numerous paragnaths. Lateral V-shaped paragnaths absent. Anterior parapodia uniramous; posterior parapodia biramous. Branchiae absent. Dorsal setae acicular, ventral setae compound.

Glycinde oligodon Southern.

Glycinde oligodon, Southern 1921, p. 629, pl. xxvii, fig. 18.

“Investigator” Sta. 98, 9 miles south-east of Santapalli Lighthouse, Vizagapatam Coast; Sta. 100, Bay of Bengal, 840 fms., Vizagapatam Channel.

Specific Characters.—Anterior part of the body rounded, middle and posterior regions flat. Prostomium with a basal ocular segment and eight rings. Four small tentacles. Proboscis nearly square in section, with two dorsal bands, each of four irregular rows of transparent horny hooked papillae and two ventral bands of smaller soft mammillate

papillae. Two large ventral jaws and a dorsal row of 4-5 small denticles. Anterior feet uniramous, with a large, broad, blunt, dorsal cirrus indented near the tip, a rounded setigerous lobe and a longer ligule, and a blunt, thick, conical ventral cirrus; compound spinigerous bristles. Middle and posterior feet biramous, a dorsal cirrus with short stout swollen base, a dark spine accompanied by two or three dark brown setae having a curved tip and a long slender curved spine on the crest; a small rounded papilla. Ventral division as in the anterior feet except that the posterior lobe is rather larger and wider.

This species, as noted already by Southern, is closely allied to *G. armigera* Moore.

A dozen specimens from deep water (Sta. 100) agree with those from Vizagapatam, and Southern's description.

Habitat.—Chilka Lake, Vizagapatam, Bay of Bengal.

Subfamily Glycerinae.

Genus **GLYCERA** Savigny.

Body rounded, tapering at both extremities, segments two or three-ringed. Prostomium acutely conical, ringed, with four small terminal tentacles. Proboscis club-like, with four hooked horny jaws. Parapodia biramous, with a stumpy dorsal cirrus, two anterior lobes, one or two posterior lobes, a ventral cirrus. Branchiae present or absent, simple or branched, permanent or retractile into the foot. Ventral setae compound, spinigerous, dorsal setae simple, capillary.

- | | |
|--|--------------------------|
| 1. Branchiae absent | 2. |
| Branchiae present | 3. |
| 2. A single posterior lobe in the feet | <i>Gl. lancadivae</i> . |
| Two rounded posterior lobes. | <i>Gl. tessellata</i> . |
| 3. Branchiae simple. | 5. |
| Branchiae branched | 4. |
| 4. Branchiae bifid | <i>Gl. manorae</i> . |
| Branchiae multifid | <i>Gl. cirrata</i> . |
| 5. Branchiae permanent | 6. |
| Branchiae retractile | 9. |
| 6. A single posterior lobe in the feet | <i>Gl. longipinnis</i> . |
| Two posterior lobes in the feet | 7. |
| 7. Posterior lobes unequal | <i>Gl. alba</i> . |
| Posterior lobes equal | 8. |
| 8. Posterior lobes short, blunt | <i>Gl. sagittariae</i> . |
| Posterior lobes pointed | <i>Gl. prashadi</i> . |
| 9. Branchiae rounded, vesicular. Posterior lobes equal, rounded. | <i>Gl. gigantea</i> . |
| Branchiae cirriform. Posterior lobes unequal | <i>Gl. rouxii</i> . |

Glycera tessellata Grube.

Glycera tessellata, Fauvel 1914b, p. 206, pl. xviii, figs. 7-9; 1923a, p. 387, fig. 152; 1919, p. 427.

Andamans, Sta. 32; from reef flat between Huludu and Heratera Is.; Off Puri, Orissa; Doarakara, Sunderbans (B. Prashad).

Specific Characters.—Branchiae absent. Parapodia with two anterior equal elongated lobes and two posterior lobes, much shorter, rounded and equal to each other. Papillae

of the proboscis long and slender. Supports of the jaws (ailerons) with two long dagger-like processes.

This species is widely distributed in the tropical and temperate seas.

The long papillae of the proboscis, and the shorter ones mixed with them, are destitute of terminal nail-like appendage.

Habitat.—Atlantic Ocean, Mediterranean Sea, Indian Ocean, Pacific Ocean.

***Glycera lancadivae* Schmarda.**

Glycera lancadivae, Schmarda 1861.

Glycera lancadivae, Michaelsen 1892, p. 12.

Glycera lancadivae, Willey 1905, p. 286, pl. v, figs. 113-116.

Glycera lancadivae, Fauvel 1930b, p. 540.

“Investigator” Sta. 337, Laccadive Sea, 271 fms.; Sta. 379, off Akyab, Burma, 250 fms.; Sta. 383, off Burma, 517 fms.; Sta. 650, Fehendu, Maldives; Ceylon Pearl Bank; Madras Coast; Koweit Harbour, Persian Gulf.

Specific Characters.—Branchiae absent. Parapodia with two anterior equal elongated lobes and a single posterior rounded, slightly emarginate lobe. Papillae of the proboscis of two kinds, acuminate and rounded, destitute of terminal nail-like appendage. Supports of the jaws (ailerons) with short unequal processes.

The specimens agree with former descriptions.

Habitat.—Ceylon, Laccadives, Maldives, Burma, Persian Gulf.

***Glycera longipinnis* Grube.**

(Pl. IV, figs. 11-14.)

Glycera longipinnis, Grube 1878, p. 182, pl. viii, fig. 9.

“Investigator” Sta. 168, Bay of Bengal, 105 fms.; Sta. 292, Persian Gulf, 53 fms.

Specific Characters.—Branchiae simple, large, inserted on the dorsal edge of the foot. Parapodia elongated, with two anterior subequal, cirriform lobes, and a single posterior, rounded or faintly emarginate lobe. Papillae of the proboscis long, cylindrical, destitute of terminal nail-like appendage. Supports of the jaws (ailerons) with two long dagger-like processes.

The feet of this species are like those of *Gl. lancadivae* but are provided with large branchiae (pl. iv, fig. 11).

The jaws with the long diverging processes of their supports recall those of *Gl. tessellata*, and the long slender papillae of the proboscis are also similar (pl. iv, fig. 14).

In the specimen from Sta. 168, the branchiae are very large (pl. iv, fig. 11), especially on the anterior and posterior feet, perhaps owing to slight maceration of the specimens. They are much larger than in Grube's fig. 9, pl. viii, and arise from the middle of dorsal edge of the foot.

In the specimen from the Persian Gulf, the feet are much elongated, with shorter, rather ovoid, branchiae inserted nearer to the tip of the foot (pl. iv, figs. 12, 13).

Grube did not describe the papillae and the jaws; nevertheless the species seems well characterised by its feet and branchiae.

Habitat.—Philippine Islands, Bay of Bengal, Persian Gulf.

Glycera alba Rathke.

Glycera alba, Fauvel 1923a, p. 385, fig. 150 (Synonymy).

Glycera alba, Gravely 1927, p. 9.

Glycera alba var. *cochinensis*, Southern 1921, p. 627, pl. xxvii, fig. 17.

"Investigator" Sta. 90, Ganjam Coast, 28-30 fms.; Cochin Backwater, near Ernakulam; Mormugao Bay.

Specific Characters.—Branchiae simple, inserted on the dorsal edge of the foot. Parapodia with two anterior subequal triangular or cirriform lobes and two posterior lobes, the upper one triangular, shorter than the anterior, the lower rounded and still shorter. Papillae of the proboscis obliquely truncated (unguiculate) with a transparent nail-like appendage. Support of the jaws triangular, with a single process.

The above specimens are to be referred to the variety *cochinensis* which differs from the type in the longer branchiae and the more acute lobes of the feet.

Habitat.—Atlantic and Indian Oceans, Red Sea, India.

Glycera parashadi, sp. nov.

(Pl. V, figs. 1-8.)

"Investigator" Sta. 292, Persian Gulf, 53 fms.; Sta. 549, Mergui, Bay of Bengal, 24 fms.; Sta. 631, Nankuari, 19-30 fms.

Specific Characters.—Body tapering posteriorly, segments biannulate. Prostomium acutely conical, faintly ringed, with four very small filiform tentacles. Proboscis long, cylindrical, covered with minute cylindrical unguiculate papillae obliquely truncated with a kind of transparent chitinous nail at the tip (pl. v, figs. 3, 4). Support (aileron) of the jaws triangular, with unequal, rather long diverging processes (pl. v, fig. 1). Parapodia with two anterior long, acutely conical, equal lobes and two equal posterior triangular lobes, but shorter than the anterior ones. Dorsal cirrus globular, knob-like, near the base of the foot. Ventral cirrus triangular, shorter than the posterior lobes. Branchiae simple, cylindrical, not retractile, inserted on the upper edge of the foot near its base and not far from the dorsal cirrus. The tip does not extend much farther than the pedal lobes (pl. v, figs. 5-7). A bundle of simple dorsal setae. Two bundles of ventral compound homogomph bristles with a long terminal piece winged and finely serrated (pl. v, fig. 2). Posterior feet more elongated and slender (pl. v, fig. 6).

The branchiae appear on about the 30th segment, and are missing on the last 14-15 segments.

Average length: 8-10 mm., 3-4 mm. broad, feet included.

The specimens are without any colour in alcohol.

In general appearance it recalls *Gl. alba*, but it differs in the two equal posterior lobes of the feet, in the insertion of the gill at the base of the foot, and in the different shape of the "aileron". *Gl. posterobranchia* Hoagland (1920, p. 620) differs from this species in having a single posterior pedal lobe.

Habitat.—Persian Gulf, Mergui, Nicobar Islands.

***Glycera sagittariae* McIntosh.**

(Text-fig. 17.)

Glycera sagittariae, McIntosh 1885, p. 346, pl. xlii, fig. 8; pl. xxiiA, fig. 10.*Glycera sagittariae* Treadwell, 1903, p. 1174.

Seven-Pagodas, Madras Coast, 5-10 fms.

Specific Characters.—Branchiae simple, short, inserted on the dorsal edge of the feet. Parapodia with two equal anterior, elongated, tapering lobes, and two equal posterior blunt triangular lobes, but much shorter than the anterior ones. Dorsal cirrus more or less remote (fig. 17 *a, b*). Papillae of the proboscis of two kinds: short, globular or ovate, and long and slender, without terminal nail-like appendage (fig. 17 *c, d*). Supports of the jaws (ailerons) with two long dagger-like processes.

There is only an anterior fragment with the proboscis retracted, which had to be dissected for examination of the papillae and the jaws.

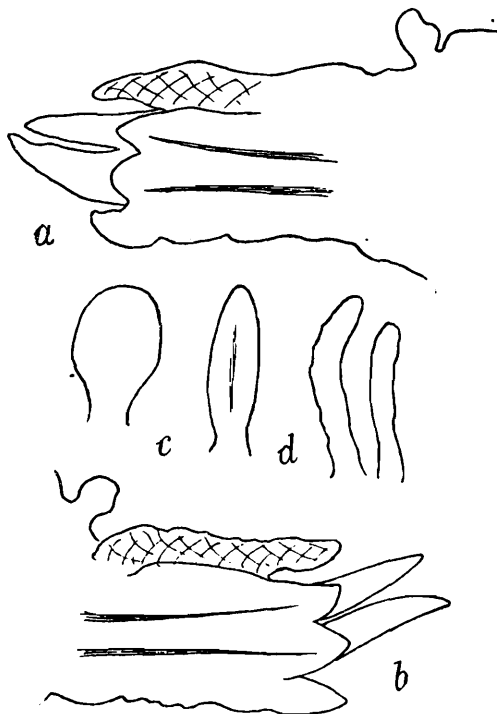


FIG. 17.—*Glycera sagittariae*: *a, b.* feet (setae not figured) $\times 65$; *c, d.* globular and elongated papillae $\times 150$.

The long slender papillae and the supports of the jaws are very similar to those of *Gl. tessellata*, as noticed already by McIntosh. The supports of the jaws show two long processes and not "a long slender process on one side of the base"

The feet do not materially differ from those of *Gl. tessellata*, but are provided with branchiae which are missing on the latter species (fig. 17 *a, b*). These branchiae arise near the base of the foot, but are coalescent with its dorsal edge on the greater part of their length, their tip only being free and much shorter than the anterior lobes of the feet. According to McIntosh, the branchiae appear a little beyond the thirteenth segment; on the above specimen they begin about the 40th foot.

McIntosh figured only an anterior gill-less foot. This species might be described as a branchiate *Gl. tessellata*.

Habitat.—Aru Islands, Hawaii, Madras Coast.

***Glycera gigantea* Quatrefages.**

Glycera gigantea, Fauvel 1923a, p. 387, fig. 152 d-k (Synonymy).

Glycera gigantea, Monro 1931, p. 18.

Glycera siphonostoma, Augener 1927d, p. 138.

(?) *Glycera siphonostoma*, Pruvot 1930, p. 74, fig. 8, pl. iii, figs. 87, 88.

"Investigator" Sta. 232, Laccadive Sea, 430 fms.

Specific Characters.—Branchiae simple, rounded, vesicular, retractile into the anterior side of the feet. Parapodia with two anterior, equal, digitiform lobes and two very short rounded, slightly unequal lobes. Papillae of the proboscis of two kinds: a few globular and others elongated, destitute of terminal nail-like appendage. Supports of the jaws triangular, with a long process on one side.

The identification of the single, large specimen is rather doubtful, as it is in a poor condition; the proboscis is retracted, and none of the branchiae is exerted.

Habitat.—Atlantic Ocean, Mediterranean Sea, New Pomerania, New Caledonia (?), Great Barrier Reef, Laccadive Sea.

***Glycera rouxii* Audouin & M. Edwards.**

Glycera rouxii, Fauvel 1923 a, p. 389, fig. 153 a-c.

Glycera goesi, Malmgren 1867, p. 184, pl. xv, fig. 81.

Glycera goesi, Arwidsson 1898, p. 22, pl. i, figs. 13, 14.

Glycera goesi, Izuka 1912, p. 238, pl. xxiv, figs. 1, 2.

Glycera decipiens, Marenzeller, 1879, p. 140, pl. vi, fig. 3.

"Investigator" Sta. 270, Laccadive Sea, 584-589 fms.; Sta. 295, Persian Gulf, 37-40 fms.; Sta. 345, Persian Gulf, 35 fms.; Sta. 349, Persian Gulf, 25 fms.; Andamans; Pamban Backwater; Chandipore, near Balasore, Orissa Coast; Vizagapatam harbour, bottom of channel.

Specific Characters.—Branchiae simple, slender, retractile in the anterior side of the feet. Parapodia with two anterior pointed equal lobes and two posterior shorter, broader, subequal lobes. In the posterior feet the posterior upper lobe is pointed and the inferior lobe is much shorter and blunt. Papillae of the proboscis either globular or lanceolate, conical, destitute of terminal nail-like appendage. Supports of the jaws triangular, with a long process on one side.

The branchiae are retractile, and in preserved specimens, very often only a few, or none of them, are exerted.

Glycera rouxii, described as an abbranchiate form, differs from *Gl. goesi* only in the absence of gills, but it is undoubtedly the same species with its gills retracted. There is no real difference between them: they have been found in identical localities, and the name *Gl. rouxii*, which has precedence, must be adopted for the species.

I have compared the above specimens with one from Bohuslän (Sweden), and was unable to find any difference.

Habitat.—Atlantic Ocean, Mediterranean Sea, Persian Gulf, India, Andamans, Japan, California.

***Glycera cirrata* Grube.**

(Text-fig. 18.)

Glycera cirrata, Grube 1857, p. 19; 1869 b, p. 35.

"Investigator" Sta. 349, Persian Gulf, 25 fms.; Sta. 395., off Tenasserim, Burma, 50 fms.; Suez (H. J. Walton); Seven-Pagodas, Madras Coast, 5-10 fms.; Andamans; Bycklwan Bay.

Specific Characters.—Body large, tapering and very slender posteriorly, numerous bi-annulate segments. Prostomium acutely conical, with 11-12 faintly bi-annulate rings and four small terminal tentacles. Parapodia with two anterior long, sharp, equal lobes and two posterior similar but shorter equal lobes. Dorsal cirrus an ovoid knob inserted near the base of the foot. Ventral cirrus sharp, triangular, about the same length as the posterior lobes (fig. 18, *a-d*). Branchiae retractile, beginning about the 17th, 25th-30th foot, first simple, long, cirriform, then bifurcate and next divided into 3, 4, 5 branches (fig. 18, *a-d*), in the posterior segments they are again simple. They are inserted at the base of the foot near the dorsal cirrus on the posterior side of the upper border of the dorsal ramus. Proboscis long, club-shaped, beset with cylindrical, unguiculate papillae obliquely truncated

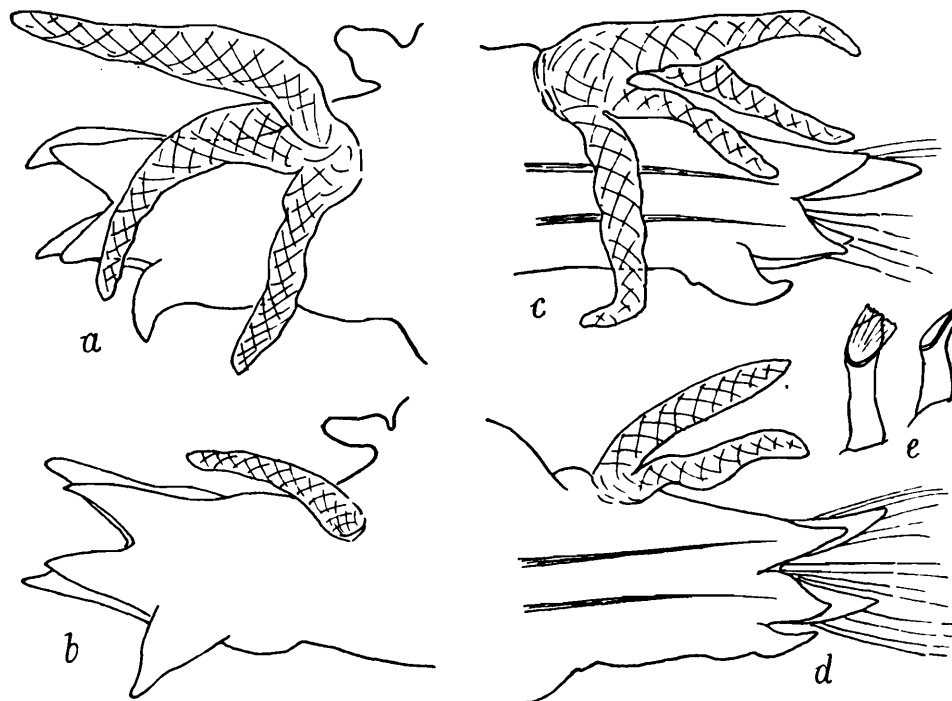


FIG. 18.—*Glycera cirrata*, from Sta. 349: *a. b.* anterior feet, setae not figured $\times 45$; *c.* foot from mid-body $\times 45$; *d.* posterior foot $\times 45$; *e.* unguiculate papillae $\times 150$.

with a transparent nail-like appendage at the tip (fig. 18, *e*). Support of the jaw (aileron) triangular, with an elongated process on one side.

Length, 10-15 mm. breadth, 5 mm., feet included.

Yellowish in alcohol.

In some specimens, only very few trifurcate gills are extruded. In others, as in the specimen from the Persian Gulf, many quadri- and quinquifurcate gills are extruded (fig. 18). In *Gl. subaenea* Grube the branched gills arise from the anterior side of the feet. In *Gl. americana* Leidy they are posterior, but much more richly branched.

Habitat.—Brazil, Red Sea, Persian Gulf, India, Andamans, Burma.

Glycera manorae, sp. nov.

(Pl. V, figs. 9-17.)

Manora Shoal, Karachi.

Specific Characters.—Body rather large, tapering posteriorly, segments numerous, bi-annulate. Prostomium acutely conical, with 10-12 rings and four small terminal tentacles. Parapodia with two anterior sharp, triangular, mucronate, equal lobes and two posterior nearly equal similar but shorter and more blunt lobes. Dorsal cirrus an elongated knob inserted near the base of the foot. Ventral cirrus triangular, about the same length as the posterior lobes (pl. v, figs. 12, 13). Posterior feet more slender and elongated (pl. v, fig. 14). Branchiae retractile, beginning about the 17th foot, first simple, large, digitiform, the following divided into two long, more or less equal branches. In the posterior feet they are again simple (pl. v, fig. 14). They are inserted at the base of the foot on its upper border, or slightly behind near the dorsal cirrus. On a number of feet one or two small retractile vesicular gills of a more or less elongated knob-like shape are inserted on the posterior side of the foot slightly behind the superior lobe (pl. v, figs. 13, 17). Proboscis covered with small cylindrical unguiculate papillae, obliquely truncated, with a transparent nail-like appendage at the tip (pl. v, fig. 9). Support of the jaw (aileron) triangular, with an elongated process on one side (pl. v, fig. 10). Dorsal setae capillary, with a narrow wing. They are grouped in two bundles. Ventral setae compound homogomph (pl. v, fig. 11) or hemigomph, with a long slender finely serrated terminal piece.

Length about 70 mm., breadth 5 mm., feet included. Colour in alcohol, rusty yellow, pedal lobes very dark at the tip.

The feet agree closely with those of *Gl. unicornis* Savigny and are similarly pigmented. The branchiae are also bifurcate, but they are inserted on the dorsal border of the feet, a little behind, instead of on the anterior side, and the papillae of the proboscis are unguiculate.

On the other hand, this unique specimen agrees with *Gl. cirrata* as regards the feet and the papillae of the proboscis, but the branchiae are bifurcate, instead of being divided into 3, 4 or even 5 branches. The most striking feature, however, is the presence of small separate retractile gill-like vesicles arising from the upper border, or from the posterior side, of the feet (pl. v, figs. 13, 17).

Unfortunately as there is a single specimen it is impossible to ascertain if such peculiarities are to be ascribed to individual variation or are really specific characters. Perhaps it is only a variety of *Gl. cirrata* (?).

Habitat.—Manora Shoal, Karachi.

Family EUNICIDAE Grube.

Body elongated, vermiform. Prostomium with lobate palps more or less united. Tentacles subulate, 1 to 7, or more. First two segments generally achaetous and apodous. Sometimes one pair of tentacular cirri in the second segment. Feet uniramous or sesquiramous. Dorsal cirrus with or without branchiae, sometimes rudimentary or missing. Ventral cirrus sometimes missing. Setae simple, or simple and compound, very varied in shape. Proboscis armed with lower jaw-plates (labrum) and a number of biserial toothed upper jaw-plates. Sometimes a membranous tube.

The Eunicidae are divided into subfamilies and genera as follows:—

- | | |
|--|---------------------------------|
| 1. Prostomium without (visible) tentacles of palps. No ventral cirri. | |
| Dorsal cirri rudimentary | Sub-family 14 Lumbriconereinae. |
| Prostomium with tentacles | 2 |
| 2. No ventral cirri. Dorsal cirri foliaceous. Three tentacles | |
| Sub-family | 12 Lysaretinae. |
| Ventral cirri present. Dorsal cirri foliaceous | 3 |
| 3. Two tentacles and two cylindrical palps. Upper jaws composed of from 2 to 4 longitudinal series of very small and numerous pieces | Sub-family 11 Staurocephalinae. |
| From 1 to 7 tentacles. Palps short, globular. Upper jaws consisting of 4 or 5 pairs of pieces | 4 |
| 4. Seven tentacles, five occipitals mounted on ringed ceratophores, and two frontals which are ovate | Sub-family 8 Onuphidinae. |
| From 1 to 5 occipital tentacles, ovate frontals absent | Sub-family 5 Eunicinae. |
| 5. Branchiae present. Five tentacles | 6 |
| Branchiae absent | 7 |
| 6. Tentacular cirri present | <i>Eunice</i> . |
| Tentacular cirri absent | <i>Marphysa</i> . |
| 7. Three tentacles. Tentacular cirri absent | <i>Lysidice</i> . |
| One tentacle. Tentacular cirri absent | <i>Nematonereis</i> . |
| 8. Tentacular cirri absent | <i>Hyalinoecia</i> . |
| Tentacular cirri present | 9 |
| 9. Branchial filaments inserted spirally | <i>Diopatra</i> . |
| Branchiae cirriform or pectinate | 10 |
| 10. Three anterior feet much enlarged, directed forwards and bearing long capillary bristles | <i>Rhamphobrachium</i> . |
| Anterior feet little modified, bearing hooked bristles, simple or compound . | <i>Onuphis</i> . |
| 11. Tentacles and palps very large; more less articulate. Dorsal and ventral cirri well developed | <i>Staurocephalus</i> . |
| Tentacles and palps rudimentary. Dorsal and ventral cirri very short | <i>Ophryotrocha</i> . |
| 12. Three short tentacles. Branchiae absent | 13 |
| Tentacles rudimentary or absent. Branchiae present | <i>Iphitime</i> . |
| 13. Three subulate tentacles folded backwards into a dorsal groove | <i>Halla</i> . |
| Three short rounded tentacles partly hidden under the border of the first segment | <i>Aglaurides</i> . |
| 14. Small parasitical worms | 18 |
| Free and often very large worms | 15 |
| 15. Cirriform branchiae present | <i>Ninoë</i> . |
| Branchiae absent | 16 |
| 16. Capillary setae and hooks simple or compound | <i>Lumbriconereis</i> . |
| Only winged capillary setae | 17 |
| 17. With a stout dorsal acicular bristle. Jaws III and IV simple hooks . | <i>Drilonereis</i> . |
| Dorsal acicular bristle absent. Jaws III and IV toothed plates. Four eyes | <i>Arabella</i> . |
| 18. Lower jaw well developed, with two hooks. Parasitic on Syllids | <i>Labrorostratus</i> . |
| Lower jaw reduced, without hooks. Parasitic on <i>Spio</i> and <i>Bonellia</i> | <i>Oligognathus</i> . |

The genus *Nicidion* which differs only from *Eunice* in the absence of gills may be regarded as a subgenus of the latter. Other genera, such as *Paramarphysa*, *Paradiopatra*, *Paronuphis* etc., are doubtful and further investigations are necessary to settle their status; they are not represented in the present collection.

Subfamily Eunicinae.

Genus **EUNICE** Cuvier.

(*Laodice* Savigny, *Eriphyle* Kinberg.)

Body very long. Head with five tentacles, cirrophore devoid of rings; two bulbous palps. A pair of tentacular cirri inserted on the second apodous segment. Dorsal cirri elongated, ventral cirri short or knob-like. Branchiae simple or generally pinnate. Parapodia sesquiramous, with acicular setae, simple pectinate (or comb-like), and compound setae. Lower jaw of two pieces. Upper jaws with a pair of mandibles and two or three pairs of toothed plates, an unpaired left plate and sometimes paragnaths.

The following key is partly after Crossland (1904, p. 287) :—

- | | |
|---|-------------------------------------|
| 1. Gills simple, or with only 2 filaments, beginning very far from the head | 2 |
| Gills branched | 3 |
| 2. Comb and acicular setae absent | <i>E. siciliensis.</i> |
| Comb and acicular setae present | <i>E. gracilis.</i> |
| 3. Gills bipinnate | <i>E. investigatoris.</i> |
| Gills pectinate | 4 |
| 4. Acicular setae tridentate | 5 |
| Acicular setae bidentate | 7 |
| 5. Gills well developed in the posterior part of the body | <i>E. antennata.</i> |
| Gills absent in the posterior part of the body | 6 |
| 6. Gills beginning on 3rd or 4th foot. Tentacles smooth | <i>E. indica.</i> |
| Gills beginning about 6th-7th feet. Tentacles annulated | <i>E. australis.</i> |
| 7. Forming tubes of characteristic structure | 8 |
| Without special tubes | 9 |
| 8. Compound setae with sword-shaped terminal piece anteriorly, sickle-shaped posteriorly | <i>E. tubifex.</i> |
| Compound setae all sickle-shaped | <i>E. floridana.</i> |
| 9. Gills occur only on the anterior third of the body, beginning about 6th to 9th feet | <i>E. coccinea.</i> |
| Gills continue nearly to hind end of the body | 10 |
| 10. Gills begin about 3rd to 8th feet | 12 |
| Gills begin about 10th to 30th feet and attain to from 4 to 16 filaments anteriorly but are simpler in the posterior region | 11 |
| 11. Gills begin about 10th to 20th feet and attain to from 6 to 16 filaments | <i>E. afra.</i> |
| Gills begin about 25th to 30th feet and attain to from 4 to 6 filaments | <i>E. afra</i> var. <i>paupera.</i> |
| 12. Very large species. Tentacles smooth. Gills up to 25-30 filaments | <i>E. aphroditois.</i> |
| Smaller species. Tentacles annulated | 13 |

13. Gills begin about 4th to 6th feet and consist of 6 to 20 filaments . *E. tentaculata*.
 Gills begin on 3rd or 4th foot and consist of 2 to 4 filaments . 14
 14. Gills suddenly disappear about 80th segment *E. savignyi*.
 Gills continue nearly to the last segments *E. grubei*.

Eunice aphroditois Pallas.

Eunice aphroditois, Fauvel, 1917, p. 215, pl. vii (Synonymy); 1930 *b*, p. 533.

Eunice aphroditois, Pruvot, 1930, p. 65, pl. vii (Synonymy); 1930 *b*, p. 533.

Eunice roussaei, Quatrefages; Fauvel, 1917, p. 220, pl. viii (Synonymy).

Eunice rousseaui, Fauvel, 1923 *a*, p. 403, fig. 158, *a-g*.

"Investigator" Sta. 655, Maldives; Sta. 664, S. end of Henry Lawrence I. Andamans; Port Blair, Andamans; Gangetic Delta.

Specific Characters.—Very large species reaching up to 1 metre and more in length. Brown, chequered pattern, often with a white collar on 3rd and 4th, setigerous segments colour fades in alcohol. Palps bilobed or plurilobed. Tentacles short, blunt, smooth or faintly wrinkled. Tentacular cirri short. The gills which begin about the 5th to 8th foot are generally branched on the 5th or 6th foot and attain up to 25, 30 and even 40 filaments. Acicular bristles black, blunt, missing in old specimens or irregularly distributed in the posterior region. Acicula black. Compound bristles with short sickle-shaped terminal piece.

There are a few large fragments from the Andamans reaching to 400, 500 and even 700 mm. in length, and 15 to 25 mm. in breadth.

The specimen from Henry Lawrence Island was "three feet long in the fresh state, probably incomplete and without the head end. It broke into two when touched (autotomy)" In preserved condition it is about 70 mm. long and 25 mm. broad, brown, speckled with small, very dark dots. Only on one specimen from Port Blair there is a faint trace of a white collar on the 5th setigerous segment.

The specimen from Gangetic Delta, measuring 720 mm. in length and 18-20 mm. in breadth, is complete, and has the hind part (45 mm. in length) regenerated. The left tentacular cirrus is double, being formed of two unequal branches divided from the base and the external shorter than the internal one.

The gills begin on the 6th setigerous segment and are already branched. The gill filaments are 25, 32 or more in number and continue to the hind part of the body.

Most of the terminal pieces of the setae are missing and the shafts are blunt or worn at the tips, as is generally the case in large specimens. The acicular bristles are missing. They were probably present only in the lost posterior end which is not entirely regenerated.

In other specimens from the Andamans, these acicular bristles are present only in the posterior segments or irregularly distributed, often missing on 2, 3, 4 succeeding feet.

In most cases the gills of the anterior end begin on the 5th or 6th setigerous segment and are already compound.

With regard to the synonymy of *E. aphroditois* there has been endless discussion. Years ago (1917, p. 215), I thought I had solved the problem by clearly indicating the distinction between *E. aphroditois* and *E. rousseaui*, though, to my mind, the differences between the two species did not appear to be very striking. Later, having had the opportunity to investigate fine specimens from Cochin-China, New Caledonia, the above specimens from Andamans

and other specimens of *E. rousseaui* from the Mediterranean, I failed to find any really distinctive features ; those considered as such being liable to variation and often found in one form or the other. Thus the white collar may be present or absent in both forms ; the same is the case with the acicular bristles. The distinction between the comb setae does not hold good ; and while the branched gills generally begin somewhat more anteriorly in *E. aphroditois*, on 5th-6th foot, instead of on 8th-10th foot ; many variations have also been noticed. In short there is no reason for considering these two giant forms of *Eunice* as two distinct species ; the name *E. aphroditois* has priority.

Habitat.—Atlantic, Indian and Pacific Oceans, Mediterranean Sea.

***Eunice tentaculata* Quatrefages.**

Eunice tentaculata, Quatrefages 1865, p. 317.

Eunice tentaculata, Fauvel 1917, p. 209, fig. xvii (Synonymy) ; 1930, p. 25.

Eunice pycnbranchiata, McIntosh 1885, p. 294, pl. xxiv, figs. 13-15.

Eunice elsyi, Baird 1870 b, p. 344.

“ Investigator ” Sta. 258, Laccadive Sea, 102 fms. ; Sta. 614, Nankauri Harbour, 13 fms. ; Port Blair Andamans ; Tuticorin Pearl Oyster Bank, 4-10 fms. ; Sandy Point, Krusadai Island ; Pamban, from coral reef ; Kilakarai, from coral reef ; Off Gopalore, 30-38 fms. “ Golden Crown ”.

Specific Characters.—Palps more or less bilobed. Tentacles annulated, rather long. Tentacular cirri articulate. Gills begin about 3rd to 6th feet and attain to 6-20 filaments, and continue to the hind part of the body. Acicula and acicular setae black. Brown or spotted in alcohol, sometimes a white collar on the 4th setigerous segment.

Most of the specimens have a small branchia on the 3rd foot, generally simple, sometimes compound. On the 4th foot the gill is compound.

Habitat.—Australia, New Zealand, Malay Seas, Laccadives, India.

***Eunice floridana* Pourtales.**

Eunice floridana, Ehlers 1887, p. 88, pl. xxii, fig. 17.

Eunice floridana, Fauvel 1914, b, p. 149, pl. i, figs. 5, 8, 11, pl. xi, figs. 22-26 ; 1923 a, p. 402, fig. 157, a-g (Synonymy).

Eunice gunneri, Roule 1907, p. 33, pl. ii, fig. 11.

Eunice amphiheliae, Roule 1896, p. 446.

Eunice philocorallia, Buchanan 1893, p. 173, pl. ix, figs. 2-6 ; pl. x, figs. 7-9 ; pl. xi.

“ Investigator ” Sta. 232, Laccadive Sea, 430 fms.

Specific Characters.—Palps bilobed. Tentacles articulate or moniliform, the median twice as long as the laterals. Tentacular cirri smooth. Gills begin about 7th to 10th foot and attain to 8-10 filaments, and continue nearly to the last segments. Acicula and acicular setae black. Commensal with corals. A membranaceous tube.

There are several specimens with only the anterior ends, and a few with posterior ends. One is still enclosed in a hole bored in a coral fragment.

The first gill appears generally on the 7th foot, more rarely on the 6th. The maximum of gill filaments reaches to 8-10. I have compared the jaws and setae with those of specimens from the Atlantic and found them similar.

Habitat.—Atlantic and Indian Oceans (Laccadives), Mediterranean Sea.

Eunice afra Peters.

Eunice afra, Crossland 1904, p. 289, pl. xx, figs. 1-5.

Eunice afra, Fauvel 1919, p. 374 (Synonymy).

Eunice afra, Pruvot 1930, p. 69.

Mergui Archipelago ; Shingle Island, Gulf of Manaar ; Muscat Shore, Gulf of Oman.

Specific Characters.—Tentacles smooth or faintly annulate. Gills begin about 13th to 20th feet, and attain to 4-16 filaments, and continue to the hind part of the body. Acicula and acicular setae dark. Body nearly cylindrical anteriorly, broad and flattened posteriorly. Dark coloured, more or less spotted with white dots, sometimes a collar on the fourth setigerous segment.

A widely distributed and high variable species.

Habitat.—Red Sea, Zanzibar, Madagascar, Seychelles, Ceylon, Maldives, Mergui, Philippine Islands, Malay Seas, Gambier Islands, New Caledonia.

Eunice afra Peters.

var. **paupera** Grube.

Eunice paupera, Grube 1878, p. 160.

Eunice paupera, Pruvot 1930, p. 69.

Eunice paupera, Fauvel 1930 b, p. 537 ; 1931, p. 12.

'Ain Musa, Gulf of Suez, shore collecting.

Specific Characters.—The palps are slightly bilobed. The tentacles are smooth or faintly wrinkled, subulate ; the median reaches backwards to the 4th setigerous segment, the laterals are shorter and the outer ones are half as short. The buccal segment is thrice as long as the succeeding segment. The tentacular cirri are smooth, subulate, somewhat shorter than the buccal segment. The gills begin on the 23rd, 26th or 27th feet in different specimens ; first 2, 3 or 9 gills are simple, succeeding ones bifid, or trifid ; and in the following ones the number of filaments decreases to two or even one ; they are missing only on the last tenth of the body (60th-70th segment). The anterior dorsal cirri are smooth, subulate, longer than the foot ; in the posterior region they are enlarged at the base, cultriform and shorter than the branchiae which bear long slender filaments. The ventral cirri are short and mamilliform. The acicula are black, so are the acicular setae which are bidentate, hooded, and begin about the 45th setigerous segment. The terminal piece of the compound setae is bidentate, the shaft is slightly enlarged. The length of the specimens is 200 to 250 mm. They are colourless in alcohol.

The section of the body is semicylindrical, flattened in the hind part.

These specimens agree with Grube's description of *Eunice paupera*, which is only a variety of the polymorphic *E. afra* differing only in its simpler gills (reduced to 3-4 filaments), beginning farther from the head. As I observed in specimens from New Caledonia, there is a whole range of intermediate forms between these types.

Habitat.—Red Sea, Philippine Islands, Malay Seas, New Caledonia.

Eunice coccinea Grube.

Eunice coccinea, Grube 1878, p. 153, pl. ix, fig. 1.

Eunice coccinea, Crossland 1904, p. 297, pl. xx, figs. 6-7.

Eunice coccinea, Willey 1905, p. 280.

Eunice coccinea, Ehlers 1908, p. 85.

Eunice coccinea, Fauvel 1914 a, p. 125 ; 1919, p. 375, fig. 5 ; 1931, p. 12.

Andamans, 130-250 fms.

Specific Characters.—Tentacles smooth. Gills begin about 6th, 9th to 13th feet. They attain to 6 to 20 filaments and occur only on the anterior third of the body which is highly arched dorsally throughout its length. Acicular setae bidentate or blunt.

The colour resembles that of *E. afra* from which *E. coccinea* differs chiefly in the shape of the body and the absence of gills in the hind part.

The specimen from the Andamans which consists only of an anterior fragment enclosed in a membranaceous tube is doubtfully referred to this species ; it may be *E. floridana* (?).

Habitat.—Red Sea, Ceylon, Andamans, Philippine Islands, Malay Seas, Indian Ocean, Atlantic Ocean, Gulf of Guinea.

Eunice grubei Gravier.

Eunice grubei, Gravier 1900, p. 258, pl. xiv, figs. 87-88.

Eunice grubei, Crossland 1904, p. 288.

Eunice grubei, Pruvot 1930, p. 68 (Synonymy).

(?) *Eunice micropion*, Marenzeller 1879, p. 135, pl. v, fig. 1,

Eunice micropion, Monro 1924, p. 55.

“ Investigator ” Sta. 669, Camorta Island, Nicobars ; Off Akyab, “ Golden Crown ”.

Specific Characters.—Tentacles articulate. Gills begin on 3rd-4th foot ; they attain to 4-10 filaments and continue nearly to the last segments. Acicula dark or yellow. Acicular setae bidentate.

The tentacles are sometimes very faintly articulate. According to Monro, *E. grubei* is synonymous with *E. micropion* Marenzeller.

E. longicirris Grube is, as I was able to confirm by an examination of a fine specimen from the Red Sea, a very different species.

Habitat.—Red Sea, East Africa, Maldives, Nicobars, Amboina, New Caledonia, Japan (?).

Eunice savignyi Grube.

Eunice savignyi, Grube 1878, p. 150.

Eunice savignyi, Ehlers, 1908, p. 88, pl. xi, figs. 7-13.

“ Investigator ” Sta. 267, Ceylon, 457-589 fms. ; Sta. 334, S. W. of Ceylon, 654 fms. ; Sta. 353, Persian Gulf, 25 fms.

Specific Characters.—Tentacles articulate. Gills begin on 3rd or 4th foot ; they attain to 8-15 filaments, and further back become reduced to one, and disappear altogether about the 30th-40th feet. Acicular setae yellow, bidentate. In the above specimens the tentacles are smooth or faintly wrinkled, as in Ehler's specimens. The gills begin on the 3rd foot. They are well developed in the anterior region and suddenly disappear about the 30th foot.

The edge of the labrum is prominent, white and toothed. The acicular setae are bidentate and not really tridentate as in *E. tridentata* Ehlers.

Habitat.—Philippine Islands, Ceylon, Persian Gulf, Agulhas Stream.

***Eunice investigatoris*, sp. nov.**

(Text-figs., 19, *a-f*.)

"Investigator" Sta. 353, Persian Gulf, 25 fms.

Specific Characters.—Body cylindrical anteriorly, semicylindrical in the middle and flattened in the hind part. Palps bilobed. The three median tentacles are subequal and reach backwards to the 6-7th setigerous segment, the two outer tentacles are hardly half as long. The tentacles are all of them subulate, slender and smooth. The buccal segment (peristomium) is thrice as long as the succeeding one. Two tentacular cirri set on a short

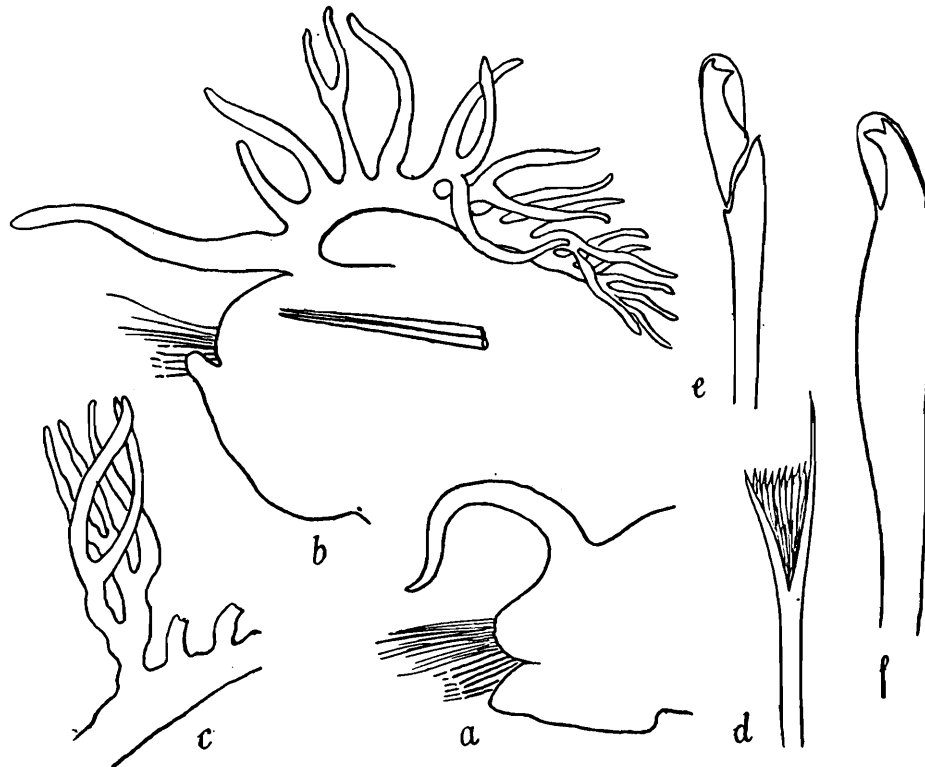


FIG. 19.—*Eunice investigatoris*: *a*. 5th foot $\times 30$; *b*. 10th foot $\times 30$; *c*. fragment of branched gill $\times 30$; *d*. comb-seta $\times 380$; *e*. compound seta $\times 150$; *f*. acicular bristle $\times 150$.

achaetous segment. Gills from the 6th setigerous segment, the first one small, but already compound; they are very large about the 7th-8th, with 18-20 filaments about the 14th setigerous segment. Well developed on about forty segments, they decrease in size in the mid-body and increase again very much in the posterior region where they continue to the 6th-7th small segments preceding the pygidium. *The posterior gills are dichotomously branched* (fig. 19, *b. c.*). In the mid-body there are already a few bifid or trifid filaments (fig. 19, *b.*). Dorsal cirri long and smooth in the first segments (fig. 19, *a.*), then shorter than the gills. They are not knife-like, and, except the first ones, hardly thicker than the branchial filaments. Ventral cirri finger-like in the 5th-6th first feet, in the succeeding ones, short

and moniliform; they again become digitiform in the posterior half of the body, becoming longer and longer towards the hind part, and where they are twice as long as the feet. Pygidium armed with two long, smooth, ventral cirri. Acicula black. Acicular setae black, bidentate, hooded (fig. 19, *f.*) beginning about the 44th-45th feet. Comb-setae long, narrow with 8-10 teeth and equal sides, or sometimes one longer (fig. 19, *d.*). Capillary setae long, slender, faintly winged. Terminal pieces of the compound setae strongly bidentate with a hood not protruding above the tip, the shaft is slightly enlarged (fig. 19, *e.*). Labrum dark with anterior edge toothed.

A single specimen 110 mm. long and 7 mm. broad, colourless or light yellowish gray in alcohol.

The brittle condition of the single specimen did not allow of dissection of the jaws.

This species is readily distinguished by the gills with their filaments branched in a more or less regular dichotomous fashion, especially in the hind part of the body where the gills have a bushy appearance resembling the gills of Terebellids.

Previously one or two divided filaments have been observed on a few gills in several species of *Eunice* but they are only casual anomalies. Ehlers (1887, p. 91, pl. xxv, figs. 12, 13) has described a few branched gills on *Eunice fucata*. It seems to be an instance of individual monstrosity, for I did not find such an anomaly again in specimens of that species from Florida.

I am aware of no other *Eunice* having such regularly and plentifully ramified gills. In *Eunice investigatoris* all the gills of the anterior feet have a number of bifid filaments (fig. 19, *b.*), and in the posterior feet each of the branched filaments is bifid again (fig. 19, *c.*).

The very conspicuous increase of the anterior and posterior gills and their decrease in the mid-body recalls *E. antennata*, but this species has (1) moniliform tentacles, (2) gills with simple filaments, and (3) yellow, *tridentate*, acicular setae.

E. investigatoris is allied to *E. afra*, but in the latter species the gills are farther removed from the head and not dichotomously branched.

Habitat.—Persian Gulf.

***Eunice antennata* (Savigny).**

Eunice antennata, Crossland 1904, p. 312, pl. xxii, figs. 1-7.

Eunice antennata, Fauvel 1917, p. 229, fig. 20 (Synonymy); 1919, p. 377.

Eunice antennata, Pruvot 1930, p. 72.

"Investigator" Sta. 353, Persian Gulf, 25 fms.; 'Ain Musa, Gulf of Suez, shore collecting; Tor, Sinai Peninsula, from Coral Reefs; Pamban, from Coral Reefs; Krusadai and Shingle Islands, Gulf of Manaar; Tuticorin Pearl Oyster Bank; Ceylon Pearl Oyster Bank; Kilakarai, from Coral Reefs; Andamans; Off little Andaman; Addu Atoll, weed-washings; Pedro Shoal, 25 fms.; Mergui.

Specific Characters.—Tentacles deeply annulated. Gills beginning about the 4th-6th feet, continued to near the anus; they attain to 10-15 filaments and are *much more developed in the anterior and posterior regions than in the middle of the body*. Acicular setae yellow *ridentate*.¹

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Philippine Islands, Pacific Ocean.

***Eunice australis* Quatrefages.**

Eunice australis, Fauvel 1917, p. 228, fig. 21 (Synonymy).

Eunice murrayi, McIntosh, Crossland, 1904, p. 310.

Eunice murrayi, Willey, 1905, p. 281.

"Investigator" Sta. Off S. Coast of Ceylon, 32 fms. ; Sta. 384, off Negrais, Burma, 40 fms. ; Sta. 631, Nankauri Harbour ; Andamans.

Specific Characters.—Tentacles deeply annulated. Gills beginning about 6th-7th feet ; they attain to 10-15 filaments. They are found only on the anterior third of the body and disappear suddenly. Acicular bristles yellow, tridentate.

This species differs from *E. antennata* chiefly in the absence of gills in the posterior part of the body.

In a few specimens from the Andamans the gills begin on the 3rd foot ; they are small and simple, but compound on the 7th.

Habitat.—Ceylon, Maldives, Andamans, Zanzibar, Cape of Good Hope, New Zealand, Australia.

***Eunice indica* Kinberg.**

Eunice indica, Crossland 1904, p. 318, pl. xxi, figs. 9-12.

Eunice indica, Fauvel 1919, p. 378 (Synonymy).

"Investigator" Sta. 76, Ganjam Coast, 93 fms. ; Sta. 81, Ganjam Coast, 89-93 fms. ; Sta. 96, Bay of Bengal, 98-102 fms. ; Sta. 292, Persian Gulf, 53 fms. ; Sta. 343, Gulf of Oman, 609 fms. ; Sta. 352, Persian Gulf, 13 fms. ; Sta. 546, Mergui Harbour, 6 fms. ; Sta. 631, Nankauri Harbour ; Off Puri, Orissa ; Andamans.

Specific Characters.—Tentacles smooth. Gills begin on 3rd foot ; they attain to 10-20 filaments and are found only on the anterior third of the body. Acicular setae yellow, numerous (4-5) tridentate. Terminal piece of the compound setae sometimes tridentate with a sharp protruding guard.

It differs from *E. australis* in its gills beginning nearer to the head, in its smooth tentacles, and chiefly in the sharp pointed end-piece of the compound setae. It is closely allied to *E. vittata* D. Ch.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Japan, Gambier Islands, New Caledonia.

***Eunice siciliensis* Grube.**

Eunice siciliensis, Gravier 1900, p. 261, pl. xiv, figs. 78-79.

Eunice siciliensis, Fauvel 1917, p. 231 (Synonymy) ; 1923 *a*, p. 405, fig. 159, *e-m*.

Eunice siciliensis, Crossland 1904, p. 323, pl. xxii, figs. 8-9.

Eunice leucodon, Ehlers 1901, p. 128, pl. xvi, figs. 1-10.

"Investigator" Sta. 702, Nankauri Harbour, Nicobars, amongst coral ; Andamans ; Off Little Andaman ; Diamond Isle, Rock Pool Reef ; Kilakarai, from Coral Reefs ; Mergui Archipelago ; Muscat Shore, Gulf of Oman.

Specific Characters.—Body divided into two distinct regions, an anterior narrow and rounded, and a posterior soft and flattened. Tentacles short, smooth or faintly annulate. Gills simple, beginning very far from the head, about 60th, 70th, 100th feet. Comb-setae and acicular setae absent. Lower jaw (labrum) white, calcareous, gouge-like.

From the Andamans, there are, in addition to an anterior fragment, several median and posterior ones corresponding to the sexual region of a female filled with eggs, soft, swollen bluish green, or showing the transition from the anterior region devoid of ventral spots to the bluish part, swollen with eggs, where a brownish red spot lies in the middle of the ventral part of each segment, as in the Palolo worm. In the short uncoloured posterior part preceding the pygidium, this brown spot fades gradually or disappears altogether in different specimens.

The sexual region very probably breaks off when mature and is regenerated later as is the case in the Palolo worm which is also an inhabitant of corals.

Habitat.—Cosmopolitan. Mediterranean Sea, Atlantic, Indian and Pacific Oceans.

***Eunice (Nigidion) gracilis* (Crossland).**

(Text-fig. 20, *a-f*.)

Eunice gracilis, Fauvel 1930 *a*, p. 26, fig. 6.

Nigidion gracilis, Crossland 1904, p. 327, figs. 65, 66, pl. xxii, figs. 10, 11.

Nigidion gracilis, Augener 1913, p. 284.

“Investigator” Sta. 593, Paway Island, Mergui Archipelago, shore collecting.

Specific Characters.—Body slender. Tentacles short, smooth or very faintly annulate. Gills beginning very far from the head, about 80th, 100th feet, or even farther. They are simple, or consist of two filaments. Comb-setae and acicular setae present (fig. 20, *d-f*).

The single specimen, incomplete behind, is 85 mm. long and 2 to 2.5 mm. broad. It is slender, with the appearance of a *Lysidice*. There seem to be at least 300 segments, which, however, cannot be easily numbered, owing to their contracted condition.

The first 5-6 segments are cylindrical, the next few segments of the body are somewhat depressed, but again become cylindrical farther on.

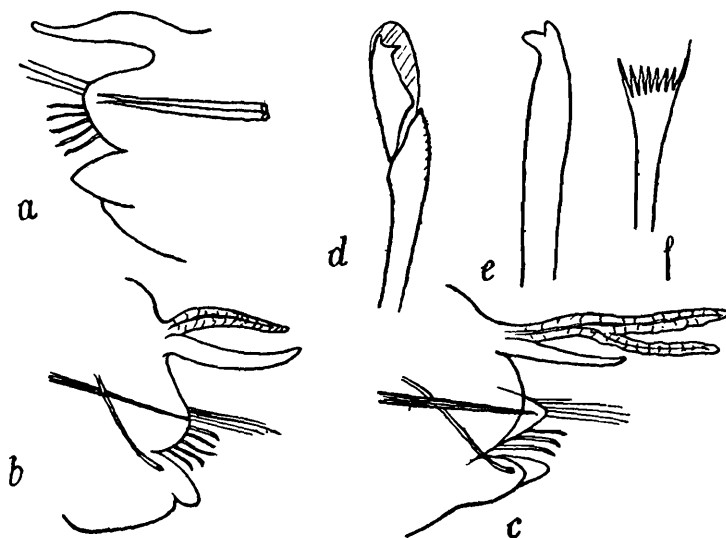


FIG. 20.—*Eunice (Nigidion) gracilis*: *a*. anterior abbranchiate foot $\times 45$; *b*. foot with simple gill $\times 45$; *c*. foot with bifid gill $\times 45$; *d*. posterior compound seta $\times 380$; *e*. acicular bristle $\times 380$; *f*. comb-seta $\times 380$.

The tentacles are slightly more elongated than those figured by Crossland (pl. xxii, fig. 10). The median tentacle extends backwards to the 4th setigerous segment. The tentacles are very indistinctly annulate.

The eyes are reniform.

The first gill appears about the 80th segment. The occurrence of gills on the succeeding segments is very irregular. They are small and simple (fig. 20, *b.*), but in the posterior half of the body there are gills consisting of two filaments, and longer than the dorsal cirrus (fig. 20, *c.*). In the specimen from Krusadai Island (Fauvel, 1930, p. 26) which was smaller and incomplete, the gills were all simple. Crossland's specimens which were much smaller, being young or incomplete, were devoid of gills, and this led Crossland to class them in the genus, or subgenus *Nicidion*.

Habitat.—Indian Ocean, Zanzibar, Gulf of Manaar, Mergui, Australia.

Genus **MARPHYSA** Quatrefages.

Prostomium rounded or bilobed. Two bulbous plaps. Five tentacles. Two eyes. Tentacular cirri absent. Dorsal cirri elongated, ventral cirri short. Gills simple or pectinate. Dorsal setae simple capillary, ventral setae simple or compound with knife-like or sickle-shaped terminal pieces. Comb-setae. Acicular setae. Lower jaw (labrum) of two pieces. Upper jaw with a pair of mandibles, two pairs of toothed plates, an unpaired plate and sometimes paragnaths.

- | | |
|---|-----------------------|
| 1. Gills on the greater part of the body | 2 |
| Gills only on a short anterior part of the body | <i>M. stragulum.</i> |
| 2. Ventral setae simple | <i>M. mossambica.</i> |
| Ventral setae compound | 3 |
| 3. Terminal piece of the compound setae sickle-shaped | <i>M. corallina.</i> |
| Terminal piece of the compound setae knife-like | 4 |
| 4. Prostomium horse-shoe-shaped | <i>M. macintoshi.</i> |
| Prostomium bilobed | 5 |
| 5. Compound setae present on the anterior and posterior parts of the body | <i>M. sanguinea.</i> |
| Compound setae absent in the anterior and posterior parts of the body | <i>M. gravellyi.</i> |

Marphysa corallina Kinberg was not found in the collection. It has been recorded from Madagascar, Cape of Good Hope, and the Pacific Ocean. *Marphysa macintoshi*, though recorded from Krusadai Island, Gulf of Manaar, is not represented in the collection.

Marphysa sanguinea Montagu.

Marphysa sanguinea, Fauvel 1919, p. 381; 1923*a*, p. 408, fig. 161 (Synonymy).

Marphysa furcellata, Crossland 1903, p. 141, pl. xv, figs. 13, 14.

Marphysa furcellata, Gravely 1927, p. 18.

Krusadai Island (dug up in sand and mud); Pamban backwater (in sand and mud); Vizagapatam Harbour (shore collecting); Tuticorin; Mormugao Bay, Goa.

Specific Characters.—Prostomium bilobed. Tentacles short. Gills which begin about 16th-30th feet, attain up to 4-7 filaments, and continue to the hind part of the body. Upper setae capillary, ventral setae compound, with a long knife-like terminal piece. Comb-setae very variable; in the posterior segments they are shorter, with a few large

teeth. Acicular setae irregularly present in the posterior part of the body, sometimes nearly wanting.

Specimens from Krusadai Island were mixed with *M. mossambica*, from which they are readily distinguished by their compound setae; otherwise the general appearance is the same.

A few worms are rather narrow and nearly cylindrical all over, as in the closely allied *M. macintoshi* Crossland, which appears to differ only in its broad horse-shoe-shaped undivided prostomium; and this latter species has been recorded from Krusadai (Fauvel, 1930, p. 28).

The European specimens of *M. sanguinea* from rock-clefts are much depressed and brittle, but those from muddy sand of the *Zostera* beds are more slender, elongated and cylindrical; in spite of this they do not differ from the others.

The large comb-like setae, considered as a specific character of *M. furcellata* by Crossland, are also found in *M. sanguinea*.

Habitat.—Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean, Australia, New Caledonia.

Marphysa gravelyi Southern.

Marphysa gravelyi, Southern 1921, p. 617, pl. xxiv, fig. 13; pl. xxv, fig. 13.

Marphysa gravelyi, Gravely 1927, p. 19.

Adyar, Madras (brackish water).

Specific Characters.—Prostomium bilobed. Tentacles subequal, a little longer than the prostomium. The gills, which begin about 36th-52nd feet and attain up to 8-9 filaments, continue to the hind part of the body. Dorsal setae simple, capillary. In the posterior segments the ventral compound setae, with knife-like terminal piece, are gradually replaced by capillary setae. Bifid acicular bristles.

The specimens from Adyar attain to a length of 245 and 270 mm. They are flattened and 5 mm. in breadth.

Habitat.—Chilka Lake, Madras.

Marphysa mossambica Peters.

Marphysa mossambica, Fauvel 1922, p. 232, fig. 32; 1919, p. 380 (Synonymy).

Marphysa mossambica, Gravely 1927, p. 19.

Marphysa mossambica, Crossland 1903, p. 139, pl. xv, figs. 7-10.

Nauphanta novae-hollandiae, Kinberg 1857-1910, p. 43, pl. xvi, fig. 23.

“Investigator” Sta. 616, Camorta Island, Nicobars; Sta. 622, Camorta Island, Coral Reefs; Sta. 700, Nankauri Harbour; Krusadai Island, Gulf of Manaar; Pamban Backwater (in sand and mud); Kilakarai, from Coral Reefs; Sunderbans.

Specific Characters.—Prostomium bilobed. Tentacles longer than the head. The gills, which begin about 30th-33rd feet, attain to 7-8 filaments and continue to the hind part of the body. Dorsal and ventral setae simple.

This species is readily characterized by the complete absence of compound setae.

Habitat.—Red Sea, East Africa, India, Bay of Bengal, Philippine Islands, Australia.

Marphysa stragulum (Grube).

Eunice stragulum, Grube 1878, p. 163.

Marphysa stragulum, Crossland 1903, p. 136.

"Investigator" Sta. 266, E. of Ceylon, 542 fms.

Specific Characters.—Body slender, elongated. Prostomium broad, rounded, undivided. Tentacles slightly longer than the head. The gills which begin about the 12th-13th feet are very large, with numerous filaments, covering the dorsum entirely but present only on 12-20 segments. Dorsal setae simple, capillary. Ventral setae compound, with a long knife-like terminal piece. In the posterior feet, falcigerous setae.

There are in the collection two specimens incomplete behind, 35 and 39 mm. long and 4 mm. broad with about a hundred segments. They are larger than Grube's specimen which was only 17 mm. long, 1.5 mm. broad and incomplete behind the 59th segment. The larger size accounts for the higher number of gills.

In the posterior feet, unfortunately all the compound setae are broken, and have lost their terminal piece. I was, therefore, unable to verify the presence of sickle-shaped setae.

On the anterior and mid-body the compound setae of the feet are knife-like (spinigerous).

This species is allied to *M. bellii* Aud. Edw. and *M. adenensis* Gravier, but *M. bellii* has both spinigerous and falcigerous bristles in the anterior feet, while *M. adenensis* has only sickle-shaped setae and no knife-like setae.

In one of the specimens of *M. stragulum* the gills begin on the 12th foot on the left, and on the 13th on the right side.

The acicular setae are pale, unidentate.

Habitat.—Philippine Islands Ceylon.

Genus LYSIDICE Savigny.

Three tentacles. Tentacular cirri absent. Dorsal and ventral cirri. Branchiae absent. Setae: simple capillary; comb-like; compound falcigerous and acicular. Lower jaw (labrum) of two pieces. Upper jaw with a pair of mandibles, two toothed plates, an unpaired plate and paragnaths.

Lysidice collaris Grube.

Lysidice collaris, Marenzeller 1879, p. 28, pl. v, fig. 2.

Lysidice collaris, Fauvel 1917, p. 236 (Synonymy).

Lysidice collaris, Gravely 1927, p. 19.

(?) *Lysidice fallax*, Ehlers 1898, p. 15.

Lysidice sulcata, Treadwell 1902, p. 200, fig. 47.

"Investigator" Sta. 645, Maldives; Port Blair, Andamans; Koweit Harbour, between tide-marks; Kilakarai, from Coral Reefs; Pamban Beach, in dead corals and from Coral Reefs.

Specific Characters.—Eyes reniform or semi-lunar. Preserved specimens are generally more or less completely colourless or light-brown. Sometimes there are traces of the white ring near the anterior end.

This species is hardly distinct from the *L. ninetta* Aud. Edw. of European Seas. It differs chiefly in the shape of the eyes which are reniform instead of oval or rounded.

L. fallax Ehlers, often met with the " Palolo " worm in swarms, is probably an epitokous condition of *L. collaris*, with large eyes provided with a lens.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Philippine Islands, Japan, Australia, New Caledonia, Gambier Islands, Guiana.

Sub-family ONUPHIDINAE.

Genus **DIOPATRA** Audouin & M. Edwards.

Head rounded. Two pad-like palps. Two small ovate frontal tentacles. Five occipital long tentacles borne on long ringed ceratophores. An achaetous segment bearing two small tentacular cirri. Dorsal cirri subulate. Ventral cirri subulate in a few anterior feet, the following pad-like. Pseudo-compound bristles in the anterior feet, succeeded by simple setae, comb-setae and acicular setae. Gills large, with a number of filaments inserted spirally. Lower jaw (labrum) of two pieces. Upper jaw with a pair of mandibles, 3 pairs of toothed plates and an unpaired one. Tube membranaceous.

Diopatra neapolitana Delle Chiaje.

Diopatra neapolitana, Fauvel 1923a, p. 419, fig. 166, a-h (Synonymy); 1930a, p. 29.

Diopatra neapolitana, Crossland 1903, p. 132, pl. xiv, fig. 1.

Diopatra amboinensis, Willey 1905, p. 274, pl. iv, figs. 95-97.

Diopatra variabilis, Southern 1921, p. 611, pl. xxv, fig. 14.

" Investigator " Sta. 98, 9 miles S. E. of Santapalli Lighthouse, Vizagapatam Coast, 20 fms.; Sta. 349, Persian Gulf, 25 fms.; Sta. 380, off Akyab, Burma, 530 fms.; Sta. 396, off Tenasserim, Burma, 50 fms.; Sta. 503, Mergui Archipelago (shore collecting); Sta. 553, Mergui, 27 fms.; Tuticorin Harbour (shore collecting); Off Black Pagoda, Orissa Coast, 11 fms.; Vizagapatam, near mouth of channel; Madras Coast, 5-10 fms.; Chandipore, near Balasore; Gangetic Delta; Taléh-Sap, Gulf of Siam, Sta. 27 (Annandale).

Specific Characters.—Body large and very long, rounded anteriorly, depressed and brittle in the posterior region. Palps small, globular. Ringed ceratophore of the tentacles much shorter than the ceratostyle. Two anterior tentacles shorter than the three posterior ones which are subequal. Eyes missing. Gills begin on 4th or 5th foot. They are very large, covering the dorsum, they decrease in size and disappear about the 50th-70th feet. On the first 4-5 setigerous segments simple winged setae and pseudo-compound bristles ending in a bidentate hook with a sharp-pointed hood. In the succeeding feet, simple setae with two wings and comb-setae with fine numerous teeth, or a few large teeth. Hooded acicular setae bidentate. A number of yellow tapering, geniculate acicula. Membranous tube partly buried in the sand, the upper part thick, tough, more or less coated with debris.

There is a number of specimens, most of them anterior fragments, some enclosed in a tube. Others, from Tuticorin and Vizagapatam, are small young worms.

The gills begin on the 4th or 5th foot, as in European specimens.

As already stated (Fauvel, 1930, p. 29) such specimens are probably *D. amboinensis*, but Milne-Edwards' description is so vague and incomplete that it is impossible to be certain to which of the numerous species of *Diopatra* described from the Indian or the Pacific Ocean it may be applied. The above specimens agree very well with the *Diopatra neapolitana* D. Ch., a species now well-known and carefully described, with which I have compared them.

In Indian specimens there are comb-setae often longer and with teeth finer and more numerous, but I have also found such setae on specimens from the Atlantic and sometimes both the types of comb-setae may be observed together in the same foot.

If such a slight difference were taken into account, this would at best characterize a variety and not a species.

The very variable *D. variabilis* does not appear to be a distinct species.

Habitat.—Atlantic, Mediterranean, Red Sea, Indian Ocean.

Genus **ONUPHIS** Audouin & M. Edwards.

Head rounded. Eyes present or absent. Two pad-like palps. Two small fusiform frontal tentacles. Five occipital tentacles borne on long ringed ceratophores. An achaetous segment bearing two small tentacular cirri. Dorsal cirri subulate, ventral cirri subulate in the anterior feet, pad-like in the succeeding region. Pseudo-compound bristles in the anterior feet, next simple setae, comb-setae and acicular setae. Gills simple or pectinate. Lower jaw (labrum) of two pieces. Upper jaw with a pair of mandibles, 2-3 pairs of toothed plates and an unpaired plate. Tube membranaceous, sometimes free.

- | | |
|---|----------------------------|
| 1. Gills simple | 2 |
| Gills pectinate | 3 |
| 2. Gills begin on the first foot | <i>O. holobranchiata</i> . |
| Gills begin about 11th-13th feet | <i>O. conchylega</i> . |
| 3. Gills begin on 1st-2nd feet. | 4 |
| Gills begin on 5th-6th feet. | <i>O. investigatores</i> . |
| 4. Gills begin on the 1st foot and remain simple on the next 10-20 feet, then pectinate | <i>O. eremita</i> . |
| Gills begin on 2nd foot and are pectinate on the 4th | <i>O. aucklandensis</i> . |

Onuphis conchylega Sars.

Onuphis conchylega, Fauvel 1914b, p. 127, pl. viii, figs. 1-18, 1923a, p. 415, fig. 164 (Synonymy).

Onuphis conchylega, Willey 1905, p. 276.

"Investigator" Sta. Andaman Sea, 640 fms.; Sta. 322, Andaman Sea, 378 fms.

Specific Characters.—All the branchiae are simple and begin about 11th-13th foot. First and second feet larger and pointing forwards, with a few stout, blunt, simple hooks replaced in the third foot by pseudo-articulate uni- or bi-dentate bristles. Tube membranaceous flattened, coated with mud and shells.

The specimens from Sta. 322 are small, enclosed in flattened tubes, coated with fine gray ooze. Empty *Ditrupa* tubes and Echinid radioles are still adhering to them. The gills are all simple and begin about the 13th foot. The ringed ceratophores of the tentacles are short.

They do not differ from *O. conchylega* from the Atlantic. Willey has already recorded this species from Ceylon. The large specimen from Sta. 228 is unfortunately very soft and has lost most of its appendages. The remaining gills are all simple. The labrum is white-prominent and toothed. The flattened tube is coated with long transparent glassy sponge spicules 80-100 mm. long.

Habitat.—Atlantic Ocean, Mediterranean, Indian Ocean.

Onuphis holobranchiata Marenzeller.

Onuphis holobranchiata, Marenzeller 1879, p. 132, pl. iv, fig. 1.

Onuphis holobranchiata, Willey 1905, p. 278, pl. iv, fig. 101.

Onuphis holobranchiata, Augener 1913, p. 283.

Onuphis holobranchiata, Fauvel 1930a, p. 30.

“Investigator” Sta. 631, Nankauri Harbour, 19-30 fms.

Specific Characters.—Gills all simple, beginning on the first foot. Eyes more or less conspicuous. Pseudo-compound bristles on the first four feet, with bidentate or tridentate terminal piece. Transverse pigment streaks on the anterior segments.

There are only a few specimens, some of them complete.

Traces of brown transverse streaks are still noticeable on some, while others are discoloured. The eyes are very small. The gills are simple and begin on the first setigerous segment.

Habitat.—Japan, Nicobars, Gulf of Manaar.

Onuphis aucklandensis Augener.

Onuphis aucklandensis, Augener 1924, p. 418, fig. 11.

Onuphis tenuisetis, Benham (*non* McIntosh) 1909, p. 5.

Andamans ; Off Puri, Orissa.

Specific Characters.—Gills begin on the second foot, and are pectinate on the 3rd-4th feet, and attain to 6-7 filaments. Tentacles long, reaching to 24th-27th segment, with short ringed ceratophore. Bi- or tri-dentate pseudo-compound hooks in the first 3 feet. Eyes absent.

The anterior fragment from Andamans, 12 mm. long and 6-7 mm. broad (feet included) agrees well with Augener's description. The small specimen from Puri, Orissa, 8 mm. long, 0.6 mm. broad, agrees with Augener's forma *juvenis*. The first gill is on the second foot. On the 21st foot the gills are still only bifid, and further back they have 3-4 filaments.

Habitat.—India, Andamans, New Zealand.

Onuphis eremita Audouin & M. Edwards.

Onuphis eremita, Fauvel 1919, p. 385, fig. 6 ; 1923a, p. 414, fig. 163 (Synonymy).

Onuphis basipicta, Willey 1905, p. 275, pl. iv, figs. 98, 99.

Onuphis landanaensis, Augener 1918, p. 339, pl. v, figs. 135-138 ; pl. vi, fig. 197.

“Investigator” Sta. 695, Akyab Harbour, Burma ; Mergui Archipelago, 40 fms. ; Hamji Basin, Burma ; Madras ; Vizagapatam.

Specific Characters.—Gills begin on the first foot, simple on the 10-22 succeeding feet, pectinate in the succeeding region, and attain to 5-6 filaments. Pseudo-compound bristles, with bi- or tri-dentate terminal piece, in the first 3-5 feet. Tentacles with long, ringed ceratophores. Eyes absent. In the specimens before me the gills remain either simple up to the 10th-13th feet or become pectinate about the 20th-23rd as in most European specimens.

Habitat.—Atlantic Ocean, Mediterranean, Suez Canal, Madagascar, Ceylon, Madras, Mergui, Akyab.

***Onuphis investigatoris*, sp. nov.**

(Pl. VI, figs. 1-6. Text-fig. 21.)

"Investigator" Sta. 145, Arabian Sea, 696 fms. (green ooze); Sta. 184, Arabian Sea, 947 fms. (grey mud); Sta. 211, Arabian Sea, 609-620 fms. (grey mud); Sta. 245, Laccadive Sea, 449-465 fms. (green mud); Sta. 339, Gulf of Oman, 604 fms. (green mud, globigerina ooze); Sta. 345, Persian Gulf, 35 fms. (soft grey mud); Sta. 365, Arabian Sea, 708 fms. (grey mud); Sta. 366, Arabian Sea, 544 fms. (brown mud).

Specific Characters.—Body elongated, depressed, about the same breadth all over, except the first 5-6 segments which are rounded, longer and narrower. Segments numerous. Palps globular, ovate. Two small ovate or subcylindrical front tentacles. Five occipital tentacles with short, ringed ceratophore and long smooth subulate cirrostyle. Median tentacle reaching backwards to the 7th setigerous segment, the outer pair reaching to the 15th. Eyes absent. Buccal segment (peristomium) which is shorter and narrower than the succeeding, bears two smooth, filiform tentacular cirri inserted on its anterior margin behind the lateral posterior tentacles. Dorsal cirri subulate in the first feet (pl. VI, fig. 1), swollen at their base in the succeeding ones. Ventral cirri subulate on the 6-7th feet (pl. VI, fig. 2). *There is no conical tubercle between the setigerous process and the base of the dorsal cirrus.* Gills begin on the 5th-6th feet, simple (or rarely bifid), bifid on the intermediate region/pectinate farther on, with as many as 10 filaments (pl. VI, figs. 4-6). They continue to the last segments where they are again simple. Posterior ligule well developed in the first feet (pl. VI, figs. 1-3), in the form of a short conical knob about the 12-15th feet. The change is progressive. Pygidium, an ovate knob with two long filiform cirri. Up to the 5th-6th setigerous segment, capillary setae and pseudocompound hooks with bidentate or tridentate

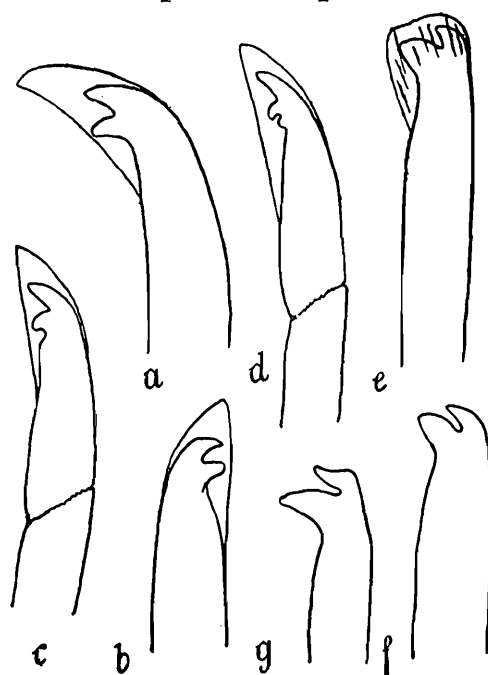


FIG. 21.—*Onuphis investigatoris*: a, b. hooks from 1st foot. $\times 270$; c, d. hooks from 4th foot. $\times 270$; e. hooded hook from mid-body. $\times 270$; f. worn hook from mid-body. $\times 270$; g. hook enclosed in a foot of the mid-body. $\times 270$.

hooded terminal piece (Text-fig. 21, a-d). In the succeeding segments, winged capillary setae and yellow bidentate hooded acicular setae (Text-fig. 21, e-g). From about the 10th-15th feet yellow acicula ending in a capillary tip. A bundle of very slender capillary acicula

enclosed in the base of the dorsal cirrus. Lower jaw (labrum) soft, chitinous, elongated, with blackish anterior edge. Jaws soft, pale-edged light brown. M. I., 1+1 mandibles without basal teeth; M. II, 9+9; M. III, 10+10; M. IV, 7+12—13, with a triangular dark, chitinous plate at the base. Tube thin, membranaceous, more or less coated with fine mud. Length up to 60 mm. or more, breadth 4-5 mm. Discoloured in alcohol.

This blind abyssal species comes somewhat near *O. cirrobranchiata* Moore (Izuka, 1912, p. 105) but the latter species has the gills beginning about 13th-14th feet (instead of 5th-6th) with 5 filaments only, and decreasing to a rudimentary condition in the hind part of the body.

O. teres Ehlers, a giant form from the South Australian shore differs in (1) its large size, (2) much shorter tentacles, (3) less pectinate gills, (4) smooth stout anterior hooks, and (5) littoral habitat.

O. quadricuspis Sars is allied to *O. investigatoris* in its tentacles, its tridentate anterior hooks and its gills beginning about the 6th-9th feet, with, at the most, 4 filaments; they again become simple from the 43rd foot backwards. The jaws have fewer teeth.

On the 30th foot the gills of *O. investigatoris* have about 10 long slender filaments (pl. vi, fig. 5). On the first setigerous segment, the hooks are stout, bent, with two large subequal, teeth at the tip broadly hung over by a sharp oval guard or hood (Text-fig. 21, *a-b*). On the 4th foot, the terminal piece of the compound, or pseudo-compound hooks is bidentate or tridentate (Text-fig. 21, *c, d*), the third tooth being smaller and shorter than the second one. Tridentate hooks may still be present on the 6th foot.

The acicular setae on the 30th foot, are frequently spanner-shaped in appearance, but are somewhat variable in species of *Onuphis* (Text-fig. 21, *e-g*). The dorsal and ventral cirrus of the 1st foot are about the same size, and have a swollen base (pl. VI, fig. 1). The ligule is elongate, hardly shorter than the cirri, so that the foot appears divided into three large conical lobes. At the fourth foot (pl. VI, fig. 2) the dorsal cirrus is much longer than the ventral, which is shorter than the elongated ligule. On the 6th foot the conditions are slightly different; the ventral cirrus is enlarged at its base, and nearly piriform (pl. VI, fig. 3). In the succeeding segments it gradually changes to a mere globular pad, and from the 15th foot backwards the conical ligule becomes shorter and shorter and dwindles to a small blunt cone (pl. VI, figs. 5-6). As the gill-filaments increase in number and in length the dorsal cirrus becomes more and more slender and is hardly to be distinguished from the gill-filaments otherwise than by its insertion (pl. VI, figs. 5-6).

One specimen from Sta. 365 bears two tentacular cirri on the left side, an anomaly which is not infrequent in Eunicidae.

In a specimen from Sta. 145 the tentacular cirri, which are probably undergoing regeneration, are quite rudimentary, being reduced to mere small white spots on the anterior border of the segment.

Habitat.—Persian Gulf, Arabian Sea, Laccadive Sea, Gulf of Oman.

Genus **HYALINOECIA** Malmgren.

Eyes present or absent. Two pad-like palps. Two small fusiform frontal tentacles. Five occipital tentacles borne on ringed ceratophores. *An achaetous segment devoid of tentacular cirri*. Dorsal cirri subulate, ventral cirri subulate in the anterior feet, pad-like

in the following ones. Simple or pseudo-compound hooks in the anterior feet, simple setae, comb-setae and acicular setae in the succeeding ones. Gills generally simple. Lower jaw (labrum) of two pieces. Upper jaw with a pair mandibles, 2-3 pairs of toothed plates and an unpaired plate. Tube membranaceous or horny, sometimes free.

***Hyalinoecia tubicola* (O. F. Müller).**

Hyalinoecia tubicola, O. F. M., Fauvel, 1923, p. 421, fig. 166, *i-g*.

Hyalinoecia tubicola, McIntosh 1885, p. 337, 339.

Hyalinoecia tubicola, Augener 1924, p. 422.

Hyalinoecia camiguina, Grube 1878, p. 142.

Hyalinoecia camiguina, Willey 1905, p. 279.

Onuphis tubicola, Ehlers 1908, p. 83.

“Investigator” Sta. 94, off Santapalli Lighthouse, Vizagapatam Coast, 15—17 fms.; Sta. 106, Laccadive Sea, 1091 fms.; Andaman Sea, 683 fms.; Sta. 128, S. of Cape Comorin, 902 fms.; Sta. 135, Arabian Sea, 559 fms.; Sta. 142, Bay of Bengal, 573 fms.; Sta. 177, Laccadive Sea, 637 fms.; Sta. 270, Laccadive Sea, 564 fms.; Sta. 280, Bay of Bengal, 446 fms.; Sta. 289, Gulf of Oman, 667-811 fms.; Sta. 301, Arabian Sea, 1000 fms.; Sta. 324, Bay of Bengal, 448 fms.; Sta. 325, Bay of Bengal, 843 fms.; Sta. 327, Bay of Bengal, 419 fms.; Sta. 339, Gulf of Oman, 604 fms.; Sta. 342, Gulf of Oman, 745 fms.; Sta. 359, Arabian Sea, 674 fms.; Sta. 363, Arabian Sea, 860 fms.; Sta. 379, off Akyab, Burma, 250 fms.; Sta. 382, off Akyab, Burma, 455 fms.; Sta. 383, off Burma, 517 fms.; Sta. 385, Arabian Sea, 630 fms.; off Mangalore; off Colombo; off Cheduba, 20-30 fms.; Gulf of Oman, 1005 fms.; Gangetic Delta; Port Blair, Andamans; Nicobars; Mergui; Snod Island; Entrance to Palk Straits.

Specific Characters.—Gills simple, beginning about 18th-26th feet. The first two pairs of feet rather stout and pointing forwards, armed with simple capillary setae and stout hooks, bluntly bidentate and hooded (on young specimens they are pseudo-compound). Tube free, horny, transparent, cylindrical, slightly bent, open at both ends and provided with internal valves.

There is a very large number of tubes, empty, or more or less filled with mud, and the worm is found enclosed in many of them.

The size of the tubes ranges from 20-50 mm. in length to 150-200 mm. or more with a diameter of 9-10 mm. in the larger ones. The old large tubes are more or less opaque, especially when they are empty; they appear to have been deserted for a long time, and are filled with ooze. The others are hyaline, colourless or yellow, sometimes marked with brown rings. In shape and resilience they are much like large goose quills.

The specimens from the Indian Ocean do not materially differ from the Atlantic specimens, only they appear to attain a larger size. But the large animals show only slight differences from the smaller ones which may be accounted for by age and wear. The gills begin nearer to the head, 18th-19th feet instead of 22nd-26th feet; the hooks of the first feet are pseudo-compound in the young ones, simpler, stouter and blunter in the older individuals. The jaw-plates have more numerous and sharper teeth in those of the smaller animals, whilst they are generally fewer and blunt in the old, large ones.

Hyalinoecia camiguina Grube, and the two varieties *longibranchiata* and *papuensis* McIntosh are not really distinct from *H. tubicola*, a widely distributed deep-sea species.

Ehlers has recorded, from the Gulf of Aden, tubes 365 mm. long, and animals attaining a length of 213 mm., with 285 segments, which appear to agree with the large specimens from the Arabian Sea and the Gulf of Bengal.

Habitat.—Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Japan, Malay Seas, Torres Straits, New Zealand.

Genus **RAMPHOBRACHIUM** Ehlers.

Two pad-like palps. Two small rounded frontal tentacles. Five occipital tentacles borne on ringed ceratophores. An achaetous segment bearing two small tentacular cirri. Dorsal cirri subulate. Ventral cirri pad-like. Three anterior feet very large, directed forwards and bearing very long capillary bristles with a hooked terminal piece. Gills pectinate. Lower jaw of two pieces. Upper jaw with a pair of mandibles, paired toothed plates and an unpaired plate. Tube membranaceous.

Rhamphobrachium chuni Ehlers.

Rhamphobrachium chuni, Ehlers 1908, p. 76, pl. ix, figs. 6-15.

Rhamphobrachium chuni, Augener 1927, p. 78, fig. 8.

“Investigator” Sta. 150, Laccadive Sea, 719 fms.; Sta. 250, S. W. of Ceylon, 480 fms.; North Andaman.

Specific Characters.—Tentacles short, subulate, nearly equal, borne on short ringed ceratophores. Eyes absent. The three anterior feet flattened, nearly imbricated, directed forwards and enclosing the head, provided with subulate dorsal and ventral cirri and very long and slender setae ending in a pseudo-articulate tridentate hook enclosed in a hood (it is smooth in the grown up specimens). Gills begin about 12th foot and consist of as many as 6 filaments.

The specimen from Sta. 150 is large, broken into two parts. Its tube is long, thick, cylindrical, coated with fine grey mud.

From Sta. 250 there are only two anterior fragments without tubes, the larger one has lost most of its tentacles and cirri and its long capillary setae, the smaller one is in a slightly better condition.

The gills begin on the 12th foot on the anterior fragment from the Andamans, and attain up to 5-6 filaments.

The anterior feet are not so large as in *Rh. agassizi* Ehlers and the setae differ slightly; nevertheless both the species are very closely related.

Habitat.—East coast of Africa, Ceylon, Laccadive Sea, Andamans, South Australia, New Zealand.

Sub-family Lysaretinae.

Genus **AGLAURIDES** Ehlers.

Prostomium rounded. Eyes present. Palps absent. Three short tentacles more or less hidden under the anterior border of the peristomium. Nuchal organs protrusible. Parapodia sesquiramous. Dorsal cirri large, thick, flattened. Setigerous lobe with two unequal ligules. Setae simple, capillary. Acicular setae. Lower jaw of two pieces. Upper jaw with five pairs of symmetrical or asymmetrical toothed plates and two long supports.

Agaurides fulgida Savigny.

Agaurides fulgida, Willey 1905, p. 284, pl. v, fig. 107.

Agaurides fulgida, Fauvel 1917, p. 240, pl. vi, figs. 52-55 (Synonymy); 1919, p. 387; 1930a, p. 31.

Agaurides erythraensis, Gravier 1900, p. 278, pl. xiv, figs. 99-103.

Agaurides erythraensis, Fauvel 1914a, p. 131, pl. vii, figs. 1-4.

Agaurides symmetrica, Fauvel 1919, p. 388.

Oenone fulgida, Augener 1913, p. 290.

Oenone fulgida, Crossland 1924, p. 85, figs. 106-111.

"Investigator" Sta. 152, S. W. of Colombo Lighthouse, 26 fms.; Sta. 593, Paway Island (shore collecting); Sta. 703, Nankauri Harbour (amongst corals); Pedro Shoal, 25 fms.; Kilakarai (from coral reefs).

Specific Characters.—Two pairs of eyes, anterior large, posterior small. Tentacles very short, rounded. Peristomium biannulate on the sides, with longitudinal ventral folds. Dorsal cirri chopper-shaped. Anterior ligule short, rounded, posterior ligule more elongated. Acicular setae yellow, bidentate, hooded. Upper jaw plates very variable in shape.

I have dissected the jaws of a large anterior fragment from Sta. 152 which resemble those of an Australian specimen I figured in a previous paper (1917, pl. vi, figs. 54, 55), only the maniple-shaped lower plate has an upper larger tooth, as in Crossland's figure 108, *d*, and the plate above has a single hook, instead of two.

If we designated the hooks as +1, the formula is, on the right: MI. 6+1; M. II, 7+1; M. III, 6+1; M. IV, 6+1; M. V, 1, and on the left: M. I, 6—7+1; M. II, 8—9+1; M. III, 5—6+1; M. IV, 1, M. V, 2. The smaller teeth are not always very distinct.

Crossland (1924) has shown the great variability of the jaw apparatus and considered these differences as only varietal, not specific. He classified the different types as varieties *diphyllidia* and *malensis*, with symmetrical jaw-plates, and var. *arabelloides*, with jaws asymmetrical as in the typical form.

I have stated elsewhere why I exclude the genus *Oenone*, which is based on an error.

Habitat.—Atlantic Ocean, Florida, West Indies, Gulf of Guinea, East Africa, Red Sea, India, Maldives, Nankauri, Philippines, Australia.

Sub-family Lumbriconereinae.

Genus **LUMBRICONEREIS** Blainville.

Body long and cylindrical. Prostomium conical or globular, devoid of palps and tentacles. Eyes absent. First two segments apodous and achaetous. Dorsal cirri absent or reduced to a small knob. Ventral cirri absent. Gills absent. Feet with two unequal ligules. Simple winged setae and simple or compound hooks. Lower jaw (labrum) bodic-like. Upper jaw with a pair of mandibles, three pairs of toothed plates and two supports

- | | |
|---|---------------------------------|
| 1. Two long cirriform ligules in the posterior feet | . 2 |
| Ligules of the feet short, or only one elongated, cirriform | . . 3 |
| 2. Prostomium conical, hooks absent | . . <i>L. pseudobifilaris</i> . |
| Prostomium ovate, hooks present | . . <i>L. bifilaris</i> . |
| 3. Hooks compound and simple | 4 |
| Only simple hooks | 5 |

- | | |
|---|----------------------------|
| 4. Prostomium conical | <i>L. latreilli</i> . |
| Prostomium globular | <i>L. sphaerocephala</i> . |
| 5. Small dorsal cirri present | <i>L. notocirrata</i> . |
| Dorsal cirri absent | 6 |
| 6. Long erect ligule in the posterior feet | <i>L. heteropoda</i> . |
| Ligules of the posterior feet shorter and not erect | <i>L. impatiens</i> . |

Lumbriconereis latreilli Audouin & M. Edwards.

Lumbriconereis latreilli, Fauvel 1919, p. 391 ; 1923a, p. 431, fig. 171, *m-r* (Synonymy).

Lumbriconereis latreilli, Crossland 1924, p. 10, figs. 8-40.

Lumbriconereis japonica, Marenzeller 1879, p. 137, pl. v, fig. 3.

Lumbriconereis japonica, Izuka 1912, p. 139, pl. xiv, figs. 17, 18.

Tuticorin Pearl Oyster Bank, 12 miles from shore, 9-10 fms.

Specific Characters.—Body narrowed anteriorly. Prostomium bluntly conical. Feet well developed ; setigerous process with an anterior rounded lobe and a posterior elongate conical ligule, which is greatly elongated in the posterior segments. In the anterior feet, capillary setae and compound hooks, in the succeeding feet unjointed hooks. The capillaries disappear about 40th-60th feet.

The variety *japonica* is hardly distinct ; it has been exhaustively dealt with by Crossland.

Habitat.—Atlantic Ocean, Mediterranean, Red Sea, Persian Gulf, Indian and Pacific Oceans, New Hebrids, Amboina.

Lumbriconereis sphaerocephala Schmarda.

Lumbriconereis sphaerocephala, Augener 1924, p. 424 ; 1927, p. 88.

Lumbriconereis sphaerocephala, Fauvel 1930a, p. 30 ; 1930b, p. 540.

Lumbriconereis sphaerocephala, Ehlers 1904, p. 33, pl. v, figs. 3-11.

(?) *Lumbriconereis obtusa*, Kinberg, Augener 1926, p. 459.

Andamans, St. 25. Off Gopalore, 28 fms. "Golden Crown."

Specific Characters.—Prostomium short, globular. Feet with an anterior rounded lobe and a posterior longer, conical ligule, slightly more elongated in the posterior feet. In the anterior feet, capillary setae and compound hooks with short terminal piece, followed by simple hooks with denticles above the main fang.

The small specimens from both the stations agree with Ehlers' description. *L. obtusa* recorded from Ceylon by Augener is very similar, if not synonymous.

Habitat.—New Zealand, New Caledonia, Gambier Islands, Bass Straits, Ceylon (?), Andamans.

Lumbriconereis impatiens Claparède.

Lumbriconereis impatiens, Fauvel 1919, p. 392, fig. 7 ; 1923a, p. 429, fig. 171, *a-i* (Synonymy).

Lumbriconereis impatiens, Augener 1918, p. 364.

"Investigator" Sta. 90, Ganjam Coast, 28-30 fms. ; Sta. 274, Laccadive Sea, 1,150 fms. ; Sta. 351, Persian Gulf, 25 fms. ; Vizagapatam Harbour and Channel.

Specific Characters.—Prostomium cylindro-conical. Feet with an anterior short, rounded lobe and a posterior longer, conical or cirriform, slightly erect ligule. Acicula

yellow. In the anterior feet, simple winged setae and unjoined hooks with denticles above the main fang and a long guard. In the middle and posterior feet the capillaries disappear and the guard of the hooks is shorter.

The Indian specimens do not differ from the Atlantic ones, though they are generally smaller.

Habitat.—Atlantic Ocean, Mediterranean, Red Sea, Persian Gulf, India, Laccadives.

***Lumbriconereis heteropoda* Marenzeller.**

Lumbriconereis heteropoda, Marenzeller 1879, p. 30, pl. vi, fig. 1.

Lumbriconereis heteropoda, Izuka 1912, p. 141, pl. iv, fig. 19.

Lumbriconereis heteropoda, Fauvel 1919, p. 394; 1930a, p. 30.

Lumbriconereis heteropoda, Crossland 1924, p. 4, figs. 1-7.

Lumbriconereis erecta, Moore 1903, p. 454.

“Investigator” Sta. 349-350, Persian Gulf; Mormugao Bay, Portuguese India; Doarakara, Sunderbans; Chaupati, Bombay.

Specific Characters.—Prostomium conical. Feet increased in length posteriorly, with posterior cirriform ligule long and often erect. Only simple capillary setae in the anterior feet, followed by winged capillaries and unjointed hooks with small denticles above the main fang.

This species differs from *L. impatiens* in having only winged capillary setae in the 10th-40th anterior feet, and the longer posterior ligules erect, or turned backwards, in the middle and posterior segments.

Habitat.—Red Sea, Persian Gulf, India, Japan, California.

***Lumbriconereis bifilaris* Ehlers.**

Lumbriconereis bifilaris, Ehlers 1901, p. 139, pl. xviii, figs. 1-10.

Taléh-Sap, Gulf of Siam.

Specific Characters.—Body long and slender. Prostomium long, conical. Anterior feet with two rounded lips, the anterior shorter than the posterior. Posteriorly they gradually change to two very long cirriform processes of about the same length. In the anterior feet winged capillary setae and unjointed hooks with small denticles above the main fang and a long guard; about the 55th foot only hooks with shorter guard.

The specimen from Taléh-Sap consists of five fragments which appear to belong to one and the same animal; the length is about 110 mm. and breadth 1 mm.

The prostomium is somewhat long, ovate rather than conical. Eyes absent. The peristomium is a little longer than the succeeding achaetous segment.

In the anterior feet, the setal-sac is compressed between two rounded lips the anterior of which is short and the posterior long, foliaceous, somewhat asymmetrical. The setae consist of winged capillaries and unjointed hooks. Posteriorly the lips grow longer and narrower and about the 55th foot, both lips are narrow and nearly equal. Further back they are intermediate between the figures 5 and 6 of Ehlers.

The prostomium and bristles agree with Ehlers' description. In the hind part of the posterior fragment, the parapodial lips, or ligules, are nearly as long as those figured by Ehlers.

I have compared this specimen with another from the coast of Morocco, but have not found any differences except in the relative lengths of the lips of the feet, which fall within the range of individual variation.

Habitat.—Coast of Chili, Taléh-Sap, Atlantic Ocean, Coast of Morocco.

***Lumbriconereis pseudobifilaris*, sp. nov.**

(Pl. VI, figs. 7-13, text-fig. 22.)

“ Investigator ” Sta. 379, off Akyab, Burma, 250 fms. (Soft green mud).

Specific Characters.—Body cylindrical deeply annulated. Prostomium conical, rather sharp, without eyes (pl. VI, figs. 7-9). The first two achaetous segments each about the same size as the following. On the ventral side of the peristomium, three longitudinal grooves reaching across to the next segment (pl. VI, fig. 9). Two large lateral mouth-pads (“ Mundpolster ”). Anterior feet with a short rounded anterior lip and a posterior one tapering at the tip (pl. VI, figs. 10-11). On the succeeding segments, the lips or ligules of the feet gradually increase in length and become cirriform, but the anterior one remains shorter and blunter than the posterior one (pl. VI, figs. 12-13). Setigerous lobe rounded, flattened between the lips and bearing only capillary winged setae (Text-fig. 22, *c, d*), which are short in the first segments. Farther back, they are less numerous and have a yellow cylindrical shaft and a broad, flattened transparent sabre-like distal part ending in a long slender tip

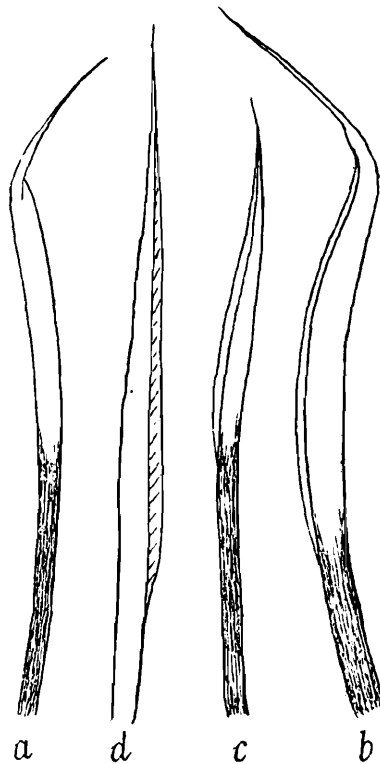


FIG. 22.—*Lumbriconereis pseudobifilaris* : *a, b*. flat setae. $\times 220$; *c, d*. winged setae. $\times 220$.

straight or bent (Text-fig. 22, *a, b*). Hooks absent. Several dark acicula. Dorsal and ventral cirri absent. Lower jaw (labrum) whitish, broad and denticulate. Upper jaws : M. I, mandibles with long smooth fang destitute of basal teeth, two very long and slender dark supports ; M. II, two symmetrical plates with 5 teeth on the right and 8 on the left M. III, 1+1 ; M. IV, two dark hooked plates with several fine denticles on the edge.

Up to 40 mm., or more in length and 2 mm. in breadth.

Colour, in alcohol, iridescent pearl-grey.

Only an anterior fragment of the above size, with 124 segments, is present in the collection.

The prostomium, rather broad at the base, ends in a somewhat sharp tip (pl. VI, figs. 7-9). At its junction with the first segment lies a small median pouch-like pit between the nuchal pads. On the right side, under the anterior rim of the first segment, lies a dark transverse spot which looks as if it were formed of two rather indistinct parts. On the left side, only traces of pigment are to be seen; they do not look like eyes.

In the gaping mouth, two large lateral pads nearly meet each other in the middle, leaving only a narrow deep groove between them (pl. VI, fig. 9). The inferior lip is slightly bulging and folded. Three faint longitudinal folds cut across the first two segments which are, as usual, achaetous and of about the same size as the succeeding ones.

The first anterior feet are smaller than the others and are slightly different. The setigerous lobe is rounded and flattened between two lips, an anterior short rounded one and a posterior, triangular one which develops a short tapering tip, often folded on the base (pl. VI, figs. 10-11). About the 20th setigerous segment, the anterior lip increases in length, but remains much shorter than the posterior one which becomes longer, nearly cylindrical and flagelliform, with a bulging base (pl. VI, figs. 12-13). Farther back, both the lips increase in size and very often diverge from one another, the anterior pointing towards the head, and the posterior directed backwards.

There is no trace of cirri, papillae or gills.

In the anterior feet, there are about 6-8 short and winged setae of nearly the same size (Text-fig. 22, c, d). In the succeeding segments the setae become scarcer, and the shaft, often of a deep yellow colour, is elongated whilst the distal part is flattened and enlarged into a hyaline blade with a narrow wing and a long and slender tip which is usually bent (Text-fig. 22, a, b). Such setae are somewhat like the broad sword-shaped bristles of some Sabellidae. They are not provided with two wings set obliquely as in the setae of *Arabella*.

Although I carefully looked over a number of feet I was unable to find any trace of hooks.

The jaws differ little from the *Lumbriconereis* type. The labrum which is whitish and soft, faintly chitinous on its anterior border, and has a few blunt teeth, recalls that of *L. bifilaris* Ehlers. The mandibles (M. I) are long, slender, and smooth without teeth or hooks at their base. They are borne on two long Y-shaped supports in the anterior part, joined in the middle and ending posteriorly in two long, slender, dark processes extending up to the 10th setigerous segment. The jaws of the second pair (M. II) consist of elongate plates with teeth on the inner rim, and a large, dark, rectangular, chitinous wing-like plate on the outer. On the right jaw-plate, there are 5 rather large, hooked teeth; on the left plate, the teeth are more numerous (8-9), smaller, and more obsolete. The plates of the third pair of jaws are short, dark, ending in a single hook. The fourth jaw-plates are alike, but have in addition a few small teeth on their anterior edge.

This species has many features in common with *L. bifilaris* Ehlers from Chili. The prostomium and the long cirriform lips of its feet are of the same type. The jaw apparatus is similar, and the labrum, mandibles (M. I), and the symmetrical plates are also of the same shape. In both species the jaw-plates (M. IV) have several teeth, but in Ehlers' species

the jaws (M. II) have the same number of teeth, 4 on either side, and supports of the mandibles are much shorter. *L. bifilaris*, however, has unjointed hooks, as is the case in almost all other species of *Lumbriconereis*. Augener confirmed Ehlers' statement on this particular point, but I was unable to find any trace of hooks in the Akyab specimens which had only capillary bristles.

Larymna cirrosa Kinberg (1857-1910, p. 49, pl. xix) has feet somewhat like those of the above specimen, but has a semi-globular prostomium, eyes, and setae of two kinds: "*styli-formes et obtusae, apicebifido*" Moreover, Kinberg mentions five pairs of jaws.

In spite of the lack of hooks and the unusual length of supports of the mandibles, both very aberrant features in *Lumbriconereis*, I have thought it best to class this new species in the genus *Lumbriconereis* rather than propose a new one for it.

Southern (1921, p. 625, pl. xxvi, fig. 16) has already described, from the Chilka Lake, *Lumbriconereis simplex* destitute of hooks and bearing only capillary winged bristles. But the feet do not have the two long cirriform lips; they are of the usual type and the jaws also differ from those of *L. pseudobifilaris*.

Kinberg (1857-1910, p. 47, pl. xix, fig. 43) published a short description of *L. atlantica* from the Rio de la Plata bearing only simple winged capillary setae, but the feet in this species are devoid of cirriform processes.

L. bifilaris Ehlers which I had the opportunity to examine from the Taléh-Sap and from the coast of Morocco, is provided with hooks, even in the anterior feet.

Habitat.—Akyab, Burma.

***Lumbriconereis notocirrata*, sp. nov.**

(Pl. VII, figs. 1-8, test-fig. 23).

Vizagapatam, farther end of the creek beyond the Ferry; channel connecting backwater with the sea (*H. S. Rao and G. Varugis*, May-June, 1926); Orissa Coast, 7 fms.

Specific Characters.—Body cylindrical, conspicuously annulate, segments up to several hundreds. Prostomium blunt, conical, without eyes (pl. VII, figs. 1-2). The first two achaetous segments are equal and of the same length as the succeeding ones. The ventral side of the peristomium is divided into faint longitudinal furrows which do not extend on the next segment. Two lateral mouth pads ('Mundpolster'). Feet of the anterior segments small, succeeding ones with a setigerous process with two ligules, an anterior, short and rounded and a posterior long and conical, becoming more and more elongated posteriorly, and erect in the middle region and the posterior segments (pl. VII, figs. 5-7).

Dorsal cirrus reduced to a small knob in the anterior feet (pl. VII, fig. 6), long and finger-like in the middle, bent, erect and translucent in the posterior region where the feet are long and protruding (pl. VII, figs. 5, 8). In the hind part of the body, a little above and in front of the base of the foot, the border of the segment protrudes as a small dorsal knob, or a transparent vesicle. Acicula yellow, four in the anterior feet, followed by three, two or only one in the posterior feet. A small bundle of very fine acicula enclosed in the base of the dorsal cirrus. In the anterior feet, mouth sword-like capillary setae with a only wing (Text-fig. 23, *a, b*); in the succeeding ones simple setae and simple hooks with bifid tip and rounded guard (Text-fig. 23, *c, d*). In the posterior feet, hooks and 1-2 capillary setae. Lower jaw (labrum) black, short, broad, with parallel semi-circular streaks

and a faintly denticulate anterior border. Upper jaw with long lanceolate supports. M. I, mandibles with a smooth base; M. II, two symmetrical plates with 4+4 teeth; M. III, 2+2; M. IV, 1+1.

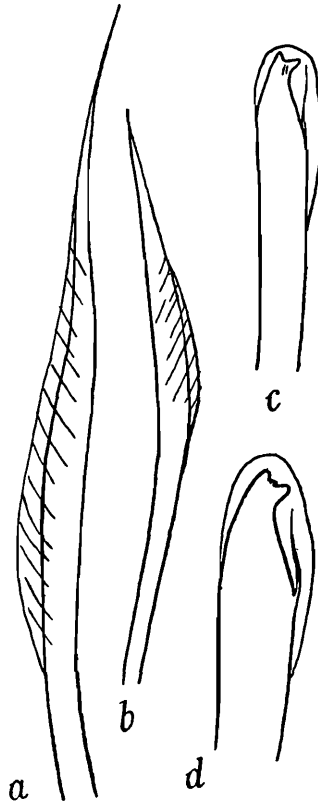


FIG. 23.—*Lumbriconereis notocirrata*: a. anterior seta. $\times 270$; b. seta from midbody. $\times 270$; c. hook. $\times 270$; d. hook tip. $\times 380$.

Length up to 350 mm. or more, breadth 8 mm. Pale salmon-colour in alcohol, with traces of transverse pale brownish red streaks.

Lives in sand.

This singular *Lumbriconereis* secretes a great deal of thick mucous slime. Several anterior, median and posterior fragments were collected. One of the specimens, broken into five pieces, but probably lacking only the last segments, is 355 mm. long and 5 mm. broad. Unfortunately it is somewhat soft behind. The specimen from Orissa is a large anterior fragment, 160 mm. long and 8 mm. broad, inclusive of the feet. The proboscis is visible through the half open mouth.

The jaws are very much like those of *L. impatiens*, the labrum is similar. The supports of the mandibles, which are destitute of teeth at the base, are longer. The jaws (M. II) are symmetrical plates with four teeth each and a lateral wing. The jaws (M. III) are bidentate and (M. IV) unidentate.

The prostomium ovate, without eyes, has nothing peculiar (pl. VII, figs. 1-2).

The first 5-6 feet which are very small, do not materially differ from those of other species of *Lumbriconereis*, but a little farther on, appears a dorsal cirrus reduced, at first, to a small conical knob with a few fine acicula enclosed in its base, and the posterior ligule of the foot is longer (pl. VII, figs. 4, 6). In the middle region the dorsal cirrus is sausage-shaped and erect (pl. VII, fig. 7). In the posterior region, the posterior ligule grows very long, cirri-form, bent or erect, and above and slightly in front of the base of the foot appears a small conical papilla directed forwards (pl. VII, fig. 5).

The setae are of the usual *Lumbriconereis* type, winged capillary and simple hooks, with two blunt teeth at the tip and, occasionally, a few traces of denticles between them (Text-fig. 23 a-d).

The feet, with their long erect ligule, recall those of *L. heteropoda* and *L. papillifera*, while the well-marked small dorsal cirri are somewhat like those of *Arabella geniculata*, but the dorsal papillae of the hind feet are a puzzle.

Under the name *Lumbriconereis bicirrata* Treadwell (1929 b, pp. 1-3, figs. 1-7) has described an apparently closely allied species. The posterior feet are similarly provided with a long cirriform ligule and a large erect appendage, which Treadwell interprets as a posterior ligule, but which is in fact a dorsal cirrus, for, in figure 3, the author has drawn an aciculum at the base. But the anterior feet are different, and Treadwell does not mention any dorsal papillae on the posterior feet. In Treadwell's species, further, the jaws M. III are unidentate. However allied these two species may be, they are undoubtedly distinct. Treadwell's specimen came from the Puget Sound, North Pacific.

Habitat.—East Coast of India.

Genus **ARABELLA** Grube.

(*Aracoda* Schmarda ; *Maclovia* Grube.)

Prostomium ovate, devoid of palps and tentacles. Eyes present. First two segments apodous and achaetous. Dorsal cirri reduced to a mere tubercle. Ventral cirri absent. Feet with two unequal ligules. Simple winged setae. Lower jaw (labrum) of two short pieces. Upper jaw with a pair of mandibles and 3-4 more or less asymmetrical pairs of toothed plates. Two or three long supports.

Arabella iricolor (Montagu).

Arabella iricolor, Fauvel 1923a, p. 438, fig. 175 (Synonymy) ; 1930a, p. 31.

Aracoda iricolor, Augener 1924, p. 430 ; 1927, p. 191.

Aracoda multidentata, Augener 1913, p. 291.

“ Investigator ” Sta. 619, Camorta Island, Nicobars (shore collecting) ; Krusadai Island, Gulf of Manaar ; Seven Pagodas, Madras Coast, 5-10 fms. ; Vizagapatam Harbour (shore collecting).

Specific Characters.—Prostomium blunt conical, with four eyes set at its back in a traverse line. Dorsal cirri reduced to a small bent knob, often wanting, in the posterior part of the body and on young specimens. All the setae are simple, short, stout, geniculate, the upper ones with a denticulate crest, the lower ones with smooth wing. The mandibles are large hooks with a toothed base. Body grey, iridescent, sometimes transverse rows of dark spots on the anterior segments.

This widely spread Eunicid does not appear to attain, in the warmer seas, as large a size as on the European coasts where its specific synonymous name, *Maclovia gigantea*, is very appropriate.

Habitat.—North and South Atlantic Oceans, Mediterranean Sea, Indian and Pacific Oceans.

Genus **DRILONEREIS** Claparède.

Body elongated, cylindrical. Prostomium devoid of palps and tentacles. Eyes may be present. The first two segments apodous and achaetous. Dorsal cirri reduced to a

mere tubercle. Gills and ventral cirri absent. Feet with two unequal lobes. Simple winged setae and a large acicular spine. Lower jaw (labrum) small or sometimes absent. Upper jaw with a pair of mandibles, a pair of toothed plates and 2-3 pairs of small hooks.

Prostomium small, lanceolate, flattened

D. filum.

Prostomium almost circular in outline, peculiarly ridged on dorsal surface

D. major.

***Drilonereis filum* Claparède.**

Drilonereis filum, Fauvel 1923a, p. 436, fig. 174, *a-h* (Synonymy); 1919, p. 389; 1927b, p. 426.

"Investigator" Sta. 378, off Akyab, Burma, 34 fms.

Specific Characters.—Body long and slender. Prostomium lanceolate, flattened, often with a longitudinal median groove. Two dark spots at the base. Peristomium with ventral longitudinal folds. Feet with an anterior rounded lobe and a posterior long, blunt, conical, one. Dorsal cirrus reduced to a mere knob with fine enclosed acicula. Capillary setae with two wings set at an angle. A very large blunt acicular bristle. Acicula with a filiform protruding tip.

The dark spots on the back of the prostomium are pigmented nuchal organs. The single specimen, incomplete behind, 40 mm. long, and 2 mm. broad, agrees with European specimens.

Habitat.—Atlantic, Mediterranean, Suez Canal, Red Sea, Persian Gulf, Burma, Gambier Islands.

***Drilonereis major* Crossland.**

Drilonereis major, Crossland 1924, p. 57, figs. 73-79.

"Investigator" Sta. 142, Bay of Bengal, 573 fms.; 'Ain Musa, Gulf of Suez (shore collecting).

Specific Characters.—Body large, up to 430 mm. in length. Prostomium flat, almost semi-circular in outline, peculiarly ridged on dorsal surface. No sense organs of any kind (?). Setae all simple, the long capillaries slender, but slightly bent and not distinctly bordered. Jaws of normal type. No teeth on bases of pincers (mandibles). Accessory plate of supports triangular, generally more or less equilateral. Rudiments of labrum usually absent, sometimes conspicuous.

The specimen from 'Ain Musa is rather large, 230 mm. long and 3 mm. broad, inclusive of the feet. It agrees well with Crossland's description.

The flattened prostomium is horse-shoe-shaped, with radiating ridges. The anterior feet are very small and the posterior ones large and elongated.

The setae agree. There are (1) upper double-winged capillaries, (2) lower capillaries somewhat shorter, (3) fine enclosed dorsal acicula in the small knob which represents the dorsal cirrus, (4) acicula ending in a long, very slender, protruding tip, resembling small capillaries, and (5) a very large, yellow acicular spine. Such setae are no more characteristic of the species than the radiating ridges of the prostomium which I noted in a specimen, of about the same size, from the Bay of Biscay. According to Crossland, such radial ridges "in some examples are indistinct and might be overlooked if not already seen in other specimens" In the specimen from Sta. 142, which is somewhat smaller, the anterior feet, though not retracted, are rather small, particularly the first 5-6.

The setae of both the specimens are quite like those of specimens from Sicily and the Bay of Biscay with which I have compared them.

In reference to the jaws, I was unable to dissect those of the animal from Sta. 142, which is very brittle, but if Crossland's figure 74 is compared with my figure 174 c (1923a) the differences appear rather slight. The mandibles, which Crossland calls pincers, are probably without teeth at their base; M. II, 6+10 teeth with a fang above. Crossland mentions 2 to 6 teeth, but there are more in his figure and, probably, he counted only the large upper ones and did not include the smaller ones at the base of the plate. Differences in the figures may also be due to the sloping of the plates; M. III, 1+3 and 1+4, Crossland notes 1+3 and 1+4 also; M. IV, 1, Crossland gives 1, 1+1, 1+2, 1+3. The absence of M. V noted by him is in accordance with my frequent observations. Sometimes the plates overlap giving rise to mistakes in counting.

In the specimen, from the Atlantic and the Mediterranean, very extensive variations in the jaws have been observed. The labrum, which Crossland calls the mandibles, is very often wanting, as also the accessory plate of the supports, the homology of which has not yet been cleared satisfactorily. As all Crossland's specimens came from two localities only two or three miles apart it is not to be wondered that their characters are less variable, for they may constitute a local race or may even have evolved from one and the same brood.

The above specimens, particularly those from 'Ain Musa, and from the Gulf of Suez, are undoubtedly *D. major*, but this species, if really distinct from *D. filum*, appears to differ only in the shape of the prostomium.

Habitat.—Gulf of Suez, Bay of Bengal.

Genus **NINOË** Kinberg.

Prostomium conical. Palps and tentacles absent. The first two segments achaetous and apodous. Gill-filaments cirriform, sessile. Simple setae, and hooks. Four pairs of upper jaws. Labrum of two pieces.

Ninoë chilensis Kinberg.

(Pl. VII, fig. 18.)

Ninoë chilensis, Kinberg 1857-1910, p. 45, pl. xviii, pg. 32.

Ninoë chilensis, Ehlers 1904, p. 141.

"Investigator" Sta. 168, Bay of Bengal, 105 fms.

Specific Characters.—"Tentacula bina submarginem anteriorem interdum occulta, lobus cephalicus conicus, sulcis quatuor longitudinalibus proeditus; branchiae in parte corporis anteriore obviae, radiis 2-11; setae limbatae aliae elongatae acuminatae, aliae breves" (Kinberg).

The single specimen is small, more or less twisted and incomplete behind. It appears to agree with the short description of Kinberg and with his figures. The prostomium is conical, rather long, devoid of eyes. The "*tentacula bina*" of Kinberg are not real tentacles, but the extruded nuchal organs, unless he meant the buccal pads figured on each side of the mouth (?) (fig. 33, pl. xviii).

There are rudimentary gills on the second foot. They have three filaments on the third foot, but the number may reach 10-12. They are well developed on about 30 segments,

then they dwindle and suddenly disappear. A larger, flattened process above the gills (pl. vii, fig. 18) is perhaps a modified dorsal cirrus (?). Behind the branchial region, the feet are similar to those of *Lumbriconereis*, with a short rounded setigerous process, devoid of cirri, and with simple winged setae and long hooks.

Habitat.—Coast of Chili, Bay of Bengal.

Family ARICIIDAE Audouin & M. Edwards.

Body vermiform, segments numerous, divided into two regions: (1) thorax more or less enlarged, depressed and (2) abdomen much longer and somewhat cylindrical. Prostomium conical, cylindrical or globular, without any appendages. Proboscis unarmed. Feet biramous, with acicula. Gills dorsal, generally simple, ciliate. A dorsal cirrus. The ventral rami of the thorax are flattened pads with or without a fringe of papillae and vertical rows of stout bristles. In the abdomen the ramus is bilobed, erect, with or without a ventral cirrus. Sometimes an intermediate cirrus between both rami. Often, transverse rows of papillae on the ventral side of a number of anterior segments. Setae simple, of many kinds. Dorsal sense-organs.

Thoracic ventral rami with vertical rows of foot-papillae	.	.	<i>Aricia</i> .
Thoracic ventral rami without foot-papillae or with only 1-3	.	.	<i>Scoloplos</i> .

Genus **ARICIA** Savigny.

Prostomium conical. A pair of erect lanceolate gills on each segment, except on a few anterior ones. Thoracic feet with an erect dorsal cirrus and a bundle of serrated capillary setae. Ventral ramus pad-like with vertical rows of stout bristles and foot papillae. Often, transverse ventral rows of papillae on a few segments. In the abdomen, an erect dorsal cirrus, capillary setae and forked setae, sometimes an intermediate cirrus. Ventral ramus bilobed, with capillary setae and a ventral cirrus. Dorsal sense-organs anchor-shaped.

1. Large hastate spear-like spines on a few thoracic segments		<i>A. nuda</i> .
No such spines		2
2. Intermediate sirrus present	.	<i>A. cuvieri</i> .
Intermediate cirrus absent	.	<i>A. exarmata</i> .

Aricia cuvieri Audouin & M. Edwards.

Aricia cuvieri, Fauvel 1927a, p. 12, fig. 3 e-l (Synonymy).

Aricia cuvieri var. *perpapillata*, Eisig 1914, p. 334, pl. xi, fig. 10; pl. xv, figs. 18-20; pl. xviii, figs. 1-14.

Specific Characters.—Prostomium sharp conical, without eyes. 22-24 thoracic segments, with a fringe of 10-15 sharp conical foot-papillae, 3-5 vertical rows of large yellow bent, blunt hooks (uncini). Transverse rows of ventral papillae on segments 17th-20th to 27th-32nd. Abdominal dorsal cirri chopper-shaped. Dorsal forked setae, a long intermediate cirrus. Ventral ramus bilobed, with fine serrulate setae and a small conical ventral cirrus. Spear-shaped spines and special glands absent.

Var. ***persica***, var. nov.(Text-fig. 24, *a-d*.)

Koweit Harbour, between tide marks.

Specific Characters.—Gills begin on 7th setigerous segment, instead of 5th. Intermediate cirrus much longer than the ventral ramus.

There is only one large specimen.

The gills begin on the 7th setigerous segment, but there is a very small one on the left side of the 6th segment.

There are 25 thoracic segments with vertical rows of genuine hooks with bent blunt tip and guard, (Text-fig. 24, *b-d*) and 2-3 intermediate segments. There are about 10 foot-

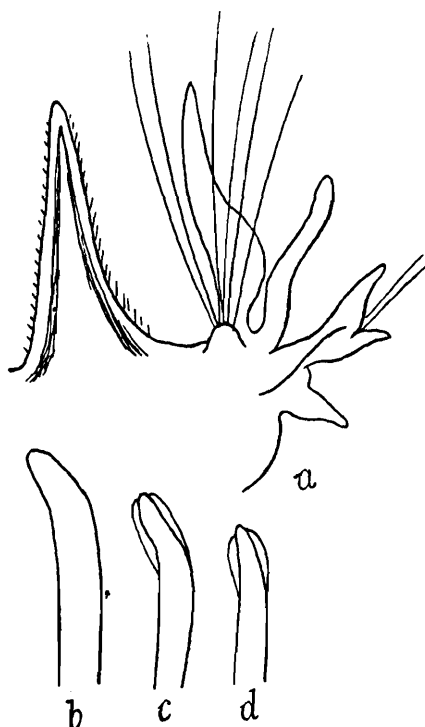


FIG. 24.—*Aricia cuvieri* var. *persica*: *a*. abdominal foot. $\times 40$; *b-d*. *uncini*, front and side view. $\times 150$.

papillae in the mid-thoracic segments. Ventral papillae are present from 23rd to 31st thoracic segments, in crowded rows of 10-11 on each side, nearly meeting in the middle.

In the abdominal region, the gills are long. One or two foot-papillae persist till the 30th-31st setiger. The intermediate cirrus (*intercirrus*) is about $1\frac{1}{2}$ times as long as the ventral ramus, whilst in typical *A. cuvieri* it is shorter, or at the most, of the same length (Text-fig. 24, *a*). The gills provide the only feature which distinguishes it from the typical form.

Habitat.—Persian Gulf.

***Aricia nuda* Moore.**(Text-fig. 25, *a-d*.)

Aricia nuda, Moore 1911, p. 311.

Aricia nuda, Eisig 1914, p. 345.

"Investigator" Sta. 378, off Akyab, Burma, 34 fms.

Specific Characters.—Body large. Prostomium small, conical. Thoracic setigerous segments 15. Gills begin on the 5th setigerous segment, the posterior ones are very long

and slender (Text-fig. 25, *a*, *b*). Ventral thoracic feet with a fringe of foot-papillae and vertical rows of *subuluncini* (Text-fig. 25, *c*), (genuine hooks (*uncini*) absent), and capillary

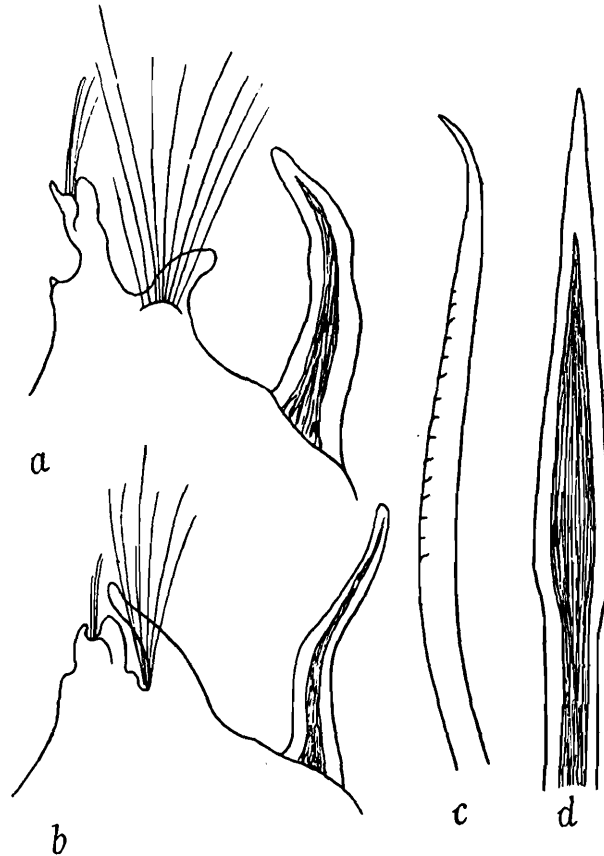


FIG. 25.—*Aricia nuda*: *a*. 26th foot. $\times 30$; *b*. 28th foot $\times 30$; *c*. subuluncinus. $\times 300$; *d*. hastate spine. $\times 120$.

setae. From the 12th to the 15th setigerous segment 4-5 very large spear-headed spines in each foot (Text-fig. 25, *d*). Ventral papillae (*subpodiale*) absent. In the abdominal feet, capillary setae and forked setae. Intermediate cirrus absent.

This species closely resembles *A. exarmata* but differs in the presence of large spear-headed spines. It differs from *A. foetida*, which is also armed with large spines, in the absence of ventral papillae, genuine hooks (*uncini*), and intercirrus.

Eisig who, on account of the slightly confused description of Moore, ascribes to *Aricia nuda* *uncini* which it does not possess, considers it distinct from a closely allied species, *A. norvegica*, owing to the *uncini* and the different shape of the large spines. But as *A. nuda* has *uncini* replaced by *subuluncini*, and has spear-shaped spines with hastate tip, quite similar to those of *A. norvegica*, I am of opinion that there are very slight differences, if any, between the two species. In *A. norvegica* also the gills begin on the 5th setigerous segment, and there are 15-17 thoracic segments with *subuluncini* and foot-papillae. Ventral papillae and intercirrus are equally wanting.

Habitat.—California, Burma.

***Aricia exarmata*, sp. nov.**

(Text-figs. 26, 27.)

“Investigator” Sta. 166, Bay of Bengal, 133 fms. (Brown mud).

Specific Characters.—Body of very large size, depressed, enlarged in the thoracic region, semi-cylindrical in the abdominal region. Prostomium rather small, blunt, conical, without

eyes. Thoracic setigerous segments 15-16 (the 16th often smaller, intermediate). Gills begin on the 5th setigerous segment. The anterior ones are triangular lanceolate, the abdominal ones long and narrow. Dorsal ramus with an asymmetrical chopper-shaped dorsal

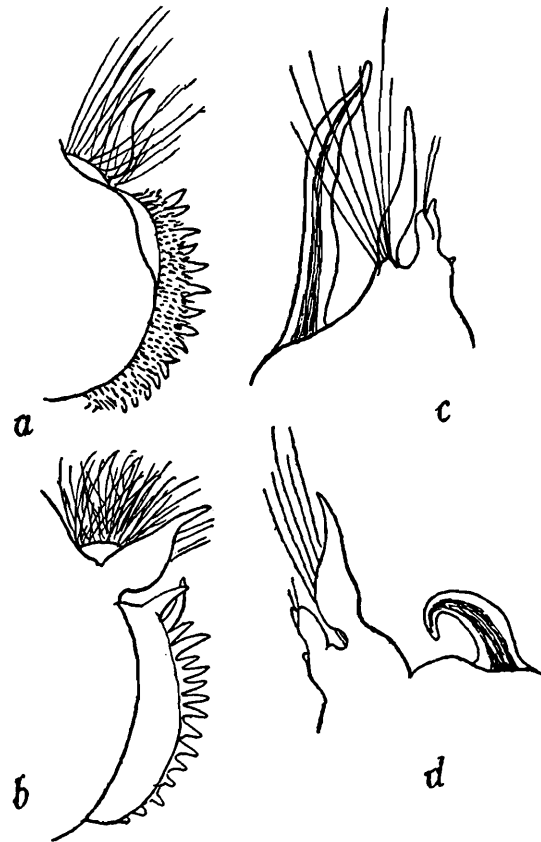


FIG. 26.—*Aricia exarmata* : a. b. thoracic foot, front and posterior view. $\times 11$; c. d. abdominal feet. $\times 11$.

cirrus with pointed tip, a bundle of camerated capillary setae (Text-fig. 27, a-c). Ventral ramus a flattened vertical pad with a narrow elongated lamella bearing a fringe of about 12-15 long conical papillae, several vertical rows of bent *subuluncini* (Text-fig. 27, e) and

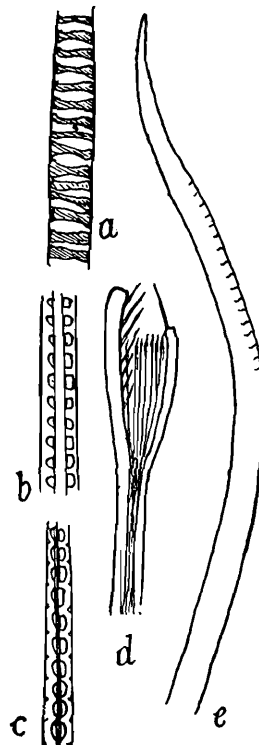


FIG. 27.—*Aricia exarmata* : a-c. parts of camerated setae. $\times 380$; d. forked seta. $\times 520$; e. subuluncinus. $\times 150$.

long serrated capillary setae (Text-fig. 26, *a, b*). *Genuine hooks (uncini) and spear-shaped spines absent*. Ventral papillae (subpodiale) absent. In the abdominal region, a long dorsal cirrus faintly cultriform, a bundle of long and slender, forked, serrated setae (Text-fig. 27, *d*). Intermediate cirrus (*intercirrus*) absent. Ventral ramus erect, bilobed, with an aciculum and a few slender capillary setae. Ventral cirrus reduced to a mere small subulate knob (Text-fig. 26, *c, d*). Proboscis with membranaceous lobes encircling the mouth.

There is a large number of anterior fragments, many of them with only a few abdominal segments. The thorax is about 20 mm. long, 9-10 mm. broad and 4-5 mm. thick.

The dorsal three-lobed sense organ is like that of *A. grubei*, but it is much injured in the abdominal region. This species is very similar to *A. nuda* but differs from it only in the absence of large spear-headed spines. But I was unable to find any trace of them in the large number of specimens examined (about 80).

Habitat.—Bay of Bengal.

Genus **SCOLOPLOS** Blainville.

Prostomium conical. A pair of erect lanceolate gills on all segments except a few anterior ones. Thoracic feet with an erect dorsal cirrus and a bundle of serrated capillary setae. Ventral ramus pad-like, with vertical rows of capillary setae mixed with hooks or without them. One to three foot-papillae, or none. Ventral papillae usually absent. In the abdomen, an erect dorsal cirrus, capillary setae, forked setae. Intermediate cirrus (*intercirrus*) is absent. Ventral ramus bilobed, with capillary setae. Ventral cirrus often absent.

- | | |
|---|---------------------------|
| 1. Gills multifold | <i>Sc. latus</i> . |
| Gills simple | 2 |
| 2. Pocket-like membranes below the feet | <i>Sc. marsupialis</i> . |
| No pocket-like membranes below the feet | <i>Sc. kerguelensis</i> . |

Scoloplos marsupialis Southern.

Scoloplos marsupialis, Southern 1921, p. 632, pl. xxvii, fig. 19.

Scoloplos marsupialis, Gravely 1927, p. 22, pl. ix, fig. 11.

Krusadai Island (digging in sand and mud). Tuticorin Beach.

Specific Characters.—Body flattened in front. Prostomium conical, composed of two rings. 17-19 thoracic segments. Short ventral hooks and capillary setae on the 8-9 anterior feet. Gills begin about the 13th-15th foot. From about 18th foot, a pocket-shaped, large, thin membrane behind and beneath the ventral cirrus. In the abdominal region, an erect dorsal cirrus, a bundle of capillary serrated setae; ventral ramus bilobed, with fine capillary setae. A small rounded lateral organ between both rami.

Several specimens from Tuticorin agree with Southern's description.

Habitat.—Chilka Lake, Krusadai Island, Tuticorin.

(?) **Scoloplos kerguelensis** McIntosh.

Scoloplos kerguelensis, McIntosh 1885, p. 355, pl. xliii, figs. 6-8; pl. xxia, fig. 19.

Scoloplos kerguelensis, Willey 1902, p. 275.

Scoloplos kerguelensis, Ehlers 1913, p. 522.

Scoloplos kerguelensis, Eisig 1914, p. 378.

Scoloplos kerguelensis, Augener 1914, p. 26.

Scoloplos kerguelensis, Fauvel 1916b, p. 443, pl. viii, figs. 23-25.

Vizagapatam, further end of the creek beyond the Ferry ; in a small creek at low-water near the Ferry ; Southern shore of channel. (May-June 1926, Dr. H. S. Rao.)

I am somewhat doubtful regarding the identification of a number of specimens, the larger of which are about 50 mm. in length and 1 to 1.5 mm. in breadth.

The prostomium is conical, but rather blunt. The pygidium bears two long filiform anal cirri. The anterior region is spindle-shaped, but not quite flattened. It consists of 18-19 segments bearing only rather long serrated bristles. Both rami, dorsal and ventral, are close to each other, without any well marked setigerous lobe, except for the 3-6 last thoracic segments which have a very small conical dorsal cirrus and the ventral pad of which bears a very small, hardly conspicuous, median point. There are no traces of ventral papillae (subpodiale), and this small process can hardly be considered as a foot-papilla (podiale).

The gills begin on the 20th, 21st, or 22nd setigerous segment, usually on the 21st. They are triangular, broad and short. On a few specimens, they are sometimes more or less vesicular.

Such specimens differ from *Sc. armiger* in (1) their less sharp prostomium, (2) the thoracic region which is not flattened, (3) the lack of ventral papillae (subpodiale), the reduction of the foot-papillae (podiale) to a single very faint one and of the dorsal cirri which exist only on the last thoracic segments, (4) their close-set dorsal and ventral rami, with long capillary setae, and without genuine hooks (uncini), and (5) their broader, triangular gills which begin only in the abdominal region.

On the other hand, in many of these features it agrees more closely with *Sc. kerguelensis*, in which species the prostomium is large and slightly sharp, the thoracic region is not flattened and is devoid of thoracic hooks, foot papillae and ventral papillae.

McIntosh mentions elongated dorsal and ventral cirri, although in his fig. 7 (of the 8th foot), they appear to be reduced to short conical processes.

According to most authors, who have examined *Sc. kerguelensis*, the thoracic region consists only of 9 to 12 segments ; the first gill appears between the 12th and 16th setigerous segment, or between 18th to 20th in specimens from the Falkland Islands, but it is necessary to remark that in these specimens measuring only from 4-7 mm. to 25 mm. the thorax had, probably, not attained the adult size.

According to Benham (1921, p. 78, pl. ix, figs. 91-94) the Antarctic *Scoloplos*, described by Gravier as *Sc. kerguelensis*, should be a distinct species which he calls *Sc. mawsoni*.

Eisig, in his important monograph of the Ariciidae (1914, p. 378) considers *Sc. kerguelensis* as synonymous with *Sc. armiger*. Augener, on the other hand, considers both the species as distinct (1914, p. 24) even though both of them exist in Australia.

I agree with Eisig that little reliance can be placed on the number of thoracic segments and the origin of the first gill, for, as he has illustrated, such features vary to a great extent in the European species of *Sc. armiger*. But I am impressed with the fact that the Indo-Pacific *Scoloplos*, described as *Sc. kerguelensis*, are all without thoracic hooks ; while in *Sc. armiger* they are rarely absent ; a few hooks probably exist at least on some of the ventral rami. If these features are taken into account, as also the constant absence of ventral papillae (subpodiale) and the reduction of the foot-papillae to a single hardly distinct papilla, and in view of the additional, though less important, characters of the more blunt prostomium

and the scarcely depressed thorax, it seems advisable to keep the Indo-Pacific species distinct and to designate it *Sc. kerguelensis*.

Habitat.—Antarctic, Kerguelen, Falklands, Australia, India.

Scoloplos latus (Chamberlin).

(Text-fig. 28, *a-e*.)

Branchethus latum, Chamberlin 1919, p. 358, pl. lxiv, figs. 7/11; pl. lxv, figs. 1, 2.

“Investigator” Sta. 378, off Akyab, Burma, 250 fms.

Specific Characters.—Body of a large size, much depressed in the anterior part, semi-cylindrical in the middle and posteriorly, ventral side convex. Prostomium small, conical, blunt. Two small rounded nuchal organs. Peristomium achaetous. Thorax of 17-18 segments. Dorsal ramus with a conical dorsal cirrus, a short setigerous lobe with a bundle of serrate capillary setae. Ventral ramus a transverse compressed pad with camerated capillary setae, stout, bent hooks and a single conical foot-papilla inserted backwards in the middle of the foot. Ventral papillae (subpodiale) absent. In the abdominal region, an erect dorsal cirrus, an aciculum and a bundle of slender capillary setae. Intermediate cirrus (*intercirrus*) absent. Ventral ramus erect, divided into two unequal lobes, one short, blunt, the other cirriform, tapering, an aciculum, a few capillary setae. Ventral cirrus absent. Gills begin on the 5th setigerous segment. The first few gills are simple, the next few are bifid, and from the 16th foot they have 5-9 long, simple filaments arising from a short transverse base, separated from the foot. In the abdominal region, these long gill-filaments bend backwards, overlap and completely cover the dorsum. Dorsal sense-organs from the 16th-17th consist of two small elongated pads in the middle of each segment.

Breadth of thorax 10 mm.

Greyish, colourless in alcohol.

There is only one specimen, broken into three parts, reaching a total length of 40 mm.

The thorax, though thick, is much flattened, tapering in front, and measures 10 mm., at its widest point, whilst the succeeding semi-cylindrical region is only 5 mm. broad.

The 60 preserved segments probably belong to a short anterior part of a large sized individual.

The teguments are tough, thick, smooth with an iron-grey glitter. The segments are clearly delimited. They are faintly biannulate on the ventral side, but with never a trace of a belt of ventral papillae such as are met with in *Aricia*.

The prostomium is a small, rather blunt, cone deeply set into the peristomium which is somewhat cup-shaped on the dorsal side (Text-fig. 28, *a*). The nuchal organs consist of a small ovate knob on each side of the base of the prostomium.

The broad and flattened thorax consists of 17 setigerous segments, but it merges gradually into the abdominal region.

Up to the 17th setigerous segment, the dorsal ramus bears a bundle of fine barred (camerated) capillary setae which appear crenulated on a side view. These setae are inserted on a short rounded lobe set near the base and in front of the erect lanceolate dorsal cirrus. The ventral ramus (Text-fig. 28, *b*) consists of a thick transverse pad bearing vertical rows of capillary bristles, similar to the dorsal ones, and slightly bent large yellow hooks, faintly

serrated on their convex border and ending in a short sharp tip (Text-fig. 28, e.) A single conical lobe (foot-papilla?), slightly shorter than the dorsal cirrus, lies behind the middle of the setigerous pad, which is greatly shortened in the 17th foot, though still bearing a few hooks.

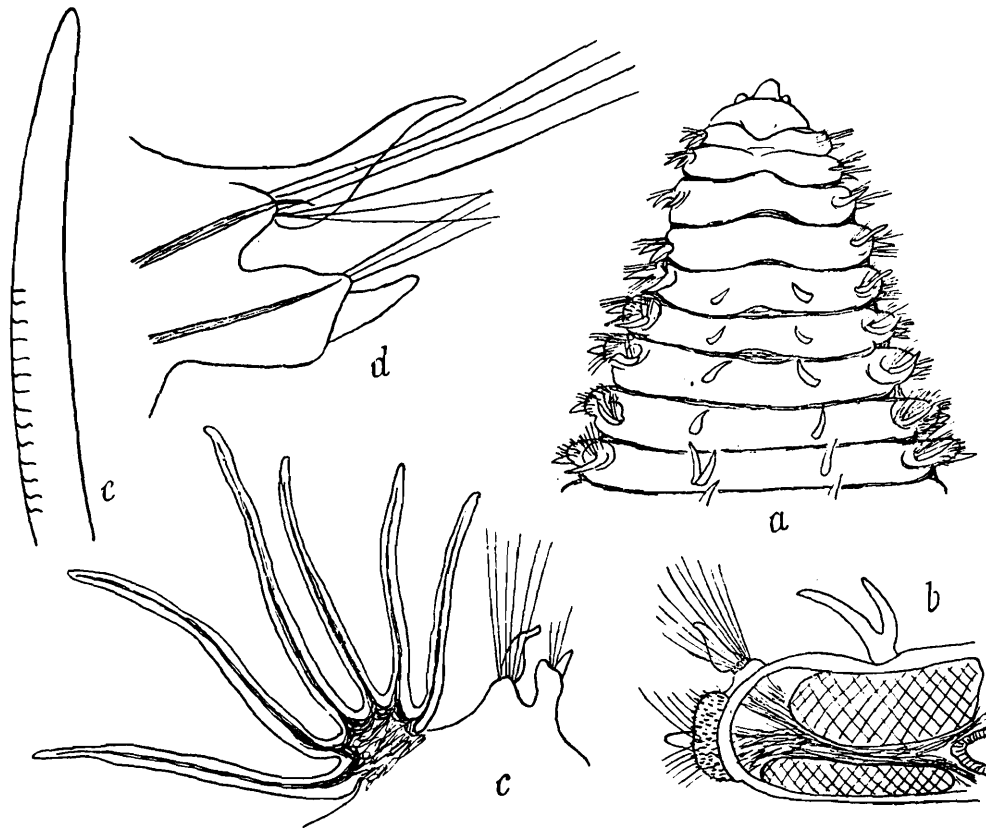


FIG. 28.—*Scoloplos latus*: a. anterior part, dorsal view $\times 6$; b. cross section of 15th setigerous segment $\times 7$; c. 33rd foot with 6-filament gills $\times 9$; d. 58th foot. $\times 25$; e. ventral hook from 13th foot $\times 150$.

On the 19th setigerous segment there are no hooks, and the foot assumes the shape characteristic of the abdomen. In the abdomen both rami are erect and close to each other, the dorsal one is little modified, but the ventral one has two unequal lobes, a short anterior one obliquely truncated and a longer posterior one cirriform and tapering (Text-fig. 28, d.) There is a stout yellow, blunt aciculum and 4-6 fine capillary setae, smooth, or faintly spinous. In the dorsal ramus, the camerated setae are replaced by longitudinally striated setae with transverse rows of very tiny, fine and short blunt spinules which are not easily detected. In the absence of the posterior part of the animal I was unable to ascertain if there were any forked setae. Chamberlin does not mention them.

Intermediate cirrus and ventral cirrus are both absent. Owing to the poor condition of the specimen the presence of a ciliate lateral organ could not be ascertained. The dorsal sense-organs are conspicuous only from the 17th setigerous segment. They consist of two small elongate areas borne on the sides of a rounded, or roughly rectangular pad which lies on the middle of each segment. On the 60th segment they are much smaller.

The branchiae afford the most striking feature of this peculiar species. On the 5th setigerous segment they begin as a small, erect, mere cone. The first four pairs are simple; the fifth is simple on the right, bifid on the left (Text-fig. 28, a); the 6th is simple on each side; the 7th on the right bifid, simple on the left; the 8th bifid on both sides; the 9th bifid on the right, simple on the left; the 10th, 11th, 12th, bifid on both sides, the 13th trifid on the right, bifid on the left. From the 16th pair, they are all compound with 5, or often 6,

long simple filaments of about the same length, arising in a transverse plane from a short base widely separated from the foot (Text-fig. 28, c). The length of these filaments is about half the breadth of the body and as they are turned backwards and overlap they give the animal a shaggy appearance, somewhat like the *Iphitime doderleini*, as figured by Izuka.

A tendency in the splitting of the gills has already been noticed in *Aricia*, such as *A. ramosa* Eisig (= *A. ligustica* Orlandi), for example, which has sometimes a few branchiae bifid or with rudimentary branches (Eisig, 1914, pl. xv, fig. 11), but such fortuitous malformations are not to be compared with the constantly highly branched gills of the above species.

In a specimen of *Sc. madagascariensis* I observed a bifurcate gill (1919, p. 434, pl. xvii, fig. 86).

Such anomalies appear to be nearly the rule in *Sc. cylindrifer* Ehlers in which Augener (1914, p. 29, pl. i, fig. 4 and 1926, p. 166) observed gills with 3-4 cylindrical filaments. But according to that author, these four branched gills are dichotomously divided, which does not agree with those of *Sc. latus* in which 5-6 nearly equal filaments arise, all in the same plane, from a short transverse ridge. In *Sc. cylindrifer* the gills begin on the 22nd setigerous segment. Augener does not describe the thoracic setae and papillae. Nevertheless the species under consideration is quite distinct, although it probably belongs to the genus *Scoloplos* (*sensu*) Eisig with which it agrees in the following characters: the conical prostomium; ventral papillae (subpodiale) absent; foot-papillae (podiale) reduced to a single large median one; intermediate cirrus and ventral cirrus absent; dorsal sense-organs in the form of two short longitudinal pads.

It was first recorded, from Panama, by Chamberlin (1919, p. 358), under the name of *Branchethus latus*. The above specimen agrees very well with Chamberlin's description, but as already stated, the species should be placed in the genus *Scoloplos*. It is allied to *Sc. cylindrifer* which has more or less branched gills. It comes from the same station as *Aricia nuda* Moore, which is most likely a deep-water species. Chamberlin's specimens were collected at a depth of 322 fms.

Habitat.—Pacific, off Panama; Bay of Bengal, off Akyab.

Family SPIONIDAE Sars.

Body vermiform, not clearly divided into distinct regions. Prostomium without tentacles, sometimes with lateral peaks. Eyes present. Two very long tentacle-like palps. Proboscis unarmed. Parapodia biramous. Dorsal and ventral cirri foliaceous. Dorsal simple gills (rarely pinnate) on a number of segments. Simple capillary setae and hooded hooks.

- | | | | |
|---|---|---|----------------------|
| 1. Fifth setigerous segment modified | . | . | <i>Polydora</i> . |
| Fifth setigerous segment not modified | . | . | 2 |
| 2. Prostomium with frontal peaks | . | . | <i>Scolecopsis</i> . |
| Prostomium without frontal peaks | . | . | 3 |
| 3. Dorsal and ventral hooded hooks | . | . | 4 |
| Dorsal hooded hooks absent | . | . | <i>Laonice</i> . |
| 4. Gills on almost all segments. An anal cup. | . | . | <i>Nerine</i> . |
| Gills only on a few anterior segments. Anal cirri | . | . | <i>Prionospio</i> . |

Genus **NERINE** Johnston.

Prostomium without frontal peaks, with an occipital tentacle-like keel. Gills from the second setigerous segment almost to the last segments. Dorsal lamella more or less joined to the gill in the anterior segments, an elongated ventral lamella. In the anterior region, only dorsal and ventral capillary setae, hooded hooks in both rami. An anal cup.

Nerine sp.

(?) *Nerine cirratulus*, Fauvel 1927a, p. 36, fig. 11, *g-n* (Synonymy).

Vizagapatam Channel, (May-June 1926, Dr. H. S. Rao and Mr. G. Varugis).

Only the anterior part of a small specimen without the palps was available.

The sharp pointed prostomium, with four small eyes, ends posteriorly in a small conical occipital tubercle.

On the first setigerous segment the dorsal and ventral lamellae are small. The gills begin on the second setigerous segment, they are small and partly joined to the triangular dorsal lamella. On the 30th foot they are short and hardly project beyond the lamella.

The ventral lamellae are rounded up to the 23rd foot, then they are notched and in the next 15 segments they are bilobed, and farther back they dwindle to a mere low ridge.

From the 2nd setigerous segment backwards, a crest, or rather a transverse ridge, lies across each segment. The sides of the prostomium are slightly winged, but not so conspicuously as in *Prionospio pinnata*. The ventral hooded hooks appear about the 30th foot. On the 36th foot there is only one dorsal hook, there are 3 on the 40th, with 4 ventral ones. The hooks are bidentate at the tip.

This species differs from *N. lefebvrei* Gravier in its bidentate hooks (instead of unidentate) and its anterior gills which are free at the tip and overreach the lamella. It approaches *N. cirratulus* Delle Chiaje, but the dorsal lamellae of the latter are more folded or lobed, the hooks begin farther back and are slightly different. In the absence of the posterior part of the body an accurate specific identification is impossible.

Genus **SCOLECOLEPIS** Blainville.**Scolecolepis indica** Fauvel.

Scolecolepis indica, Fauvel 1928, p. 93, fig. 2, *g-m.*, 1930a, p. 35, fig. 7, *g-m.*

Vizagapatam, Channel connecting backwater with the sea ; near mouth of channel ; farther end of the creek, beyond the Ferry. (Dr. H. S. Rao and Mr. G. Varugis).

Specific Characters.—Body long, slightly broader and flattened forwards, filiform behind. Prostomium shield-shaped with two frontal peaks, well marked and laterally inserted. The prostomium ends posteriorly in a pointed keel extending up to the second setigerous segment, but not raised in to an occipital tentacle. Two irregular clusters of very small and numerous eye-spots. Two long and stout spirally curling palps. Gills beginning on the first setigerous segment. In the anterior region, the long, cirriform gills cross over the back. Dorsal lamella erect, lanceolate, attached to the outer edge of the gill only at its base. Ventral lamella rounded or oval, slightly mucronate, not notched ; posteriorly it is reduced gradually to a decreasing crescent. Dorsal capillary setae neither winged, nor dotted. Ventral setae similar but shorter and somewhat dotted, with a bundle of 5-6 short larger, curved ones with a tapering bent tip. Hooded ventral crochets bidentate, 2 to 6 in each ramus, from about the 70th setigerous segment. Dorsal crochets absent. In the last

segments, gills short, no more marked lamellae, long and slender capillary setae; in the ventral ramus, 1-2 curved setae, 5-6 crochets and 1-2 long slender setae. Pygidium bearing 4 short finger-shaped cirri. Anus terminal.

Colour, in life, pink. Length 60 mm. or more, breadth 1 to 1.5 mm.

One of the specimens has a regenerated anterior part, a kind of ringed process, curving upwards and resembling the prostomium of a *Glycera*, with two small unequal lobes (rudiments of palps) and no mouth.

Habitat.—Krusadai Island, Vizagapatam.

Genus **LAONICE** Malmgren.

Prostomium rounded, without frontal peaks, ending backwards in a raised occipital tentacle. 2 eyes. Large palps. Gills beginning at the second setigerous segment and existing only in the anterior part of the body. The dorsal lamella is not attached along the gill. Ventral lamella not notched. Genital pouches present. In the anterior region, only dorsal and ventral capillary setae, next hooded crochets to the ventral ramus only. Anal cirri.

Laonice cirrata Sars.

Laonice cirrata, Söderström 1920, p. 220, fig. 128.

Laonice cirrata, Fauvel 1927a, p. 38, fig. 12, a-e.

Aonides cirrata, Fauvel 1914b, p. 220, pl. xx, figs. 4-9.

Spionides japonicus, Moore 1907, p. 204.

Off Puri, Orissa, 4-4½ fms.

Specific Characters.—A long dorsal crest (sense organ) on the first 28-30 segments. Gills 35-45 pairs only, long, cirriform, folded on the back, apart from the dorsal lamella all along. Dorsal lamellae large, auriculate in the branchiate segment; smaller, triangular and ovate in the succeeding ones. Ventral lamellae oval, rounded in the succeeding segments. From about the 25th foot, on mature specimens, pigeon-nest shaped genital pouches between the lamellae. Ventral hooded crochets bidentate from about the 40th-50th feet.

The single specimen is small and without palps. The dorsal crest is well marked. The gills begin on the 2nd foot, the dorsal lamellae are large and triangular and are not bound to the gills which exist on about 40 anterior segments. The genital pouches are quite conspicuous from the 24th, 25th foot. The ventral bidentate hooks are present from the 40th foot.

I have failed to find any difference between the Indian and the European specimens. According to Söderström (1920, p. 220), *Spionides japonicus* Moore (1907, p. 204) is synonymous.

Habitat.—Arctic Seas, Atlantic Ocean, Mediterranean, India, Japan.

Genus **POLYDORA** Bosc.

Prostomium blunt, or notched in front, ending posteriorly in a crest. Gills begin beyond the 6th-9th feet, rarely on the 2nd. Fifth setigerous segment highly modified, with peculiar stout dorsal bristles. Dorsal and ventral capillary bristles, ventral bidentate hooded crochets from the 7th-8th feet. An anal cup, simple or lobed.

Prostomium with two tentacle-like lobes in front and an occipital tentacle

P. antennata.

Prostomium faintly notched in front, without an occipital tentacle

P. ciliata.

For more extensive keys and descriptions of the species of *Polydora* see Mesnil (1897), Söderström (1920) and Fauvel (1927a, p. 48).

The curious species *Polydorella prolifera* Augener, which is common in the Gulf of Manaar (Fauvel, 1930a, p. 36) is not present in the collection.

***Polydora ciliata* Johnston.**

Polydora ciliata, Mesnil 1896, p. 210, pl. xiv, figs. 1-8.

Polydora ciliata, Fauvel 1927a, p. 49, fig. 16, *i-p.* (Synonymy).

Chandipore, near Balasore, Orissa Coast "small Spionids among debris and roots of Hydroids or Chaetopterid tubes".

Specific Characters.—Prostomium faintly notched in front. Only ventral setae at the first setigerous segment. Gills begin on the 7th foot. Peculiar hooks of the 5th setigerous segment with a lateral spine; lanceolate setae. Hooks from the 7th foot. A deeply notched anal cup.

These small specimens agree fairly well with *P. ciliata* though the modified hooks of the 5th foot are slightly different and somewhat like those of *P. antennata*; they might be aberrant specimens of the latter species.

Habitat.—Atlantic Ocean, Mediterranean, Red Sea, India, Australia, Falkland Islands

***Polydora antennata* Claparède.**

Polydora antennata, Fauvel 1927a, p. 56, fig. 19, *i-m* (Synonymy), 1930a, p. 36.

Carazzia antennata, Mesnil 1896, p. 227, pl. xiv, figs. 22-25.

"Investigator" Sta. 611, Arabian Sea, 180 fms.

Specific Characters.—Prostomium with two tentacle-like lobes in front and a small erect occipital tentacle. Only ventral setae on the first setigerous segment. Large gills beginning on the 7th foot. Peculiar setae of the 5th foot arranged in the form of a horse-shoe and of two kinds—lanceolate setae, and stout hooks with a hollow, shoe-shaped, tapering tip. Ventral hooded hooks from the 8th foot. No peculiar posterior setae. Anal cup notched on dorsal and ventral border.

The small specimens differ from the typical form only in the absence of the elongated tentacle-like lobes of the prostomium, which is notched and bears a small occipital tentacle. They probably belong to the var. *pulchra* Carazzi in which the prostomium has only two blunt lobes.

Habitat.—Atlantic Ocean, Mediterranean, India, Arabian Sea.

Genus PRIONOSPIO Malmgren.

Prostomium short, rounded, frontal peaks and occipital tentacles absent. Eyes present. Long deciduous palps. Gills 3 to 11 pairs, often pinnate. Dorsal lamellae not bound to the gills. Ventral lamellae entire. Sometimes, genital pouches. Dorsal and ventral capillary setae. Dorsal and ventral pluridentate hooded crochets.

- | | |
|---|-------------------------|
| 1. Prostomium with large wings. All the gills pinnate | <i>Pr. pinnata.</i> |
| Prostomium without large wings | 2 |
| 2. Gills pinnate. Genital pouches absent | <i>Pr. krusadensis.</i> |
| Gills simple | 3 |

3. Gills all subulate, 6-13 pairs

Pr. cirrifer.

Gills very numerous, the first few pairs long and filiform, the rest foliaceous

Pr. polybranchiata.

Though *Prionospio krusadensis* Fauvel and *Pr. polybranchiata* Fauvel were recorded from Krusadai Island (1930, p. 38, fig. 9, p. 39, fig. 10) they are not present in the collection.

***Prionospio pinnata* Ehlers.**

Prionospio pinnata, Ehlers 1901, p. 163, 1908, p. 110.

Prionospio pinnata, Fauvel 1923c, p. 9.

Prionospio pinnata, Augener 1927b, p. 351, fig. 2.

Prionospio africana, Augener 1918, p. 402, pl. vi, figs. 162-163.

Paraprionospio pinnata, Caullery 1915, p. 356, fig. 2.

Paraprionospio tribranchiata, Berkeley 1927, p. 11, pl. i, figs. 2-3.

(?) *Prionospio alata*, Moore 1923, p. 185.

"Investigator" Sta. 379, off Akyab, Burma, 250 fms.; Madras, St. 3; Vizagapatam, bottom of Channel; Mormugao Bay, Goa, St. 5.

Specific Characters.—Prostomium enclosed between two up-turned membranaceous wings. 3-4 pairs of pinnate gills beginning on the first setigerous segment.

The specimens from Madras are in very good condition. The prostomial wings are well marked. They have four very small eyes arranged in a square, sometimes there are only two which are hardly noticeable.

The long and very deciduous palps are present on some specimens. Most of them have four pairs of large, pinnate, nearly flabelliform gills. Generally those of the second pair are smaller, but they exhibit a great deal of variation. Sometimes they are all of the same size, sometimes there are three large ones on one side and one large and two small ones on the other. As the gills are very easily lost, the differences in size are to be ascribed to regeneration. The species has often been described as having only three pairs of gills, but very rarely specimens are found which have not lost some or all of them. I observed the small filament mentioned by Caullery at the base of the third gill, but it is often very small and not easily detected. I missed it in my specimens from Angola.

A well marked transverse crest or ridge arises between the first two setigerous segments; it is sometimes conspicuously raised, but this feature is very variable. There are no ridges posteriorly. In a female filled with eggs, on the five anterior segments, *i.e.*, from 21st to 25th, I noticed a transverse dorsal membrane in the form of a collar, slanting forwards. Such membranes which are less conspicuous in other specimens, are perhaps homologous to egg-pouches (?).

The pygidium is provided with a long slender median cirrus.

Considering the variation in the size of the gills, Caullery's var. *inaequibranchia* must be included in the synonymy of the species. *P. aucklandica* Augener, *P. alata* Moore, and *P. tribranchiata* Berkeley are closely allied, if not synonymous.

The specimen from Sta. 379 is in a very poor condition, and in spite of its large prostomial wings, its identity is somewhat doubtful.

Habitat.—Chili, Malay Seas, New Zealand, India, Gulf of Suez, Atlantic Ocean, Morocco, West Coast of Africa, Angola.

Prionospio cirrifera Wiren.

Prionospio cirrifera, Söderström 1920, p. 237, figs. 134-146.

Prionospio cirrifera, Fauvel 1927a, p. 62, fig. 21 (Synonymy).

(?) *Prionospio multibranchiata*, Berkeley (non Fauvel, 1928) 1927, p. 10, pl. i, fig. 1.

Vizagapatam, bottom of Channel.

Specific Characters.—Prostomium rounded in front, ending behind in a crest extending to the 2nd-3rd setigerous segments. There are no membranaceous prostomial wings. Gills 6-13 pairs, all simple, beginning at the second setigerous segment. Anterior dorsal lamellae very large, and from 3rd to 6th feet sharp pointed. In mature specimens, genital pouches begin about 5th-7th setigerous segments. Ventral lamellae oval or rounded.

There are in the collection a small complete specimen, and the anterior part of a very small *Prionospio*, with four small eyes on the prostomium, which is blunt in front and tapering behind. The sides of the first segment are thick, forming a longitudinal pad, but there are no foliaceous wings as in *Pr. pinnata*.

The gills begin on the second setigerous segment, and there are 13 pairs, all alike, simple, subulate. The anterior dorsal lamellae of the feet are large, oval-lanceolate, attaining their greatest size on the second and third feet and then gradually decreasing. The ventral lamellae are short and rounded.

The posterior part of the specimen, about 10 segments behind the gills, is wanting.

It agrees with *P. multibranchiata* Berkeley, which is not the species that I described from Madras under the same name, and of which later I had to alter the name to *P. polybranchiata*, Berkeley's denomination having priority. I am unable to distinguish Berkeley's species, *P. multibranchiata* from *P. cirrifera*. The small, complete specimen with 11 pairs of gills but without transverse crests and the genital pouches, is immature.

Habitat.—Arctic Seas, Atlantic Ocean, India, Vancouver Island (?).

Family DISOMIDAE Mesnil.

Prostomium with two long tentacle-like palps. Feet biramous (at least in the anterior region) with simple setae. Setae of various kinds. Acicular setae. Dorsal and ventral cirri elongated or frilled. Body not clearly divided into regions.

Genus **DISOMA** Oersted.

Neither median front tentacle nor nuchal organ with three tentacular lobes. Dorsal cirri fleshy, rounded, with a frilled or smooth border.

Disoma orissae, sp. nov.

(Text-fig. 29, a-m.)

Off Puri, Orissa, 4-4½ fms.

Specific Characters.—Prostomium elongated, slightly notched in front, bulging in the middle and ending behind in a crest reaching to the second setigerous segment (Text-fig. 29, b). On the raised part, four very small eyes, two dorsal and two lateral, and a small erect, tapering median tentacle. On each side, at the base of the prostomium, a small projecting nuchal organ. On the first setigerous segment, a large lanceolate subulate dorsal cirrus and a ventral one directed forwards, a small bundle of capillary setae in front of the

dorsal cirrus and a fan-shaped ventral bundle of much longer setae extending beyond the prostomium. On the 2nd setigerous segment dorsal and ventral cirri, triangular, much smaller than the first ones and ventral setae of two types (1) an anterior row of very fine capillary setae and (2) a posterior transverse row of stouter shorter bristles with blunt curved tips, (Text-fig. 29, e-f). *Dorsal setae absent*. On the third setigerous segment, a large lanceolate, chopper-like dorsal cirrus, a crescentic lip, a triangular ventral cirrus smaller than the dorsal one, a small ligule under the ventral cirrus, and in front of the parapodial lamella, a vertical row of 7 stout yellow acicular setae with a blunt, bent tip and an anterior row of slender capillary setae (Text-fig. 28, g-i) and, in front of the cirrus, a diverging fascicle of dorsal capillary setae (Text-fig. 29, k). In short, the ventral setae of the second foot are shaped like those of the third, but the acicular bristles are smaller, paler and more hyaline. Between the 3rd and 4th feet, a deep triangular notch on each side of the body divides the

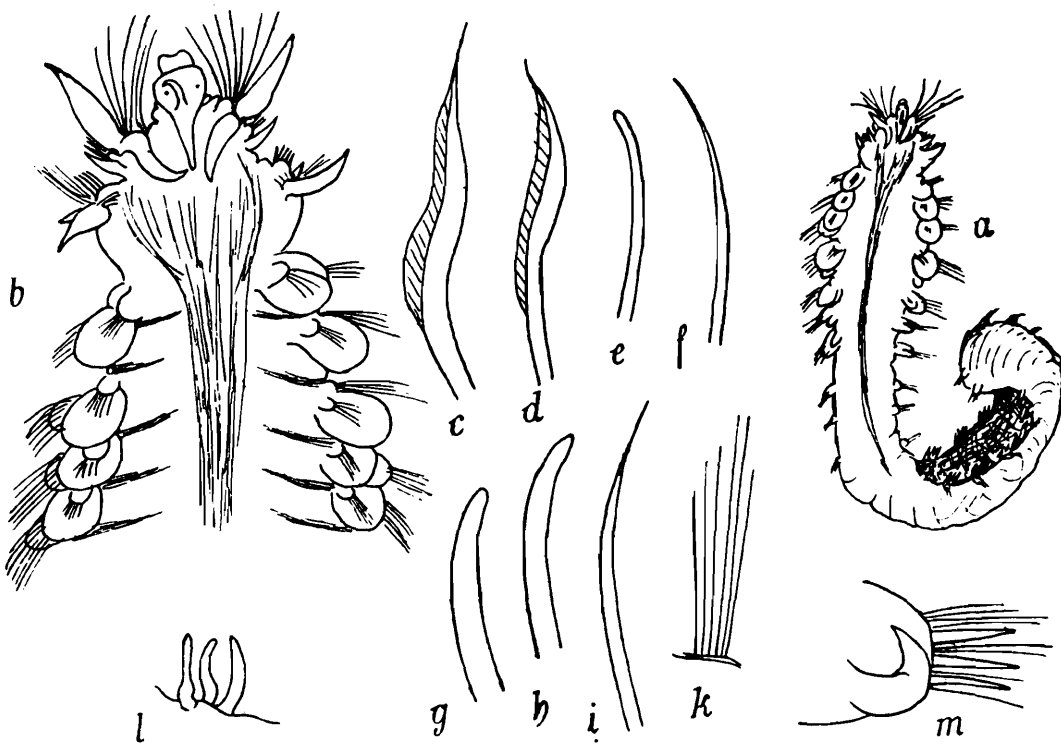


FIG. 29.—*Disoma orissae*: a. $\times 9$; b. anterior end, dorsal view $\times 30$; c. d. winged bristles from 6th setigerous segment $\times 150$; e. ventral stout bristles from 2nd setigerous segment $\times 150$; f. ventral capillary seta from 2nd setigerous segment $\times 150$; g. h. stout bristles from 3rd setigerous segment $\times 150$; i. capillary seta from 3rd setigerous segment $\times 150$; j. capillary seta from 3rd setigerous segment $\times 150$; k. fine dorsal setae from 3rd setigerous segment $\times 150$; l. abdominal papillae $\times 65$; m. posterior foot with bodkin and capillary setae $\times 65$.

anterior part from the succeeding one, in which the first 6-7 segments are much larger than the others, as a result this region is enlarged and flattened (Text-fig. 29, a).

On the 4th setigerous segment, the first of the enlarged part, smaller than the succeeding one, the dorsal and ventral cirri are thick rounded lamellae and there is a bundle of dorsal and ventral setae. The condition is the same in the succeeding four segments, only the ventral bristles are large, stout, yellow, set brush-wise as in *Aricia* and of two kinds. The ventral bristles of the first kind are stout, doubly curved, nearly sickle-shaped with a broad wing, showing a tendency to split into fine spines (Text-fig. 29, c-d). The others are capillary and similar to the dorsal ones. The dorsal setae disappear about the 11th foot. From the 9th foot backwards, the dorsal cirri become filiform and the ventral ones are modified about the 12th-13th feet. Beyond the 11th foot long filiform ventral papillae make their appearance, a single one at first under each foot, but increasing to 2, 3 or 5 (Text-fig. 29,

l). From the 9th foot backwards, the ventral setae are of two kinds : (1) stout, straight bodkin-shaped, and (2) very slender capillary (Text-fig. 29, *m*). The single specimen, whose hind part is unfortunately soft and twisted, is about 6 mm. long, 1 mm. broad in the thorax, 0.6 mm. in the abdomen, with about 25 segments.

It is very closely allied to *D. watsoni* Fauvel (1916c, pp. 1-3, fig. 1). The anterior part of the body and the bristles are very similar, but as only the first 9 segments of the latter species are known, it cannot be properly compared.

Habitat.—East Coast of India.

Family CHAETOPTERIDAE Audouin & M. Edwards.

Body soft, divided into two or three regions. Prostomium little conspicuous. Mouth terminal, no extrusible proboscis. Two or four tentacles (palps and tentacular cirri). Anterior region of a few uniramous segments ; middle region, when present, with biramous highly specialised segments ; posterior region of numerous biramous, all of them similar, segments. Dorsal setae capillary or lanceolate. In the fourth setigerous segment peculiar stout spines. Ventral setae pectinate uncini. Tube, horny, more or less ringed, translucent or opaque, parchment-like.

Tube, large, opaque, membranaceous

Chaetopterus.

Tube, horny, cylindrical, ringed

Phyllochaetopterus.

Mesochaetopterus minutus Potts, recorded from Krusadai, is not present in the collection.

Genus CHAETOPTERUS Cuvier.

Body of a large size, thick, soft, divided into three distinct regions. Two small filiform palps. Anterior region with uniramous feet and oar-shaped setae. Stout modified bristles on the 4th setigerous segment. Middle region of 5 biramous segments, the first with two aliform appendages, the next with dorsal rami cup-shaped and the others paddle-shaped. Ventral rami coalescent, bearing uncini. Posterior region with dorsal rami unilobed, ventral rami bilobed, uncinigerous. Tube consisting of layers of parchment-like membranes.

Chaetopterus variopedatus (Renier).

Chaetopterus variopedatus, Fauvel 1927a, p. 77, fig. 26, *a-n* (Synonymy) ; 1919, p. 446 (Literature).

Chaetopterus variopedatus, Pruvot 1930, p. 76.

Chaetopterus cautus, Marenzeller 1879, p. 143, pl. vi, fig. 5.

Mergui (a specimen still enclosed in its tube).

The specific characters are mainly those of the genus. It is very doubtful whether there is really more than one species, although many have been described, but the characters used to discriminate them are of very little value. Specimens exhibit a great deal of individual variation which is probably a result of frequent autotomy, followed by more or less complete regeneration ; individual specimens present certain differences.

The branched tubes of *Ch. cautus*, considered to be characteristic of this species, are often met with in *Ch. variopedatus* from the English Channel and Atlantic.

The number and size of the anterior segments vary to a very large extent, as also the length of the feet.

Habitat.—Atlantic Ocean, Mediterranean, Persian Gulf, Indian and Pacific Oceans.

Genus **PHYLLOCHAETOPTERUS** Grube.

Body slender, divided into three regions. Two long tentacles (palps) and two small posterior tentacles. Anterior region with uniramous feet bearing oar-shaped setae. One or more large peculiar spines on the 4th setigerous segment. Middle region with a number of biramous feet, dorsal rami foliaceous, lobed, lateral branchial lobes and bilobed ventral rami. Posterior region with biramous feet, dorsal rami cylindrical; ventral rami uncinigerous. Tube horny, translucent, cylindrical, more or less ringed. Scissiparous reproduction frequent.

Phyllochaetopterus socialis Claparède.

Phyllochaetopterus socialis, Fauvel 1914b, p. 267, pl. xxv, figs. 16-21; 1927a, p. 84, fig. 30; 1930a, p. 40.

Phyllochaetopterus pictus, Crossland 1903, p. 174, pl. xvi, figs. 5-9.

"Investigator" Sta. 354, Gulf of Oman, 1005 fms.; Sta. 363, Arabian Sea, 810 fms.; Sand Heads, R. Hughly P. V. "Lady Fraser," (Capt. Parks); Chandipore, near Balasore, Orissa; "Tube below Hydroids imbedded in sand. Low tide." Bombay, No. 79.

Specific Characters.—Segments of the middle region numerous, 5 to 28. On the fourth foot, a single large modified spine obliquely truncate at the tip. One or two lanceolate setae in the posterior dorsal rami. Horny tubes ringed, simple or branched.

The tube from Chandipore contained the animal. The specimens from Sta. 354 are without tubes. Those from Sta. 363, Sand Heads and Bombay consist of empty tubes and probably belong to this wide-spread species.

Fixed to empty Gastropod shells from Mangalore and Honawar Coast, there are a few small conical, ringed, hyaline tubes containing the macerated debris of a Chaetopterid which may belong to an incipient colony of *Phyllochaetopterus socialis*, or some closely allied species.

Habitat.—Atlantic Ocean, Mediterranean, Indian Ocean, Australia, Falkland Islands.

Family CIRRATULIDAE Carus.

Body stout, subcylindrical, tapering at both ends. Prostomium without palps and tentacles. Peristomium ringed. Stout tentacular palps, or tentacular cirri, inserted on the dorsal side of an anterior segment. Long slender simple gills inserted above the dorsal ramus. Feet biramous, both rami low and far apart. Capillary simple setae and simple acicular hooks. Dorsal and ventral cirri absent.

- | | |
|--|-----------------------|
| 1. Tentacular filaments numerous. Stout tentacular palps absent | 2 |
| One pair of large stout palps. Tentacular filaments absent | 3 |
| 2. Tentacular filaments beginning on the same segment as the gills | . <i>Cirratulus</i> . |
| A few segments with lateral gills in front of the tentacle-bearing segment | <i>Audouinia</i> . |
| 3. Capillary setae and hooks | <i>Dodecaceria</i> . |
| Capillary setae only | <i>Tharyx</i> . |

Cirratulus filiformis Keferstein, *C. chrysoderma* Claparède and *Dodecaceria opulens* Gravier have been recorded from Krusadai Island.

Genus **AUDOUINIA** Quatrefages.

Lateral gill filaments from the first segments to nearly the last ones. Tentacular cirri numerous, as slender as the gills, and set in two clusters on 1-2 segments farther back than the first gill-bearing ones. Capillary setae and hooks in both rami.

Distance between the point of gill-insertion and the dorsal ramus shorter than the distance between both rami. 4-5 hooks in each ventral ramus.

A. anchylochaeta.

Distance between the point of gill-insertion and the dorsal ramus greater than the distance between both rami. 1-4 ventral hooks

A. filigera.

Audouinia filigera Delle Chiaje.

Audouinia filigera, Fauvel 1911, p. 140 ; 1927a, p. 92, fig. 32, *h-m* ; 1930a, p. 43.

"Investigator" Sta. 593, Paway Island (shore collecting) ; Rameswaram ; Palan ; Bidang ; Cape Comorin.

Specific Characters.—Gills from the first setigerous segment. Tentacular cirri in two dense clusters inserted on the 4th-5th or 5th-6th setigerous segments. Capillary setae in every foot. Dorsal and ventral hooks present, except in the anterior segments. Ventral hooks few, 1-3, 3-4, and stout. Point of gill-insertion above the feet greater than the distance between both rami.

The specimen from Cape Comorin is rather large, the others are much smaller.

Habitat.—Atlantic Ocean, Persian Gulf, Indian and Pacific Oceans.

Audouinia anchylochaeta Schmarda.

Audouinia anchylochaeta, Fauvel 1930b, p. 541.

Cirratulus anchylochaetus, Schmarda 1861, p. 58.

Cirratulus anchylochaetus, Augener 1914, p. 53 (Synonymy) ; 1927, p. 219 ; 1923, p. 78.

Timarete anchylochaeta, Ehlers 1904, p. 53.

Timarete fecunda, Kinberg 1857-1910, p. 64, pl xxv, fig. 1.

(?) *Audouinia tentaculata*, (Montagu) Fauvel 1927a, p. 91, fig. 32.

Koweit Harbour (on shore between tide marks).

Specific Characters.—Gills from the first setigerous segment. Tentacular cirri inserted in two clusters on the 5th-6th setigerous segment. Capillary setae in every foot. Dorsal and ventral hooks, 2-4 in each ramus, rather slender. Distance between point of gill-insertion and the foot shorter than the distance between both rami.

This species is very closely allied to *A. tentaculata*, if not synonymous ; the hooks are only smaller and slightly more numerous.

Habitat.—Persian Gulf, Australia, New Zealand, New Caledonia.

Genus **THARYX** Webster and Benedict.

Body cylindrical, slender, elongate. Peristomium and the two succeeding segments achaetous. Prostomium conical. Lateral gills on a number of anterior segments. One pair of stout dorsal palps and one pair of gills on the first setigerous segment. Dorsal and ventral rami little remote. Only capillary setae.

Tharyx multifilis Moore.

Tharyx multifilis, Moore 1909, p. 267, pl. ix, fig. 43. Madras Sta. 3.

Specific Characters.—Prostomium long, sharp conical, without eyes (?). Gills absent only on about the last 20 segments. Dorsal setae longer than the ventral ones.

The three small specimens, which have lost most of their gills, agree with Moore's description, but this species comes very near to *Th. marioni* Saint-Joseph.

Habitat.—San Diego, California, Madras.

Family CHLORAEMIDAE Malmgren.

All the segments nearly alike, short and papillose. Prostomium and buccal segment in the form of a retractile tube, with eyes, two stout palps, and slender, retractile, branchial filaments. The setae of the first segments are generally very long, directed forwards and forming a more or less marked cephalic cage. Parapodia biramous, rami far apart, generally without distinct setigerous processes. Dorsal setae simple, capillary, annulated. Ventral setae sigmoid, or hooked, or compound with sickle-shaped end-piece.

- | | |
|---|-----------------------|
| 1. Ventral hooks compound. Body enclosed in a thick mucous sheath containing pedunculate papillae | <i>Flabelligera</i> . |
| Ventral hooks simple. Mucous sheath absent | 2 |
| 2. A pair of elongated nephridial papillae on the ventral side. | <i>Brada</i> . |
| Conspicuous nephridial papillae absent | 3 |
| 3. Gills all similar | <i>Stylarioides</i> . |
| Gills of two kinds | <i>Diplocirrus</i> . |

Genus **STYLARIOIDES** Delle Chiaje.

Body elongated, more or less cylindrical or club-shaped, coated with papillae. Two stout palps. Gills filiform, often very numerous, all similar, inserted on a more or less long peduncle, and retractile. A cephalic cage. Dorsal setae long, capillary, annulated. Ventral setae simple or rarely pseudo-compound, those beyond the first segments ending in a somewhat stout hook, sometimes bidentate. Acicular setae slender. Blood green.

- | | |
|---|---------------------------|
| 1. Ventral setae unidentate | 2 |
| Ventral setae bidentate | <i>Sty. eruca</i> . |
| 2. A kind of dorsal oval shield firmly coated with sand | <i>Sty. parmatius</i> . |
| No such dorsal shield | 3 |
| 3. Body slightly and gradually tapering posteriorly. Gills inserted on two flattened lobes | <i>Sty. bifidus</i> . |
| Body very slender and twisted in the posterior part. Gills inserted on a horse-shoe-shaped membranaceous lobe | <i>Sty. bengalensis</i> . |

Stylarioides parmatius Grube.

Stylarioides parmatius, Grube 1878, p. 199, pl. xi, fig. 1.

Stylarioides parmatius, Willey 1905, p. 289, pl. viii, fig. 5.

Stylarioides parmatius, Fauvel 1919, p. 434; 1930a, p. 42.

Stylarioides parmatius, Augener 1926a, p. 180, fig. 5.

Stylarioides iris, Michaelsen 1892, p. 108, fig. 6.

Madras Sta. 14. East of Terribles, 13 fms.

Specific Characters.—Body much swollen anteriorly, abruptly tapering into a filiform tail, and bearing on the front part of the dorsum a kind of oval shield firmly coated with sand; other parts of the body not coated with sand. Setae of the cephalic cage long, slender, iridescent, belonging to the 3 anterior segments.

On the specimen from Madras, the skin-papillae are set on two circular rows on each segment.

The numerous, rather stout gills protrude through the anterior orifice in two culsters which appear to be borne on a long peduncle; the gills resemble more those of *Sty. plumosa* than those of *Sty. monilifer*.

Only the characteristic anterior part of the other specimen was protruding from a mass of empty Serpulid tubes amongst which it was fixed deeply.

Habitat.—Philippine Islands, Ceylon, Madras, Madagascar, New Zealand.

Stylarioides eruca Claparède.

var. **indica** Fauvel.

Stylarioides eruca, Clap, var. *indica* Fauvel 1928, p. 93, fig. 3, *h-l*; 1930a, p. 42, fig. 10, *h-l*.

“Investigator” Sta. 703, Nankauri Harbour (amongst corals).

Specific Characters.—Body subtetragonal, thickly coated with sand, segments clearly marked. *Skin-papillae small, short, not arranged in regular longitudinal rows.* 3-4 longer papillae behind each bundle of setae. Branchiae numerous, filiform, inserted on a short peduncle, deciduous. Cephalic cage formed by the setae of the three first setigerous segments, long, slender, not iridescent, and pointing forwards. In the third segment the ventral setae are already bidentate, and shorter than the dorsal ones. In the following segments, the ventral setae vary in length but are all ringed, bent at the tip, with a long slender sub-rostral spine. About 70 segments, 60 mm. long and 3-4 mm. broad.

This variety differs from the type in having (1) shorter adhesive papillae, less numerous and less regularly arranged and (2) relatively longer and more slender upper ventral setae. The small specimen from Nankauri is coated all over with sand. The setae are like those of the type-specimen from Madras. The anterior ventral setae are of two kinds: (1) long, slender, articulate and bidentate and (2) short, unidentate, striate hooks.

From near the head backwards, the short hooks predominate, and are the only ones to persist on the last setigerous segments. In the contracted sand-coated tail the papillae are not arranged in regular longitudinal rows.

Habitat.—Indian Ocean, Krusadai Island, Nankauri Harbour. (Typical variety: Atlantic Ocean, Mediterranean.)

Stylarioides bengalensis, sp. nov.

(Text-fig. 30, *a-f*.)

Madras Coast; Sandheads, R. Hughli. P. V. “Lady Fraser” (*Capt. Parks*).

Specific Characters.—Anterior part of the body cylindrical or club-shaped, posterior part abruptly tapering into a filiform coiled tail. Segments numerous and hardly distinct. Body covered with small globular papillae which do not firmly retain the sand. Buccal tube very long and protrusible, cylindrical, frilled at the edge. Branchiae slender, filiform, very numerous, set in several rows on a membranaceous horse-shoe-shaped branchial lobe with

edges rolled in as in Serpulids. Two canaliculate palps with sinuous edges. Mouth opening three-lobed, the two ventral lobes larger than the dorsal. Cephalic cage formed by the setae of the first three setigerous segments arranged in three close-set concentric circles. The setigerous lobes of the third foot are more protruding and less far apart. These bristles, 3 to 5 in each bundle, are very long and stout, ringed, and beautifully iridescent. On the next three segments very small and slender dorsal capillary setae and a few fine ventral capillaries. On the following segments sigmoid ventral hooks.

About 60 mm. long and 6-7 mm. broad.

Colour in alcohol whitish-grey under the thin coating of fine reddish ooze adhering to the skin-papillae.

This species bears a great likeness to *Stylarioides monilifer* D. Ch. The size, the general appearance, the shape of the body, the cephalic cage with long stout bristles glistening with the most beautiful hues of the rain-bow are similar. The arrangement of the buccal and branchial apparatus is the same. But the Indian species differs from the European in (1) its cephalic cage which is formed by the bristles of the first three setigerous segments, instead of the first two, (2) its ventral hooks beginning farther back and being somewhat more numerous and slender, and (3) its skin-papillae being shorter and less densely set. This last character is not of much importance as it is very variable in *Sty. monilifer*; the papillae, in the variety *hirsutus*, are longer and more close-set than in the typical form.

To the first setigerous segment belong 4 bundles, each of 3-5 stout bristles and, sometimes, one or two more slender ones. These four bundles are nearly equidistant. The bristles of the second setigerous segment are grouped in four bundles, nearly alternating with those of the first segment and set on a circle slightly behind the former. On the third setigerous segment the dorsal and ventral rami are much nearer each other and clearly lateral. The iridescent bristles are generally less numerous, shorter and more slender.

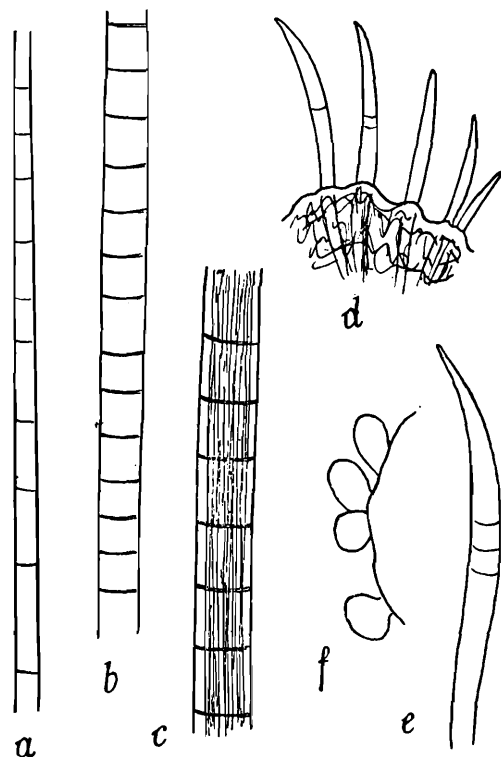


FIG. 30—*Stylarioides bengalensis*: a. b. base and tip of dorsal seta. $\times 380$; c. part of bristle of the cephalic cage $\times 380$; d. ventral ramus $\times 45$; e. ventral hook $\times 120$; f. skin-papillae $\times 150$.

The papillae of the first three segments are longer and are directed forwards on the base of the bristles of the cephalic cage, especially in the second segment.

In the succeeding segments the dorsal setae are capillary, ringed, but very slender, much smaller and fan-shaped. On the first three segments behind the cephalic cage, only a few very fine capillary bristles occur (Text-fig. 30, *a, b*.)

The ventral hooks, at first small and few, do not appear to begin before the 4th-6th (7-9th setigerous) segment. In midbody they are, in each foot, about 4-5, usually 3 larger ones and 1-2 smaller (Text-fig. 30, *d, e*). In the caudal region only one subsists in each ventral ramus. These bent, sigmoid hooks, with a slightly curved tip, are transverse lysteriad in the middle.

The skin-papillae are short, globular, rather apart (Text-fig. 30, *f*), and do not constitute clearly marked "rosettes" at the base of the feet, with the exception of those of the cephalic cage which are longer.

The buccal siphon, which protrudes in one of the specimens, is an elongated tube, conical at the base and cylindrical at the tip, which ends in a longitudinally folded or frilled membrane.

The trilobed mouth has a flower-de-luce appearance. The diverging palps are canaliculate, puckered on the edges. They are overhung by the branchial lamella, which is spirally coiled at the sides and bears a large number of small branchial filaments. The structure has a false appearance of being made up of two peduncles united by a dorsal membrane with a few filaments in between them. This buccal and branchial apparatus is quite similar to that of *St. monilifer*.

On comparing this species with *Coppingeria longosetosa* Haswell, in regard to the cephalic cage, we find in *Coppingeria* a cephalic cage formed by the bristles of the first two setigerous segments, so close together that they seem to form a single crowning circle. In *Sty. monilifer*, the cephalic cage is similarly formed by the bristles of the first two setigerous segments but these bristles are disposed in two quite distinct circles. In *Sty. bengalensis* the cephalic cage is formed by the first three setigerous segments.

The specimens from Madras, in which the bristles of the third setigerous segment are less stout than in the type specimen from the Sandheads are a connecting link with *Sty. monilifer*, though in the latter I was never able to find setae of the third setigerous segment forming a part of the cephalic cage, and they were not iridescent.

In regard to the branchial apparatus, *Coppingeria* is very different; the gills are borne on two clearly distinct cylindrical lobes.

Habitat.—East Coast of India, Madras, Hughli River.

Stylarioides bifidus, sp. nov.

(Pl. VII, figs. 15-16, Test-fig. 31.)

"Investigator" Sta. 357, Arabian Sea, 555 fms.; Sta. 391, off Travancore Coast, 260 fms.; Sta. 610 Arabian Sea, 300 fms.

Specific Characters.—Body gradually tapering backwards, segments clearly marked. Skin-papillae rather short and well apart, cylindrical in the anterior region, nearly globular in the hinder part. The body is not coated with sand, but with fine ochraceous ooze. Buccal

siphon ovate, with a delicate frilled membrane at the base; mouth small, behind two short, stout, canaliculate, puckered palps. Gills, very small, slender, very numerous, inserted on two flattened, elongated, diverting lobes, free from the base and without any connecting membranes (pl. vii, fig. 16). Cephalic cage formed mainly by the first three setigerous segments and partly by the 2 succeeding ones. The bristles of the cephalic cage are long slender, hardly iridescent and few in the first three segments, in which the feet are stout, protruding and directed forwards. Both rami are close together, the ventral one slightly behind the other. The dorsal setae of the succeeding 10-12 segments are long, capillary, directed for-

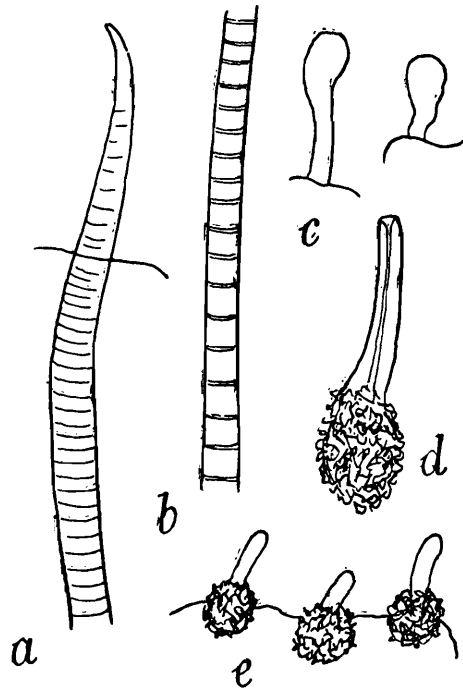


FIG. 31.—*Stylarioides bifidus*: a. ventral hook $\times 65$; b. part of dorsal seta $\times 150$; c. naked papillae $\times 65$; d. large ooze-coated papilla $\times 65$; e. smaller coated papillae $\times 65$.

wards, gradually decreasing in length (Text-fig. 31, b); the ventral setae are shorter and fewer, and some still exist with the ventral hooks which appear farther back and are only well marked in the posterior region. They are yellow, sigmoid, ringed, with a blunt tip and about 5-6 in each ventral ramus (Text-fig. 31, a).

Length, 70-80 mm., breadth, 4.5-5 mm.

Greyish-white with small, sparse, orange-coloured tubercles (ooze on the base of skin-papillae).

On one of the specimens from Sta. 391, which is complete with palps and branchial apparatus retracted into the body, the anterior part has a truncate appearance and is deeply set, as in a groove, between the projecting forward feet of the first setigerous segments (pl. vii, fig. 15). In the cephalic cage there are on each side only two or three long, iridescent setae and a few much shorter and slender ones. The cephalic cage is not clearly outlined, as the setae of the anterior feet are long and directed forwards (pl. vii, fig. 15).

The skin-papillae are long, cylindrical or conical, or even club-shaped and swollen at the base with a coat of fine ochraceous ooze which gives them a pear-shaped appearance. Further back they become smaller and more globular. They do not retain sand (Text-fig. 31, c-e).

In the specimen from Sta. 610, the branchial apparatus is protruded, but the palps have fallen off. In the specimen from Sta. 357 it had to be dissected, but was found to be similar and very characteristic of the species.

Habitat.—Arabian Sea.

Genus **BRADA** Stimpson.

Skin-papillae. The setae of the anterior segments do not form a marked cephalic cage. Two stout palps. Cirriform branchiae in two clusters, retractile into the mouth. Dorsal ringed capillary setae, simple ventral bristles stouter. One pair of nephridial papillae protruding on one of the anterior segments.

Body long and slender. Skin-papillae small and not capable of retaining sand

Br. talehsapensis.

Body shorter. Large skin papillae retaining sand grains

Br. mamillata.

Brada talehsapensis, sp. nov.

(Pl. VII, fig. 17, Text-fig. 32.)

Taléh-Sap, Sta. 27. (*N. Annandale*).

Specific Characters.—Body long, cylindrical, nearly of the same breadth all over, abruptly truncate at both ends, with a small rounded knob in front. About 45 to 60 segments. Few small skin-papillae, cylindrical, enlarged at the tip. On the ventral side of the 5th setigerous segment, one pair of small, short, rounded nephridial papillae. Bristles of the first setigerous segment directed forwards, but few, slender, articulate and not iridescent. From the second setigerous segment backwards, dorsal bristles shorter, bent, ringed,

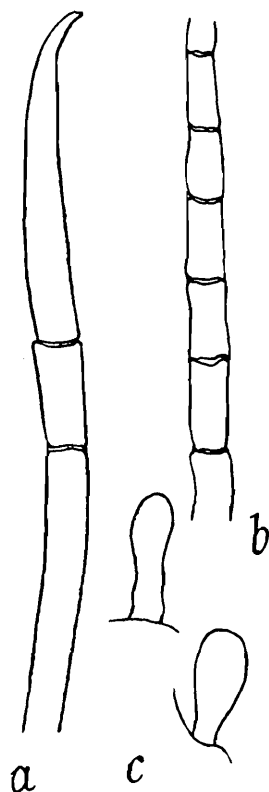


FIG. 32.—*Brada talehsapensis* : a. ventral hook $\times 150$; b. part of dorsal seta $\times 150$; c. papillae $\times 150$.

about 4-6 in each ramus (Text-fig. 32, b). Ventral rami close to the dorsal ones. Ventral setae, 5-6 yellow curved hook, with a slightly bent, smooth, translucent tip (Text-fig. 32, a).

About 27-38 mm. long and 2 mm. broad. In alcohol, greyish-white with a coating of fine rusty reddish ooze.

Out of the three specimens two are apparently nearly complete, while the third is broken into two parts.

One of the complete (?) specimens is 27 mm. long, with 45 setigerous segments, the other is 38 mm. long with about 60 segments. Both are 2 mm. broad.

The general appearance is rather unusual for the genus the body being generally short with few segments, whilst in this species it is long, vermiform and has numerous segments. The first segments are clearly marked but the succeeding ones are only noticeable by their dorsal and ventral rami protruding as lateral, close-set ridges (pl. vii, fig. 17).

The skin is coated with a thin layer of very fine reddish ooze, but it does not retain any sand grains. Under a low magnification, the skin appears smooth, but it is nevertheless provided with numerous very slender cylindrical, or slightly claviform papillae, rather sparsely and irregularly distributed. The foot-papillae are hardly larger than the others (Text-fig. 32 c).

The body ends in front in a small rounded knob enclosed between the dorsal rami of the first setigerous segment each of them armed with a bundle of slender, ringed, pale, colourless bristles as long as the first 6-7 segments and pointing forwards (pl. vii, fig. 15), but without forming a cephalic cage. The ventral setae appear to be missing on that segment. From the second setigerous segment backwards the dorsal setae are already much shorter. There are about 4-6 setae, hardly bent, with well marked cylindrical articulation. Their length equals about half the breadth of the body; they diverge in a fan-like manner.

The ventral setae, about 5-6, are large yellow hooks, slightly curved, with a smooth more or less sharp tip. These hooks show a few transverse streaks of articulation in the middle of their shaft (Text-fig. 32 a.) Between them there are a few very fine setae enclosed in the teguments.

On the fifth setigerous segment, arise the nephridial papillae characteristic of the genus *Brada*. They protrude slightly on each side, in front of the ventral ramus, and are shaped as small rounded knobs.

In all the specimens the proboscis and the branchial apparatus are unfortunately retracted. The small size and the brittleness of the anterior fragments, further, did not allow of a sufficiently accurate examination of these organs. Nevertheless, as far as could be ascertained, the gills appear to be large and few, and the palps short and frilled.

This species is characterized chiefly by its long indistinctly ringed and slender body, the large number of segments, and the small size of the skin-papillae which do not retain sand grains. Moreover there are no marked circles of papillae round the feet.

Habitat.—Taléh-Sap, Gulf of Siam.

***Brada mamillata* Grube.**

Brada mamillata, Grube 1877, p. 541.

Brada mamillata, McIntosh 1885, p. 370, pl. xliii, fig. 11; pl. xxiii, figs. 7-8.

Brada mamillata, Ehlers 1897, p. 109.

“Investigator” Sta. 357, Arabian Sea, 555 fms.

Specific Characters.—Body gradually and faintly tapering backwards. Dorsal skin-papillae large, rounded, disposed in rows far apart, retaining sand. Ventral papillae very small. On the ventral side of the 5th setigerous segment, a pair of small conical nephridial papillae. Bristles of the first setigerous segment slender and directed forwards; they do not form a cephalic cage and are not iridescent. On the succeeding segments, dorsal setae shorter. Ventral curved hooks from the second setigerous segment inserted on a rounded lobe encircled with long cylindrical papillae. Two short stout frilled palps. Gills numerous, slender, borne on two semi-circular pads.

The only specimen, which appears to be complete, is 48 mm. long and 5 mm. broad, with 40 setigerous segments. The body is firmly coated with sand, especially on the dorsal side. It is slightly enlarged in front and very gradually tapering backwards. The segments are much more clearly marked in the hind part.

The dorsal skin-papillae are large, rounded, and set in nearly regular rows, especially in the tail where there are 4, 3, 2 and finally only a single transverse row on each segment. The ventral papillae are very small and slender. Round the base of the ventral bundle of hooks the papillae are long and cylindrical. The dorsal setae are very fine and slender, ringed as usual, and those of the first segment are only longer and more numerous, directed forwards, but they do not form a cephalic cage.

The ventral hooks begin on the second setigerous segment. They are yellow, ringed, faintly sigmoid and abruptly tapering into a long, filiform tip which is often broken; the broken end assuming the form of a faintly sharp tip. In the posterior segments, the tip of the hooks is blunt, enlarged and colourless.

On the 5th segment, a small conical nephridial papilla is still visible on one side, and on the other the skin is torn out. The branchial apparatus is half protruding. The palps are short, curved, tapering and frilled. Two large crescentic raised pads presumably bear only the traces of numerous, slender gills. The segments are more numerous than in Grube's and McIntosh's specimens (40 instead of 30); otherwise the specimen agrees with the previous descriptions.

Habitat.—Kerguelen Island, Patagonia, Arabian Sea.

Genus **DIPLOCIRRUS** Haase.

Body elongated or club-shaped, covered with sand-retaining papillae. Two palps. Branchiae of two kinds, filiform and enlarged. Setae of the first setigerous segments longer than the others, directed forwards and forming a cephalic cage. Dorsal and ventral setae capillary, ringed.

(?) **Diplocirrus glaucus** (Malmgren).

Diplocirrus glaucus, Haase 1914, p. 195, figs. 3-5.

Diplocirrus glaucus, Fauvel 1927a, p. 120, fig. 43, a-d.

Trophonia glauca, Malmgren, 1867, p. 192, pl. xiv, fig. 78.

Mergui, 4 fms.

I refer to this species with great hesitation a single specimen with its branchial apparatus retracted, which could not be examined without the risk of destroying the specimen.

The body, which appears to be complete with about 50 segments, is nearly cylindrical, varying little in breadth and looks truncate at both ends. It is coated with a thin smooth layer of small hard sand-grains. The entrance to the buccal apparatus is enclosed between the feet of the first setigerous segment directed forwards.

The bristles of the first three segments are hardly longer than those of the succeeding ones; they are few, not iridescent and do not form a marked cephalic cage. The papillae round their base are longer than the succeeding ones. In mid-body, the 5-8 diverging dorsal setae are about half, or a third of the breadth of the body. They are slender, capillary, with a tapering flexible tip. The ventral setae are similar, hardly shorter and fewer. There are no hooks, even in the posterior segments.

The absence of nephridial papillae on the 4th or 5th setigerous segments clearly distinguishes it from *Brada talehsapensis*. The general appearance of the two species is somewhat similar, but the latter species has rather large ventral hooks.

The absence of ventral hooks, the shape of the setae, the small papillae hidden under a coating of sand grains agree very well with *Diplocirrus glaucus*, as described by Haase (1914, p. 195); but the most important character of *Diplocirrus* lies in the disposition of the two kinds of gills, and as I could not ascertain this feature the identification must remain doubtful.

Habitat.--North Atlantic Ocean, (Mergui ??).

Family SCALIBREGMIDAE Malmgren.

Body club-shaped or short fusiform. Prostomium small, bilobed or with frontal peaks. Sometimes eyes in clusters. Two nuchal grooves. Peristomium achaetous. Proboscis soft, unarmed. Skin generally tessellated or corrugated. Segments sub-divided into annuli. Dorsal and ventral rami each bearing setae of two kinds, viz., simple capillary setae and furcate setae, sometimes also acicular setae. Gills, when present, limited to a few anterior segments.

Acicular setae in the first segments

Parasclerocheilus.

Acicular setae absent

Scalibregma.

Genus **SCALIBREGMA** Rathke.

Body arenicoliform. Prostomium T-shaped, with two elongated frontal peaks. Gill present on the anterior segments. Parapodia prominent, flattened. Dorsal and ventral cirri. Acicular setae absent.

Scalibregma inflatum Rathke.

Scalibregma inflatum, Ashworth 1901, p. 237, pls. xiii-xv.

Scalibregma inflatum, Fauvel 1927a, p. 123, fig. 44 a-f.

Scalibregma inflatum, Moore 1923, p. 217.

"Investigator" Sta. 343, Gulf of Oman, 609 fms.

Specific Characters.--Four pairs of gills in setigerous segments 2-5. Four anal cirri. Finger-shaped dorsal and ventral cirri from the 16th-18th segments backwards. Lateral ciliate organ between the rami. Acicular setae absent.

The specimen (incomplete behind) is 15 mm. long, 4 mm. broad in the thorax, 2.5 mm. in the abdomen. The setae are very long and slender. No eyes are visible. It was recorded from California by Moore.

Habitat.—Atlantic Ocean, Antarctic, Kerguelen, California, Gulf of Oman.

Genus **PARASCLEROCHEILUS** Fauvel.

Body fusiform, elongated. Prostomium T-shaped, with two long frontal peaks and eyespots. Nuchal organs protractile. Peristomium achaetous. Proboscis unarmed. Anterior segments divided into superficial rings. A few anterior segments bearing branchiae. Dorsal and ventral rami reduced to stout rounded processes. Dorsal cirri absent. *A cirrus-like process above the ventral ramus* in the posterior region. Lateral organs. Acicular setae in the dorsal ramus of the first setigerous segments. Forked setae in the following segments. Anal cirri finger-like.

Parasclerocheilus branchiatus Fauvel.

Parasclerocheilus branchiatus, Fauvel 1928, p. 159, fig. 1 *a-k*.; 1930 *a*, p. 44, fig. 11.

“Investigator” Sta. 593, Paway Island, shore collecting.

Specific Characters.—Body rather long, nearly uniform in breadth, slowly tapering backwards, rectangular in section, with a more or less marked ventral groove. Prostomium globular, with two diverging thick tentacle-like processes. Four red pigmented plates, linear, arched, converging (eye-spots). Two protractile cushion-shaped nuchal organs. Peristomium achaetous. Proboscis huge, campanulate. Segments divided into four rings, nearly smooth on the ventral side, rough and corrugated on the dorsal. In the first four setigerous segments, the dorsal ramus carries, in front of a bundle of long capillary setae, large curved acicular setae with a hook at the tip. Of the other dorsal and ventral setae some are capillary, slender and smooth, while the others are shorter and slightly bent. In the succeeding segments, the dorsal and ventral rami are similar, and in the form of thick rounded processes, without cirri, and bearing each a bundle of capillary setae and shorter forked setae with limbs unequal and ciliated on the inner edge. From the 29th setigerous segment to the last one, a short slender finger-like process is inserted *above* the ventral ramus. In the last segments, this process reaches one-fourth or one-third of the breadth of the body. A lateral organ lies between the two rami. *There are 6 pairs of branchiae* (from the 2nd to the 7th setigerous segment), arborescent, densely ramified (as in *Scalibregma*). The first pair, the smaller, has 6-7 filaments, the four last ones are subequal and much larger. They are inserted behind the dorsal setae. Pygidium short, with broad terminal vent and 6 anal cirri: 1 dorsal, 1 ventral and 2 on each side. With the proboscis included the worm is 35 mm. long and 3 mm. broad. Discoloured in alcohol, with the exception of the reddish carmine eye-spots.

The specimen from Sta. 593 agrees with the type from Krusadai. The proboscis is not protruding and the last segments are missing.

Habitat.—Krusadai Island, Gulf of Manaar; Gulf of Oman.

Family OPHELIIDAE Grube.

Body rather short, dorsum arched, ventral side flat or with a longitudinal groove. Prostomium conical, destitute of appendages. Cephalic eye-spots hidden under the skin. Often

with lateral eye-spots. Segments more or less clearly subdivided into annuli. Proboscis unarmed. Nuchal organs protrusible. Gills cirriform (very rarely branched) or absent. Feet biramous, often reduced to dorsal and ventral bundles of capillary setae. Dorsal cirri absent. Sometimes a few ventral cirri. Lateral sense organ between the parapodial rami. Pygidium bearing papillae, and often an anal funnel.

- | | | | | | | | | |
|---|---|---|---|---|---|---|---|-------------------------|
| 1. Lateral gills absent | . | . | . | . | . | . | . | <i>Polyophthalmus</i> . |
| Lateral gills present | . | . | . | . | . | . | . | 2. |
| 2. Ventral groove absent | . | . | . | . | . | . | . | <i>Travisia</i> . |
| Ventral groove conspicuous | . | . | . | . | . | . | . | 3. |
| 3. Ventral groove limited to the posterior half of the body | . | . | . | . | . | . | . | <i>Ophelia</i> . |
| Ventral groove along the whole length of the body | . | . | . | . | . | . | . | 4. |
| 4. Lateral eye-spots present | . | . | . | . | . | . | . | <i>Armandia</i> . |
| Lateral eye-spots absent | . | . | . | . | . | . | . | <i>Ammotrypane</i> . |

Genus **ARMANDIA** Filippi.

Body elongated, not divided into distinct regions, a deep median and two lateral ventral grooves. Prostomium conical. Eyes on the brain under the skin. Segments divided into annuli. Cirriform gills all along the body, from the 2nd setigerous segment. Parapodia with only two bundles of capillary setae. A small ventral cirrus. Anal funnel fringed with papillae and a median cirrus. Lateral eye-spots on many segments.

- | | | | | | | |
|---------------------------|---|---|---|---|---|-------------------------|
| 29-30 setigerous segments | . | . | . | . | . | <i>A. lanceolata</i> . |
| 33-37 setigerous segments | . | . | . | . | . | <i>A. leptocirris</i> . |

Armandia lanceolata Willey.

Armandia lanceolata, Willey 1905, p. 288, pl. v, fig. 120.

Armandia lanceolata, Augener 1914, p. 33; 1926, p. 462.

Armandia lanceolata, Fauvel 1917, p. 259; 1919, p. 435; 1930b, p. 547.

"Investigator" Sta. 414. Fisher Bay, Tavoy Island, Mergui Archipelago (shore collecting); Pamban (from coral reefs).

Specific Characters.—29 (occasionally 30) setigerous segments. Gills from the 2nd setigerous segment, absent on the last 3 segments. Generally 11-12 pairs of eye-spots beginning about the 7th setigerous segment. Anal funnel compressed, short, fringed by 12-20 small papillae. A median anal cirrus.

The specimens from Pamban have 29 setigerous segments—as was the case with Willey's specimens from Ceylon—the lateral eye-spots from the 7th setigerous segment, while the gills are lacking on the last three segments.

The specimen from Sta. 414 appears to have 30 setigerous segments as in some Australian specimens, but the last segments are very small and not easy to count. *A. lanceolata* has, like most other species, a median anal cirrus, which is inside the anal funnel, inserted on a cirrophore; when the cirrostyle is broken—which is frequently the case—the cirrophore is hidden inside the tube and is easily overlooked.

The number of small anal papillae is very variable.

Habitat.—Persian Gulf, Ceylon, Pamban, Mergui, Australia, New Caledonia.

Armandia leptocirris Grube.

Armandia leptocirris, Willey 1905, p. 289.

Armandia leptocirris, Fauvel 1911, p. 414 ; 1919, p. 435 ; 1930a, p. 50.

Ophelina leptocirris, Grube 1878, p. 194.

Andamans Sta. 32—8 "burrowing in sand."

Specific Characters.—33 to 38 setigerous segments. Gills from the 2nd setigerous segment to the last one. 10-12 pairs of lateral eye-spots, from about the 7th setigerous segment. Anal funnel long, compressed, slantingly cleft, fringed with long papillae. A long median anal cirrus.

Most specimens from the Andamans have 33 setigerous segments, a few appear to have only 31.

As in the preceding species, there is a certain amount of variation. In specimens from Krusadai, the setigerous segments range from 36 to 38.

Habitat.—Red Sea, Persian Gulf, Ceylon, Gulf of Manaar, Andamans, Philippine Islands, New Caledonia.

Genus **AMMOTRYPANE** Rathke.

Body vermiform, not divided into distinct regions. A deep ventral groove all along the ventral side and two lateral ridges. Prostomium conical. Cephalic eyes hidden under the skin. Segments divided into annuli. Cirriform gills from the 2nd setigerous segment, nearly to the end. Parapodia with short setigerous lobes and two bundles of simple setae. A small ventral cirrus. Anal funnel with papillae and anal cirrus. *Lateral eye spots absent*.

Ammotrypane aulogaster Rathke.

Ammotrypane aulogaster, Fauvel 1914b, p. 243, pl. xxii, figs. 5-7 ; 1927a, p. 133, fig. 47, a-e.

Ammotrypane aulogaster, Hoagland 1920, p. 625.

"Investigator" Sta. 68, Orissa Coast, 20 fms. ; Sta. 352, Persian Gulf, 13 fms. ; Ennur backwater, Madras.

Specific Characters.—Prostomium conical, ending in filiform clavate tip. Gills absent only on the 3-4 last segments. Ventral cirri small, conical. Anal funnel spoon-shaped, with a large ventral opening fringed with small papillae. Two large ventral papillae and median anal cirrus with a long cirrostyle borne on a cylindrical cirrophore.

The specimen from Sta. 68 is 50 mm. long and 3 mm. broad, with about 68 segments. The two specimens from the Persian Gulf have 60-65 setigerous segments, while the one from Ennur backwater has 68. I have compared them with specimens from Bohuslan (Sweden) and from Spitsbergen, and the only difference lies in the greater number of segments : 65-68 instead of 50-54 ; the branchiae and anal funnel are similar. Kukenthal has recorded from the Philippine Islands (1887, p. 365) *A. langii* with 50 segments, which differs from *A. aulogaster* only in the anal funnel. Hoagland records *A. aulogaster* from the same Islands.

Habitat.—Arctic Seas, Atlantic Ocean, Persian Gulf, India, Philippine Islands.

Genus **POLYOPHTHALMUS** Quatrefages.

A longitudinal ventral groove. Prostomium short. Cephalic and lateral eye-spots. Nuchal organs protruding. Gills and ventral cirri absent. Biramous parapodia with capillary setae. Anal funnel fringed with papillae.

Polyophthalmus pictus (Dujardin).

Polyophthalmus pictus, Fauvel 1927a, p. 137, fig. 48, *l-n*; 1930b, p. 546; 1919, p. 437 (Synonymy).

Polyophthalmus ceylonensis, Kukenthal 1887, p. 371, pl. xxi, figs. 12, 13.

Polyophthalmus collaris, Michaelsen, 1892, p. 17, fig. 5.

"Investigator" Sta. 650, Fehendu, Maldives; Pamban Bridge; Kilakarai (from Coral Reefs).

Specific Characters.—27-28 setigerous segments. There are no prominent setigerous lobes. Only a single bundle of capillary setae in each foot, except on the last ones. Nephridial pores on segments 8-11. Colour very variable, brown spots or streaks more or less conspicuous.

The very extensive variation of colour pattern has resulted in this cosmopolitan species being described under many names.

Habitat.—Atlantic; Mediterranean; Indian Ocean; Pacific.

Genus **TRAVISIA** Johnston.

Body divided into two distinct regions, an anterior enlarged and a posterior narrow, square in section. There is no marked ventral groove. Prostomium small, conical. Two nuchal organs. Proboscis unarmed, soft globular, more or less lobed. Segments divided into annuli. Branchiae from the 2nd setigerous segment, cirriform, or very rarely branched. Dorsal and ventral rami reduced to a bundle of capillary setae. In the posterior region, huge lateral fleshy processes. Ventral cirri absent. A lateral sense organ between the rami. Pygidium, a rounded knob.

Travisia arborifera, sp. nov.

(Text-fig. 33 *a-f*.)

"Investigator" Sta. 225, Andaman Sea, 53 fms.; off Puri, Orissa, 4-4½ fms.

Specific Characters.—Body short, plump, spindle-shaped. 36 setigerous segments subdivided into annuli. Posterior segments imbricated, square in section. Skin divided into polygonal glandular areas. Prostomium rounded, ending in a small conical tip. Two small nuchal organs. Gills branched, beginning on the 2nd setigerous segment and missing only on the last 6-7 segments. Dorsal and ventral rami far apart and each reduced to a bundle of simple, smooth or very finely barbed capillary setae inserted in a pit. A small triangular fleshy lamella in front of the gills; a similar, slightly larger lamella in the ventral ramus. In the posterior part of the body, these lamellae are larger. A lateral pit-like sense organ between the rami, conspicuous even on the first setigerous segment. Nephridial pores from the 3rd to the 14th setigerous segment.

A large specimen from Sta. 225 is 38 mm. long and about 10-11 mm. broad; one from Puri, Orissa, is much smaller, only 10 mm. long and 3 mm. broad. The larger specimen is soft and flattened, the other is in a very good condition.

The rounded head, ending in a small conical lobe, resembles that of an *Ophelia*. The mouth opens into a funnel-shaped pit between the first and the second setigerous segment. The wide-open anus is nearly terminal. The last segments are more or less sunk into one other, as in *Tr. forbesi*, but the hind part is less slender.

The gills are very peculiar, and readily distinguish this species from all others by their conspicuous branching (Text-fig. 33 *b-d*). Most of them are richly ramified and bushy, as in

the gills of *Arenicola*, but some are rather like those of *Eunice* with a main stem bearing a number of filaments (Text-fig. 33 b). On the large specimen, they are unfortunately in a poor state of preservation. The first one, on the second setigerous segment, is very small. They are, as far as could be ascertained, missing on the last 6-f segments. The huge lateral lobes of the parapodial rami of *Tr. forbesi* are large, triangular, flattened, foliaceous lamellae, which are not restricted to the posterior region, but are also found in the middle part of the body, where, however, they are less developed, especially in the dorsal ramus (Text-fig. 33 a).

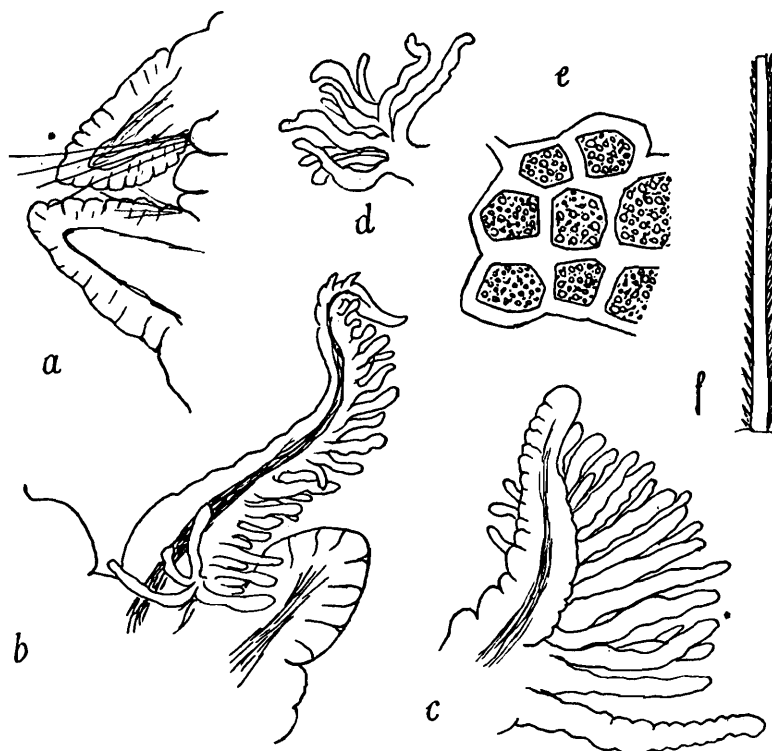


FIG. 33.—*Travisia arborifera*: a. posterior foot. $\times 65$; b. posterior gill. $\times 75$; c. gill from mid body. $\times 85$; d. part of gill. $\times 85$; e. polygonal glandular areas of the tegument. $\times 75$; f. part of seta. $\times 380$.

The capillary setae are smooth, with a narrow wing, and the stouter ones of the large specimen are finely barbed or hairy owing to disintegration of the worn-out wing, as it is the case in the dorsal bristles of *Arenicola* (Text-fig. 33 f.).

The tegument displays a polygonal pattern with the areas filled with glandular cells. Such a condition is similar to that of *Travisia forbesi* as described by McIntosh and du Réau (Text-fig. 33e).

The polygonal appearance is due to the crowding together of large spherical papillae, deformed by mutual pressure, and in a transverse section the body-wall appears limited by two overlying epidermic layers separated by a basal membrane.

From the structure of the body-wall, the large fleshy parapodial processes, the number and condition of the lateral sense-organs and nephridial pores, as also the posterior telescoped segments, this species, in spite of its bushy gills, is to be referred to *Travisia*.

Grube and Augener (1922, p. 39) indeed have already noticed exceptionally one or two bifid or trifid gills in *Travisia chinensis* Grube, but such rare monstrosities are hardly to be compared with the strongly branched and bushy gills of *Tr. arborifera*.

Amongst the Opheliidae, *Euzonus articus*, alone has really branched gills, but it is quite a different species, entirely without setae (Augener, 1912, p. 176, figs. 12-14).

In the small specimen from Puri, Orissa, the ventral lamellae, though beginning on the 10th, are only developed from the 14th setigerous segment, as also the dorsal ones, the first of which is very large. In the anterior segments the dorsal cirrus is not easily distinguished from the gill. The anterior gills are bushy, the posterior ones more *Eunice*-like.

The vent is terminal. The pygidium ends in a knob, with 6-8 short cirri.

Habitat.—Andaman Sea, Puri, Orissa Coast.

Family CAPITELLIDAE Grube.

Body divided into a thorax and an abdomen. Prostomium conical, without appendages. Proboscis unarmed, papillose. Peristomium achaetous. Branchiae simple, compound, or absent altogether. Parapodia biramous. Dorsal and ventral cirri absent. Capillary setae and hooks borne on uncinigerous tori. Lateral sense-organs.

- | | |
|---|----------------------------|
| 1. Thorax with only capillary setae | 2. |
| Thorax with capillary setae and hooks | 8. |
| 2. Thorax with 13 setigerous segments. Compound, retractile, abdominal gills | <i>Dasybranchus</i> . |
| Thorax with less than 13 setigerous segments | 3. |
| 3. Twelve thoracic setigerous segments | 4. |
| Less than twelve thoracic segments | 5. |
| 4. Anal funnel cup-shaped, with radiating acicular bristles | <i>Scyphoproctus</i> . |
| A broad round, anal plate, without acicular bristles. Two long anal cirri | <i>Heteromastides</i> . |
| 5. Eleven thoracic setigerous segments | 6. |
| Less than eleven thoracic setigerous segments | 7. |
| 6. More or less developed abdominal gills | <i>Notomastus</i> . |
| Abdominal gills and raised uncinigerous tori absent | <i>Capitellethus</i> . |
| 7. Seven thoracic setigerous segments. A dorsal copulatory organ | <i>Branchiocapitella</i> . |
| Nine thoracic setigerous segments. Posterior segments with stout dorsal spines | <i>Pulliella</i> . |
| 8. First 6 setigerous segments with capillary setae, the next 5 with long hooks | <i>Barantolla</i> . |
| First 5 setigerous segments with capillary setae, the next 6 with long hooks | <i>Heteromastus</i> . |

Heteromastides bifidus Augener, *Scyphoproctus djiboutiensis* Gravier and *Pulliella armata* Fauvel were recorded in the "Littoral Fauna of Krusadai Island" They are not represented in the present collection.

Genus NOTOMASTUS Sars.

Thorax of eleven setigerous segments, with only dorsal and ventral capillary setae. Abdomen with hooded hooks borne on raised tori. Gills reduced to short processes of the parapodial ridges, or sometimes compound. Thorax tessellated.

- | | |
|--|------------------------|
| Parapodial gills on both rami, the dorsal ones, small or globular, on the lower edge of the dorsal ridge | <i>N. latericeus</i> . |
| Dorsal gills compound | <i>N. giganteus</i> . |

Notomastus latericeus Sars.

Notomastus latericeus, Fauvel 1927a, p. 143, fig. 49 a-h. (Synonymy); 1916a, p. 455.

Notomastus latericeus, Ehlers 1897, p. 117; 1901, p. 188; 1908, p. 130.

"Investigator" Sta. 265, Bay of Bengal, 225-594 fms.; Sta. 332, Andaman Sea, 279 fms.; Sta. 354, Gulf of Oman, 1,005 fms.; Sta. 521 (?).

Specific Characters.—Thorax tessellated, segments biannular. Peristomium biannular, achaetous. First dorsal tori close to each other, coalescent; farther back they are well apart. Gills rudimentary and are represented by lateral processes of the dorsal ridges and of the upper end of the ventral tori. Genital pores from the 2nd abdominal segment.

Only anterior fragments were collected, a few filled with eggs or sperms; in one specimen the genital pores are conspicuous on 7 abdominal segments.

They do not differ from the European specimens.

Habitat.—Atlantic; Mediterranean; Falkland Islands; Chili; Magellan Coast; Andaman Sea; Gulf of Oman.

Notomastus giganteus Moore.

Notomastus giganteus, Moore 1906, p. 227, pl. xi, figs. 24, 25.

Dasybranchus giganteus, Moore 1909, p. 279, pl. ix, fig. 57.

"Investigator" Sta. 172, N. E. of Ceylon, 200-350 fms.; off Puri, Orissa, 4-4½ fms.

Specific Characters.—Body of large size. Prostomium rounded with a small conical tip. Without eyes. Thoracic segments biannulate and partly tessellated. Eleven segments with capillary dorsal and ventral setae. First abdominal dorsal tori very small, connected across the dorsum by a low transverse fold. Posteriorly they become very obscure. First abdominal ventral tori ending in a sharp upper process which decreases in size farther back. Gills retractile and usually obscured anteriorly; on the middle and abdominal segments they become conspicuous bushy tufts, composed of numerous (about 20-30) filaments arising from the posterior end of the dorsal tori, or posteriorly, when the tori become obsolete, replacing them.

Moore noted a complete specimen 140 mm. long and 7 mm. broad and another much larger incomplete example. The specimen from Puri, Orissa, is much smaller (24 mm. long, 2 mm. broad in the thorax) and has 55 segments. The specimen from Sta. 172 consists only of a short anterior fragment. On the first 9 abdominal segments, a pair of large genital pores are very conspicuous, opening behind the knob-shaped lateral sense organs which are inserted between the dorsal torus and the sharp upper end of the elongated ventral torus.

About the 14th-15th abdominal segment, the dorsal tori become obsolete and remote and, on each side, behind the hooks, there is a transverse row of small filliform papillae; farther back they increase in size and become tufts of simple or branched gill-filaments. According to Moore these gills are retractile.

It was first described by Moore as a *Notomastus*, and later on referred by him to *Dasybranchus*; I consider this to be wrong. *Dasybranchus* has compound retractile gills, but they are inserted between the parapodial rami and not behind the dorsal tori. Moreover, *Dasybranchus* has 13 thoracic setigerous segments.

Mastobranchus trinchesi Eisig has rows of branchial filaments inserted behind the dorsal tori and 11 thoracic setigerous segments with capillary setae, but the abdomen bears both capillary setae and hooks.

Moore's species is a *Notomastus*, closely allied to *N. profundus* Eisig, which has rather long but simple gills, and is intermediate between *N. giganteus*, with compound, more or less branched gills, and the other species (such as *N. latericeus*) with very obsolete gills.

Habitat.—North Pacific ; Gulf of Georgia ; San Diego ; California ; Ceylon, Orissa Coast.

Genus **DASYBRANCHUS** Grube.

Thorax with 13 setigerous segments, bearing only capillary setae. Abdomen with only hooks, inserted on dorsal and ventral tori. Retractable gills inserted at the upper end of the ventral abdominal tori.

Dasybranchus caducus Grube.

Dasybranchus caducus, Eisig 1887, p. 823, pl. xvii-xxiii.

Dasybranchus caducus, Fauvel 1927a, p. 148, fig. 52 a-h.

"Investigator" Sta. 379, off Akyab, Burma, 250 fms. ; Andamans.

Specific Characters.—Prostomium small, conical. Peristomium long, achaetous. Compound gills from on about the 20th abdominal segment, with numerous simple filaments. Body tough. There are only a few anterior fragments of this cosmopolitan species.

Habitat.—Atlantic, Indian and Pacific Oceans.

Genus **HETEROMASTUS** Eisig.

Thorax with 11 setigerous segments, the first 4 with only capillary setae, the next 6 with long stalked hooks. Abdomen with only shorter hooks inserted on tori. Posterior segments campanulate, or strobiliform. The parapodial gills are only an extension of the ventral tori. A median anal cirrus.

Heteromastus similis Southern.

Heteromastus similis, Southern 1921, p. 640, pl. xxix, fig. 23.

Heteromastus similis, Fauvel 1930a, p. 46.

Heteromastus sp., Gravely 1927, p. 26.

Vizagapatam ; Channel ; Harbour ; in mud opposite the railway station ; further end of the creek, beyond the Ferry ; Taléh-Sap, Gulf of Siam, Stas. 13, 22, 31 (*N. Annandale*.)

Specific Characters.—Prostomium conical, pear-shaped. Peristomium long, achaetous. Body long, slender, swollen at the anterior end, tapering gradually to the tail. The first abdominal segments are not conspicuously elongated. Lateral lobes wanting in the moniliform segments.

One incomplete specimen from Vizagapatam is 215 mm. long and 1.5-1.8 mm. broad. The body is filiform, of a nearly uniform breadth. The general appearance varies much with the state of contraction of the body. Sometimes the posterior segments are only short and close together, more often they are moniliform, or even strobiliform, campanulate, telescoped into one another. There is a great deal of variation even in a single specimen, according to the state of contraction of the different parts.

It is very little different from *H. filiformis* Claparède, and may be synonymous with it.
Habitat.—Chilka Lake, Gulf of Manaar, Vizagapatam, Taléh-Sap, Gulf of Siam.

Genus **BARANTOLLA** Southern.

“Capitellidae having 12 thoracic segments, of which the first is achaetous. Segments 2-7 have only capillary setae, segments 8-12 only elongate crochets. The abdominal segments have short crochets only. The anterior thoracic segments have reticulate markings on the skin, and the sculpture of the thoracic segments is rather elaborate. Branchiae in the form of short finger-shaped lobes behind the dorsal setae of the middle and posterior segments. These segments are provided each with a membranous collar, produced into four shallow parapodial lobes” (Southern).

Barantolla sculpta Southern.

Barantolla sculpta, Southern 1921, p. 643, pl. xix, fig. 24.

Banks of the canal near Barantolla, Salt Water Lake Sta. XI, near Calcutta ; Taléh-Sap, Gulf of Siam, Sta. 22 (*N. Annandale*.)

Specific Characters.—Body widest near the 4th-5th segment, very gradually tapering backwards. Prostomium short, two-ringed, without eyes. Proboscis covered with minute papillae. First four segments tessellated. Capillary setae with narrow wings. In segments 8-12 only long hooks resembling those of *Heteromastus*, ending in a strong tooth with 5-6 slender spines on the crest and a long hood. Abdominal crochets much smaller. Gills begin about 55th-60th-70th segments ; they lie under the dorsal parapodial lobes, each consisting of 3-4 short rounded lobes hidden by the parapodial lobes. The larger reach up to 9-11 finger-shaped lobes. A median anal cirrus.

Three specimens from Barantolla are complete, two have a small faintly-indented pygidial cup, and a somewhat large, coiled median cirrus. The third which is undergoing regeneration (?) has the pygidium reduced to a small knob.

The worms being much twisted it is not easy to ascertain their length which appears to be about 55-60 mm. with a breadth of 2-3 mm., in the enlarged part of the thorax, and 2 mm. in the mid-body. The segments are numerous, short and crowded together. The gills agree with Southern's description, but in one specimen they begin farther back, on the 70th segment. Owing to their contracted state, I was unable to make out either the genital and nephridial pores or the lateral sense organs. I could not clearly see the dorsal crochets in the 10th thoracic segment, the setae of which are very long, slender and bent, and are not genuine hooks. Perhaps the tip was broken (?), as is often the case.

In the collection which Southern examined the posterior end of the animal with the pygidium was not present.

Habitat.—Barantolla, near Calcutta, Taléh-Sap, Gulf of Siam.

Genus **CAPITELLETHUS** Chamberlin.

(*Capitellides* Ehlers *non* Mesnil.)

Thorax with exclusively capillary setae, abdomen with crochets exclusively. Branchiae none. Eleven setigerous thoracic segments ; no other macroscopic distinction between thorax and abdomen.

Capitellethus dispar (Ehlers).

Capitellethus dispar, Chamberlin 1919, p. 466.

Capitellethus dispar, Fauvel 1930b, p. 548.

Capitellides dispar, Ehlers 1907, p. 24, fig. 15.

Notomastus zeylanicus, Augener 1926a, p. 172 ; 1927a, p. 218.

Vizagapatam, bottom of channel.

Specific Characters.—The characters of the only species are those of the genus.

There is only one small, somewhat incomplete, specimen 15 mm. long and 0.8 mm. broad, with 35 segments.

The body is slender, filiform, without any apparent difference between the thorax and the abdomen, and is extraordinarily like that of an Oligochaete.

I was unable to detect any ventral setae on the first setigerous segment, nor did Eisig. Augener (1926, p. 173), who failed to find these, is nevertheless of the opinion that they must occur. In the above specimen, the 11th setigerous segment carries dorsal capillary setae and ventral hooks, which represents probably an individual variation.

Otherwise it agrees with the previous descriptions of *C. dispar*. The original generic name, *Capitellides*, which was previously given by Mesnil (1897) to quite a different species, was altered to *Capitellethus* by Chamberlin. Augener identifies it with *Notomastus zeylanicus*, but Willey's description is so short and incomplete that it could fit any *Notomastus*; I very much doubt this synonymy.

Habitat.—New Zealand; New Caledonia; Australia; India.

Genus **BRANCHIOCAPITELLA**, gen. nov.

Thorax with seven setigerous segments, bearing dorsal and ventral capillary setae. On the 8th and 9th segments, ventral hooks and a dorsal copulatory organ with modified large spines. In the abdomen, dorsal and ventral hooks and dorsal cirriform gills.

Differs mainly from *Capitella* in having abdominal gills.

Branchiocapitella singularis, gen. et sp. nov.

(Pl. VII, figs. 9-14.)

Barantolla ? or Vizagapatam (?).

Specific Characters.—Body slender, filiform, slightly enlarged in the thorax, about 200 segments or more. Skin faintly tessellated in the anterior segments. Prostomium blunt conical, without eyes. Peristomium achaetous, short ventrally and overhanging the prostomium on the dorsal side where it is twice as long. The first 8-9 segments biannulate, larger and more swollen than the following. Maximum breadth about the 6th segment. The first 7 setigerous segments bearing each two dorsal and two ventral bundles of capillary setae. On the 8th and 9th segments, ventral hooded hooks and a dorsal copulatory apparatus armed with 8 large, bent acicular spines (two in each ramus) converging towards the boundary of the two segments between which opens the male genital pore (pl. vii, fig. 12). In each dorsal ramus there are two bristles, a long one and a shorter supplementary seta (pl. vii, fig. 13). An ovate gland lies between the posterior bristles. From the 10th setigerous segment backwards, dorsal and ventral hooded hooks (pl. vii, fig. 14). In the abdominal region the body is semi-circular in section. Dorsal and ventral uncinigerous tori are

short, little raised transverse pads. About the 80th setigerous segment the gills make their appearance. They are small, finger-shaped, with one or two filaments inserted on the inner end of the dorsal tori (pl. vii, figs. 10, 11). Pygidium a short faintly bilobed knob.

Up to 95 mm. long and 1 mm. broad.

Discoloured in alcohol, whitish, with an irregular, more or less broad streak of brown spots placed far apart between the abdominal dorsal rami. In a small complete specimen, the dorsal genital pore is inconspicuous, but the large dorsal spines may be seen.

In the larger one, and another incomplete specimen, the genital opening and copulatory bristles are easily seen. All the specimens are more or less mature males and it is impossible to ascertain whether the copulatory apparatus exists in both sexes, as in *Capitellides giardi* Mesnil, or is restricted to the males, as in *Capitella*.

In a large specimen all the gills have a single filament, in others they have one or two filaments (pl. vii, figs. 10, 11). In one instance the first 13 gills have a single filament each, all the succeeding ones having two.

The dorsal copulatory apparatus on the 8th-9th setigerous segments is very similar to that of *Capitella* and *Capitellides*, but both of them are without gills. On the other hand the dorsal gills have something in common with *Barantolla*, *Mastobranchus* and *Notomastus profundus*, but none of them is provided with a dorsal copulatory apparatus, and the thorax is different.

Habitat.—The locality of this peculiar form is uncertain, but taking into account the other species in the same bottle it appears to be Barantolla or Vizagapatam.

FAMILY MALDANIDÆ Malmgren.

Body nearly cylindrical, segments long and few. Prostomium small, destitute of appendages. A median keel on each side of which is a nuchal groove; often with a more or less rimmed cephalic plate. Buccal segment achaetous. Parapodia biramous, a dorsal setigerous lobe with capillary bristles, a ventral uncinigerous torus. Dorsal and ventral cirri absent. Ante-anal segments often achaetous. An anal funnel with cirri or an anal plate. Cutaneous glands well developed. Tube membranaceous, coated with sand or mud, or hard arenaceous.

- | | |
|---|------------------------|
| 1. Head with a cephalic plate surrounded by a thickened margin or not | 2. |
| Head with a bordered plate. A foliaceous anal plate . . . | <i>Petaloproctus</i> . |
| 2. Anal segment having a ciliated funnel with cirri on the margins; the anus lies in the centre . | 3. |
| Anal segment forming a smooth plate without cirri | 5. |
| 3. Ventral uncini replaced by acicular setae in a number of anterior segments | <i>Clymene</i> . |
| Ventral acicular setae absent in the first segments | 4. |
| 4. Uncini, or ventral hooks, in all the setigerous segments . | <i>Axiiothella</i> . |
| Neither uncini nor acicular setae in the first segment . | <i>Maldanella</i> . |
| 5. Cephalic keel long and arched . . . | <i>Maldane</i> . |
| Cephalic keel short and flat . | <i>Asychis</i> . |

In the Maldanidae the head, anterior segments, and the pygidium are amongst the most important features which characterize species and even genera. Distinct genera, such as

Petaloproctus and *Nicomache* differ mainly in the structure of their pygidium, whilst the head and the first segments are almost similar. On the other hand, genera with a similar pygidium are distinguished by the different structure of the head. Incomplete specimens can, therefore, be exceptionally identified with certainty. Unfortunately the Maldanidæ are very brittle worms, and more often than not, are represented in collections by incomplete specimens to which specific and sometimes even generic names can be ascribed very doubtfully. Such is the case with many fragments which I had to deal with in the Indian Museum Collection.

Genus **CLYMENE** Savigny.

A slanting, rimmed cephalic plate. Acicular ventral bristles in the first three setigerous segments. Several anteanal achaetous segments. Pygidium funnel-shaped, bordered with cirri. Anus at the tip of a cone enclosed in a funnel. Glandular belts on the anterior segments.

Key to Sub-genera.

Anal cone sunk in the bottom of the funnel	<i>Euclymene</i> .
Anal cone protruding. Ventral cirrus much larger than the others	<i>Praxillella</i> .

Clymene (Euclymene) annandalei Southern.

Euclymene annandalei, Southern 1921, p. 648, pl. xxviii, figs. 22, *a-g*; pl. xxix, figs. 22, *h-k*.

"Investigator" St. 332, Andaman Sea, 279 fms.; St. 622, Camorta Island, on shore inside the reef on east side.

Specific Characters.—Twenty-one segments: 19 setigerous and 2 achaetous anteanals. Large and concave dorsal cephalic plate. Rim with two lateral notched parts and a posterior crenate portion. Nuchal grooves rather long, almost parallel. Numerous ocelli. Ventral acicular hooks of the three anterior segments with a simple, boldly curved tip. Caudal funnel fringed with short, bluntly rounded cirri, the median ventral cirrus stouter than the rest.

Three specimens from St. 622 are complete and agree with Southern's description and figures. The others are only fragments.

Habitat.—Chilka Lake, Andaman Sea, Camorta Islands.

Clymene (Euclymene) insecta (Ehlers).

Clymenella insecta, Ehlers 1904, p. 54, pl. vi, figs. 16-19; pl. viii, figs. 1-5.

Praxillella insecta, Augener 1926a, p. 192.

Madras, St. 3, Vizagapatam, in mud opposite the railway station.

Specific Characters.—19 setigerous segments and 3 achaetous anteanals. Dorsal cephalic plate oval, a long keel. Rim with two lateral notches, posterior portion smooth. Nuchal grooves long, parallel. Ventral acicular hooks of the three anterior segments with a slightly bent smooth tip. Caudal funnel fringed with short cirri, the ventral median cirrus slightly longer than the others.

The specimen from Madras is small, with 15 setigerous segments and four smaller regenerated segments.

There are three circular anteanal pads. The anal funnel is fringed with twelve, equal triangular cirri and a longer median ventral cirrus. The rim of the cephalic plate is smooth but the posterior part of it is notched in the middle. This is the only difference from Ehlers' single specimens. The segments 4 to 7 bears rings of glandular bands.

From Vizagapatam only an anterior and a median fragment were available.

The head is similar to that of the other specimen, the posterior border of the cephalic rim is smooth, and there is only a faint median notch.

According to Arwidsson, Ehlers' species belongs to the sub-genus *Euclymene*.

Habitat.—New Zealand, Madras, Vizagapatam.

(?) **Clymene (Euclymene) grossa** Baird.

Clymene grossa, Baird, Ehlers 1901, p. 190, pl. xxv, figs. 1-4.

"Investigator" St. 666, Andamans; on coral and mud reef.

An anterior fragment, 70 mm. long and 5 mm. broad, with 10 setigerous segments, agrees well enough with Ehlers' description and figures of *Cl. grossa*, but the posterior part being absent the identification is doubtful. The cephalic plate is rounded, with a long narrow keel and elongated parallel nuchal grooves. The cephalic rim is notched on each side, leaving an extended back part, partly smooth, dented only on a short dorsal space, with 13 well marked teeth.

The first five segments are short, with a raised anterior margin, especially on the fourth.

The first three segments bear, in the ventral ramus, 2-3 large yellow, straight acicular spines. On the 9th setigerous segment the uncinigerous tori are long, encircling nearly two-thirds of the segment. A short fragment of the tube is thick and hard, much alike the tube of *Cl. lumbricoides* Quatrefages.

(?) **Clymene (Euclymene) watsoni** Gravier.

Clymene watsoni, Gravier 1906, p. 198, pl. iii, figs. 214-216.

Sinai Peninsula.

A posterior fragment with 4 long setigerous segments, 2 achaetous anteanals, an anal funnel, with about 30 equal short cirri, agrees with Gravier's species, but in the absence of the head it cannot be identified with certainty. As *Cl. watsoni* was described from Djibouti and Suez the above specimen might belong to it ??

(?) **Clymene (Euclymene) santanderensis** Rioja.

Clymene santanderensis, Rioja 1917, p. 1, fig. 1.

Clymene santanderensis, Fauvel 1927a, p. 177, fig. 61, a-h.

? *Clymene monilis*, Fauvel 1901, p. 89, figs. 31-42.

? *Macroclymene monilis*, Augener 1918, p. 485, fig. 78.

Vizagapatam, farther end of the creek, beyond the ferry.

Specific Characters.—Segments very numerous, about 40, very brittle. Cephalic plate oval, rim with 2 lateral and 1 posterior notch. Keel and nuchal grooves straight and long. Ventral acicular spines on the first 3 setigerous segments. One achaetous anteanal. Pygidial funnel fringed with numerous alternating cirri, the median ventral one longer.

A number of fragments with more than 20 setigerous segments, two with the pygidium and an anterior fragment, all seem to belong to the same species.

The largest fragment, without head or tail, is 175 mm. long, 2 mm. broad and numbers 35 segments.

It is very likely truncated forwards between the first and second setigerous segments of the animal, for the first two segments of this fragment still bear, in the ventral ramus, a large, dark, bent acicular spine. The cut is healed and sealed by a large regeneration bud. The first two segments (really the 2nd and 3rd setigerous) are rather short. From the 4th to the 8th, a whitish swollen belt extends on nearly the anterior half. The 8th segment is longer and bears setae on its posterior fourth.

Two other fragments consisting of 13 and 21 segments respectively may belong to the same animal (?).

The only anterior fragment has a cephalic plate whose rim is smooth and faintly notched on each side and in the middle of the back part.

The keel and nuchal grooves are long, narrow and parallel. The first setigerous segments are like those of the long fragment.

Two posterior bits of 21-22 setigerous segments have an anal funnel with an encircling pad and fringed with numerous irregularly alternating cirri, the median ventral being longer than the others.

If all these fragments belong to the same species, it agrees with *Cl. santanderensis* Rioja, which is very likely synonymous with *Cl. monilis* Fauvel.

The largest fragment consisting of 35 setigerous segments, though incomplete, belongs certainly to one of the very few species of Maldanids possessing a large number of segments and as the other anterior and posterior fragments agree with *Cl. santanderensis* the identification is most probably correct.

Habitat.—Santander, west coast of Africa (?), India.

? *Clymene (Praxillella) gracilis* Sars.

Cly. (Praxillella) gracilis, Fauvel 1927a, p. 178, fig. 62, m-p.

Cly. (Praxillella) gracilis, Moore 1923, p. 238.

"Investigator" St. 353, Persian Gulf, 25 fms.

Specific Characters.—Prostomium long and tapering. Ocelli present. Cephalic plate oval, rim notched on the sides and back. 1-3 ventral acicular spines in the first 3 setigerous segments. 4 achaetous anteanals. Anal funnel with a longer median cirrus. Anal cone protruding.

There is only an anterior fragment with the prostomium ending in a filiform tip. The keel and nuchal grooves are straight and long. The cephalic rim is smooth, with a notch on each side and a faint one on the back. The ventral hooks are replaced, on the first three segments, by stout acicular bristles. In the absence of the pygidium the identification is somewhat doubtful.

Habitat.—Atlantic Ocean, Mediterranean Sea, California, Persian Gulf (?).

Genus *AXIOTHELLA* Verrill.

A cephalic rimmed plate. Pygidium funnel-shaped, fringed with cirri. Without collar. Denticulated uncini from the first setigerous segment.

Axiothella obockensis Gravier.

Axiothella obockensis, Gravier 1906, p. 206, pl. iv, figs. 221, 222.

Axiothella obockensis, Fauvel 1930a, p. 51, fig. 14, a-e.

Kilakarai, from coral reefs.

Specific Characters.—Long oval cephalic plate with a smooth rim, a long keel and two parallel nuchal grooves. Anal funnel with a long ventral cirrus. A ventral row of numerous small hooks on the first setigerous segment. Pinnate setae absent.

Two anterior fragments appear to belong to this species, which has already been recorded from the Gulf of Manaar with *A. australis* Augener, a closely allied species.

Habitat.—Red Sea, Krusadai, Kilakarai.

Genus **MALDANE** Grube.

Cephalic keel convex, arched; rim divided into three parts by two deep lateral notches. Nuchal grooves short. Anal plate oval, slanting, with the rim notched on each side. Anus dorsal. Achaetous anteanals. Anterior segments without collar. Ventral setae absent on the first segment. Dorsal setae of three kinds. Uncini from the 2nd setigerous segment. Glandular belts. Tube coated with mud.

Maldane sarsi Malmgren.

Maldane Sarsi, Arwidsson 1906, p. 151, pl. vii, figs. 192-199.

Maldane Sarsi, Fauvel 1927a, p. 197, fig. 69, a-i.

Maldane Sarsi, Augener 1927a, p. 227.

“Investigator” St. 90, Ganjam Coast, 28-30 fms.; St. 97, Bay of Bengal, 1,310 fms.; St. 201, Bay of Bengal, 296-320 fms.; St. 232, Laccadive Sea, 824 fms.; St. 235, Andaman Sea, 370-419 fms.; St. 245, Laccadive Sea, 449-465 fms.; St. 260, Laccadive Sea, 487 fms.; St. 269, Laccadive Sea, 464 fms.; St. 321, S. of Ceylon, 660 fms.; St. 337, Laccadive Sea, 271 fms.; St. 339, Gulf of Oman, 604 fms.; St. 358, Arabian Sea, 585 fms.; St. 612, Arabian Sea, 725 fms.; Andamans, 171 fms.

Specific Characters.—Cephalic keel strongly arched. Rim notched on each side, but smooth. Nuchal grooves short, diverging, straight or faintly curved. Two short achaetous anteanal segments, with well marked tori. Anal plate oval, slanting with a rim notched on each side, smooth or faintly crenate on the ventral side. Anus dorsal, puckered under the anal plate border.

There are a number of specimens, some of them large, complete and in good condition, with or without their thick tube of mud.

They do not differ from the specimens from the North Atlantic and the North Seas.

Habitat.—North Seas, Atlantic Ocean, Japan, Arabian Sea, Bay of Bengal, South Australia, Arctic and Antarctic.

Genus **MALDANELLA** McIntosh.

A rimmed cephalic plate. Nuchal grooves straight, parallel. Anal funnel fringed with cirri, with anus at the bottom. Ventral setae and hooks absent on the first setigerous segment. Uncini from the second setigerous segment. Anterior segments short, collarless. Glandular belts on the first 7 segments.

Maldanella harai (Izuka).

Maldanella Harai, Fauvel 1914b, p. 260, pl. xxiii, fig. 1; 1927a, p. 186, fig. 64, *i-n* (Synonymy).

Clymene Harai, Izuka 1902, p. 111, pl. iii, figs. 9-12.

Axiotea campanulata, Moore 1903, p. 485, pl. xxvii, fig. 99; 1906, p. 239.

"Investigator" St. 199, Bay of Bengal, 637-800 fms.; St. 319, Laccadive Sea, 1,154 fms.

Specific Characters.—Prostomium eyeless. Cephalic plate slanting with a smooth rim faintly or not notched. Keel and nuchal grooves extending on about half the length of the plate. 19 setigerous segments and 2 achaetous anteanals. Anterior border of the first 7 setigerous segments glandular. Dorsal setae of two kinds (1) winged, and (2) slender, smooth capillaries. Uncini from the second setigerous segment. Anal funnel elongated, fringed with small, nearly equal cirri.

The specimen from St. 319 is small but complete and agrees with the previous descriptions. The anterior border of the first 4 segments is raised, owing to contraction.

From St. 199 only an anterior fragment, with 8 segments, was available; although it agrees with the other specimens the absence of the posterior end leaves the identification somewhat doubtful.

Habitat.—Atlantic Ocean, Japan, Bay of Bengal, Laccadive Sea.

Genus **PETALOPROCTUS** Quatrefages.

Head arched, without cephalic plate. Nuchal grooves short. A large anal foliaceous plate, without cirri, surrounding the anus. Ventral acicular bristles on the first three setigerous segments. Anterior segments short, middle ones more elongated, posterior ones shorter, with a dorsal fleshy lobe. Achaetous anteanals rudimentary. Glandular belts on the anterior segments. Hard, thick tube of concrete sand.

Petaloproctus terricola Quatrefages.

Petaloproctus terricola, Fauvel 1927a, p. 194, fig. 68, *a-i* (Synonymy).

Maldane cristagalli, Claparède 1868, p. 457, pl. xxvi, fig. 4.

Koweit Harbour, between tide marks.

Specific Characters.—Head rounded without any trace of rim. Keel arched. Nuchal grooves short and diverging. 22 setigerous segments; achaetous anteanals wanting. A large ventral spine on the first three setigerous segments. Dorsal setae of three kinds. Last segment very short. A large, raised, fleshy pad ending backwards in a blunt lobe on the dorsal side of the last 6-7 segments.

The large specimen, broken into two parts, agrees very well with specimens from the Atlantic Ocean.

The ventral spines of the first three setigerous segments are stout yellow hooks. The dorsal setae are (1) winged, (2) slender capillaries, and (3) long, slender, filiform, barbed threads. The teeth on the vertex of the uncini are blunt and worn. After treatment with Iodgreen the fleshy posterior pads appear bluish, as also the anterior belt of the anterior segments, in front of the feet.

Habitat.—Atlantic Ocean, Mediterranean Sea, Persian Gulf.

Genus **ASYCHIS** Kinberg.

Cephalic plate rounded, rim divided into three parts by two deep lateral notches. Keel flat and short. Nuchal grooves curved. Anus dorsal, above the large anal foliaceous, more or less lobed, plate. First ventral setigerous segment without ventral setae or hooks. Uncini from the second setigerous segment. Anterior segments short. Achaetous anteanals short rudimentary. Dorsal setae of three kinds.

- | | |
|--|---------------------------|
| 1. Anal plate with long filiform processes, simple or forked | 2. |
| Anal plate without filiform processes | 3. |
| 2. Anal plate with 3 long filiform processes, single or forked. Lateral sides of cephalic plate smooth . | <i>A. trifilosa.</i> |
| Anal plate with several sharp, slender processes. Cephalic plate rim denticulate . | <i>A. gotoi.</i> |
| 3. Anal plate foliaceous, dorsal part broad, with triangular rolled in lateral lobes, ventral part bilobed, smooth . | <i>A. gangeticus.</i> |
| Anal plate with dorsal and ventral lobes smooth or denticulate | 4. |
| 4. Cephalic plate rim smooth | <i>A. theodori.</i> |
| Cephalic plate rim denticulate | <i>A. disparidentata.</i> |

Asychis theodori Augener.

Asychis theodori, Augener 1926a, p. 183, fig. 6.

"Investigator" St. 349, Persian Gulf, 25 fms.

Specific Characters.—Cephalic plate rim divided into three smooth lobes by the deep lateral notches. First segment achaetous, with anterior border drawn out into a collar notched on each side and in the middle of the ventral lobe. 19 setigerous segments and two achaetous anteanals. Dorsal lobe of the anal rounded plate smooth, ventral-lobe bluntly dented.

The single small specimen, partly enclosed in its tube, has a very small regenerated head, much more narrow than the succeeding segments. The prostomium is rounded and enlarged in front, with a short keel, hardly half the plate length, a low smooth rim, notched on either side, and two curved nuchal grooves. The buccal segment, still very rudimentary, is not collar-like. The second segment is not yet regenerated, for there are only 18 full grown setigerous segments and two achaetous anteanals. Only the head, the peristomium and first setigerous segment had been lost and were undergoing regeneration. The anal plate is set nearly at a right angle to the body; it is round, plane, with a smooth dorsal border and a ventral lobe with a dozen broad, short, irregular teeth, some of them being blunt while others are sharp.

As is sometimes the case in Maldanids, the rectum is largely protruding through the anus looking much like a proboscis. Such an appearance has more than once caused the posterior ends of a Maldanid to be mistaken for the head, as is the case with Grube's description of *Maldane glebifer*.

The above specimen agrees with *A. theodori* Augener from New Zealand.

Habitat.—New Zealand, Persian Gulf.

(?) *Asychis gotoi* (Izuka).

Maldane Gotoi, Izuka 1902, p. 109, pl. iii, figs. 1-8.

Maldane coronata, Moore 1903, p. 483.

"Investigator" St. 249, Laccadive Sea, 1,022 fms.; Andamans, 405 fms.

Specific Characters.—Rim of the cephalic plate divided into three lobes by deep lateral notches. Dorsal lobe serrated, lateral lobes fringed with cirri of unequal lengths. First segment produced into a collar notched on each side. 19 setigerous segments. The dorso-posterior margin of the anal plate expanded into a petaloid plume having 6 corners each of which is prolonged into a slender cirrus.

The specimen from the Andamans is a large anterior fragment, 80 mm. long, 6 mm. broad, with 12 setigerous segments. The other specimen, from St. 249, is also incomplete behind, and they can, therefore, be referred to *A. gotoi* with some doubt, though they agree closely with Izuka's description and figures.

Habitat.—Japan, Laccadive Sea (?).

***Asychis disparidentata* (Moore).**

Maldane disparidentata, Moore 1904, p. 494, pl. xxxviii, figs. 32-35; 1909, p. 282.

"Investigator" St. 128, S. of Cape Comorin, 902 fms.

Specific Characters.—Cephalic plate broadly oblong, elliptical, frontal ridge low, broad inconspicuous, equal to one-third of the cephalic plate. Nuchal grooves short. Posterior lobe of the cephalic rim divided into about 15 low, broad, truncate teeth, irregular and not constant; lateral lobes considerably more elevated and bearing 5 or 6 larger, more prominent, rounded teeth. Anterior margin of the first setigerous segment produced into a collar. 19 setigerous segments, an achaetous anteanal. Anal plate with a dorsal lanceolate lobe arched over the anus and a ventral lobe smooth or slightly irregular, but entirely without lobes or processes.

The only specimen, still enclosed in a thick muddy tube, is 40 mm. long and 2 mm. broad, and has 19 setigerous segments.

The lateral lobes of the cephalic rim bear 4-5 large, sharp teeth; the posterior lobe is divided into a dozen smaller teeth. The collar is well marked on the ventral and lateral sides of the first setigerous segment. The dorsal lobe of the anal plate is petaloid and smooth. The ventral lobe is broad, with a faintly sinuous rim.

This species is very likely only a variety of the *A. biceps* Sars. According to Moore (1909, p. 282), it is only distinguished "by having more numerous and blunter teeth on the anterior division of the cephalic limbus, the pre-anal segment uniannulate instead of biannulate, and the emargination on the ventral division of the caudal funnel entire instead of emarginated and slightly lobate".

Habitat.—California, India.

***Asychis trifilosa* Augener.**

Asychis trifilosa, Augener 1926, p. 187, fig. 7.

"Investigator" St. 354, Gulf of Oman, 1,005 fms.; in greenish brown mud.

Specific Characters.—Lateral lobes of the cephalic rim smooth, dorsal lobe faintly and finely crenate or smooth. First setigerous segment not produced into a collar. 19 setigerous

segments and one (?) anteanal. A collar on the 5th setigerous segment. Anal plate with a dorsal petaloid lobe bearing three very long filiform simple, or forked cirri; ventral lobe narrow and smooth.

The complete specimen is 160 mm. long and 4 mm. broad. The other is only an anterior fragment. The head of the complete specimen is more elongated than on Augener's fig. 7. The keel and nuchal grooves are longer and slightly different. On the other specimen the prostomium is less protruding and sharper, the keel is more raised backwards and the posterior lobe of the cephalic rim is smooth, whilst it is very finely crenulate in the complete specimen, which agrees with the variations noted by Augener.

I did not find any trace of a collar on the first setigerous segment. Between the 4th and the 5th setigerous segment I observed a low and thin fold with a sharp margin, the collar of Augener, but it extends, more or less marked, all round the segment and is not limited to the ventral side as stated by Augener.

Augener mentions an achaetous preanal segment. I noticed only, at the base of the pygidium, a large puckered, wrinkled pad with two transverse glandular streaks, ending at the vent, about the middle of the dorsal lobe. Perhaps this raised, wrinkled region is homologous with the rudimentary ante-anal segment??. The dorsal lobe of the anal plate is large, petaloid and bears three very long, whip-like processes. The middle cirrus is divided, at the tip, into four filaments. On the left side, the cirrus ends in three filaments, two long ones and a shorter. The cirrus of the right side is broken. The ventral lobe of the anal plate is raised, narrow, deeply hollowed to the last setigerous segment and has a nearly smooth border. The tori of the last setigerous segment are little removed from the raised base of the anal funnel.

The anus is dorsal and wrinkled.

This species is readily distinguished by its very peculiar anal plate.

Habitat.—New Zealand, Gulf of Oman.

***Asychis gangeticus*, sp. nov.**

(Pl. VIII, figs. 1-9.)

Gangetic Delta.

Specific Characters.—Body nearly cylindrical, truncate at both ends. 19 setigerous segments. Achaetous anteanals absent. Cephalic plate rounded, slanting, with a membranaceous rim divided into three parts by deep lateral notches, back and lateral parts smooth, faintly wavy (pl. viii, figs. 3-6). Prostomium flattened, broadly rounded in front. Keel broad, long and depressed. Nuchal grooves transversely curved. A longitudinal furrow on either side of the achaetous buccal segment. Anterior rim of the first setigerous segment produced into a collar sheathing the buccal segment, deeply notched on either side (pl. viii, figs. 1, 3). Buccal segment and the first three setigerous segments somewhat uniformly glandular, 4th, 5th, and 6th with broad ventral glandular pads, next with only large raised glandular tori (pl. viii, fig. 1). There is no glandular dorsal crescent-shaped pad on the 5th setigerous segment. Dorsal setae of three kinds: (1) long winged setae, slightly bent (pl. viii, fig. 8), (2) slender setae, barbed at the tip and shorter (pl. viii, fig. 7) and (3) very slender smooth capillary setae. Acicular spines and uncini absent on the first setigerous segment. On the following segments a transverse row of uncini, whose

large fang is crested with a rather large tooth and numerous tiny denticles (pl. viii, fig. 9). The sub-rostral barbs are few and slender, the manubrium is clearly enlarged. The last two setigerous segments are very short, with raised glandular tori, the last one reaches the base of the caudal funnel. Pygidium with (1) a broad, triangular, foliaceous dorsal lobe with a rounded border, lateral borders rolled inwards and a dorsal keel ending in a rounded valve above the anus (pl. viii, fig. 5), and (2) a foliaceous ventral lobe divided by a deep indentation into two lateral lobes sheathing the base of the rolled in dorsal lobe (pl. viii, figs. 2, 4). The length of the pygidial apparatus equals that of the last three setigerous segments. Length 140 mm.; breadth 5-6 mm.; colour in alcohol: yellowish brown with glandular bands and whitish tori.

The only specimen of this species is well preserved. It was labelled *Petaloproctus gangeticus*, without any author's reference. It certainly does not belong to that genus as the head and pygidium are different and the acicular spines on the first setigerous segment and posterior dorsal fleshy lobes of that genus are wanting in the species under discussion.

The slanting cephalic plate is not so depressed as in *A. biceps*, the keel is somewhat arched, but much less than in *Maldane*. The prostomium is short and broad, the nuchal grooves are transverse (pl. viii, figs. 3, 6).

The species has some likeness to *Asychis theodori* (Augener, 1926, p. 184, fig. 6, a) which has also, on the first setigerous segment, a collar cleft on either side, but in Augener's species the collar is indented in the middle of the ventral side and the pygidium is quite different. The pygidium of *A. gangeticus* is unlike that of any other species.

The dorsal part of the pygidial funnel, when unrolled and flattened, looks like a large triangular lobe, broader than long, slightly raised in the middle and ending on either side in a sharp cocked-hat-like point. When the lateral points are rolled inwards the whole has a trumpet-shaped appearance (pl. viii, figs. 2, 4, 5). On the dorsal side of this large foliaceous lobe runs a rather long keel, transversely wrinkled, with a small valve at the tip overlying the anus. In the middle of the ventral side of the lobe runs a narrow raised line under that keel (pl. viii, fig. 2).

The ventral part of the pygidial apparatus is composed of a large funnel-shaped membranaceous lobe with a deep median indentation and two smaller ones which divide it from the dorsal lobe.

The lack of achaetous anteanal segments, and the last uncinigerous tori set very close to the pygidium are peculiar features.

The anus being set rather back on the dorsal lobe one wonders whether the wrinkled keel preceding it might not be homologous with modified anteanal segments (?).

In *Asychis triflora* the anus opens on a large puckered knob which extends slightly on the base of the petaloid dorsal lobe with two transverse glandular streaks and deep wrinkles. To this wrinkled part corresponds, on the ventral side, the funnel-shaped membranaceous lobe, and the genuine anteanal segments appear to be wanting. Augener (1926, p. 190) who considers the basal ring of the funnel as an achaetous anteanal segment is inclined to the view that the dorsal wrinkled region corresponds to a second achaetous segment inconspicuous on the ventral side. The head of *A. gangeticus* is intermediate between that of *A. biceps* and *Maldane sarsi*. Malmgren did not separate the two genera, in spite of the

somewhat marked differences between the two species, and the intermediate forms described incline one to consider *Asychis* as only a subgenus of *Maldane*.

Habitat.—The Gangetic Delta.

Family OWENIIDAE Rioja.

(*Ammocharidae* Malmgren).

Body cylindrical, anterior segments longer than broad, posterior ones shorter. Prostomium fused with the buccal segment, devoid of appendages or ending in a lobed membrane. Dorsal setae capillary, ventral uncini very small, very numerous, set on transverse rows and with a bent hooked tip. Anal cirri absent. Tube coated with sand or shell fragments.

Genus OWENIA Delle Chiaje.

Prostomium bearing a branchial laciniate membrane. Buccal segment achaetous. The first three setigerous segments long and without uncini. Dorsal setae slender, spinous. Uncini bidentate. Pygidium bilobed. Glandular belts and spinning glands.

Owenia fusiformis Delle Chiaje.

Owenia fusiformis, Fauvel 1927a, p. 203, fig. 71, a-f (Synonymy); 1919, p. 446; 1921, p. 20.

Owenia fusiformis, Augener 1914, p. 77.

Owenia fusiformis, Gravier 1906, p. 294.

Ammochares assimilis, Malmgren 1867, p. 210, pl. xii, fig. 65.

"Investigator" St. 316, S. of Ceylon, 1,500 fms.; St. 553, Mergui, 27 fms.; Tuticorin Pearl Bank 12 miles from shore, 9-10 fms.

Specific Characters.—Uncini with an elongated manubrium and curved hook with two parallel teeth. The two anteanal segments without dorsal setae. Tube membranaceous, open and tapering at both ends, coated with overlapping sand grains and flat bits of shells.

The tubes from St. 553 are large, empty or contain only fragments of the animals. They are very characteristic, tapering at both ends, open and densely coated with rather large neatly imbricated bits of shell. Those from Tuticorin are similar, with the worms still inside. The tubes from St. 316 (1,500 fms. deep) are somewhat different. They are coated with rounded *Foraminifera*, which alters the normal imbricated appearance. But some parts of the tubes are coated with shell fragments; these small fragments are flat, set on edge and imbricated as in shore specimens. Of course the imbricated structure can only be attained when the animal uses flat materials, and this is not possible with the deep *Foraminifera* ooze.

Habitat.—Atlantic Ocean, Mediterranean Sea, Indian and Pacific Oceans.

Family SABELLARIIDAE Johnston.

Body divided into three regions. Prostomium not conspicuous, between two large opercular stalks bearing modified setae (paleae) set in concentric circles. Two palps. Anterior region of two short segments with rudimentary feet and 3-4 parathoracic biramous segments with oar-shaped setae; abdominal region with uncinigerous dorsal rami and ventral

rami with capillary setae. Simple gills. A caudal tail-like unsegmented achaetous and apodous region. Hard, thick, sandy tube.

Two concentric rows of opercular paleae

Pallasia.

Three concentric rows of opercular paleae

Sabellaria.

Genus **SABELLARIA** Lamarck.

Opercular stalks short, each bearing three concentric rows of golden paleae. Two small elongated palps. Numerous filiform tentacles on the ventral side of the opercular stalks. Three biramous parathoracic segments with oar-shaped setae. Dorsal falciform gills. In the abdomen, broad dorsal pinnules with pectinate uncini and ventral capillary setae. Tail smooth, achaetous. Thick tube of firmly cemented sand grains.

1. Outer opercular paleae with a slender, elongated, barbed process.

Plates of the middle row cup-shaped, smooth

S. spinulosa.

Outer opercular paleae without median slender barbed process

2.

2. Tip of the outer paleae ending in a long, slender, smooth spine

S. cementarium.

Tip of the outer paleae gradually decreasing into a barbed point.

Edge of the middle paleae denticulated

S. pectinata.

Sabellaria spinulosa Leuckart.

Sabellaria spinulosa, Fauvel 1927a, p. 208, fig. 73, a-p (Synonymy).

Sabellaria spinulosa var. *alcocki*, Gravier 1909b, p. 298, pl. viii, figs. 11-23.

Sabellaria spinulosa var. *alcocki*, Fauvel 1911, p. 415, pl. xx, fig. 44 ; 1914a, p. 144 ; 1927a, p. 211 ; 1930a, p. 53.

"Investigator" St. 593, Paway Island, coral reefs, shore collecting ; Matlah River, Gangetic Delta.

Specific Characters.—Outer paleae broad, paddle-shaped with 5-9 straight teeth and a median, slender, barbed process. Middle paleae geniculate, cup-shaped, smooth, short or elongated and erect. Inner paleae spoon-shaped. 2-3 pairs of dorsal acicular bristles. A triangular finger-like cirrus between the opercular stalks.

Var. **alcocki** Gravier.

Middle paleae alternately long and short, erect, or all elongated.

From St. 593 there are only two small specimens, without tubes. The paleae of the middle row are all of them elongated and erect ; instead of alternately long and short, as is often the case. They agree just as well with European specimens as with exotic ones.

The lump of small sandy tubes from the Matlah River is rather brittle and still contains several small worms, all of which have their middle paleae erect.

Habitat.—English Channel, Atlantic Ocean, Persian Gulf, Indian Ocean.

(?) **Sabellaria cementarium** Moore.

(Text-fig. 34).

Sabellaria cementarium, Moore 1906, p. 248, pl. xii, figs. 45-51.

Tuticorin Beach.

Very thick, hard tubes made of large, translucent quartz grains firmly cemented together, with an inner diameter of about 3 mm. yielded only fragments of a *Sabellaria*, which on

account of their opercular paleae I refer with some doubt to *S. cementarium*. The outer paleae end in a long slender, sharp, smooth spine arising between shorter smooth spine (fig. 34, e. f).

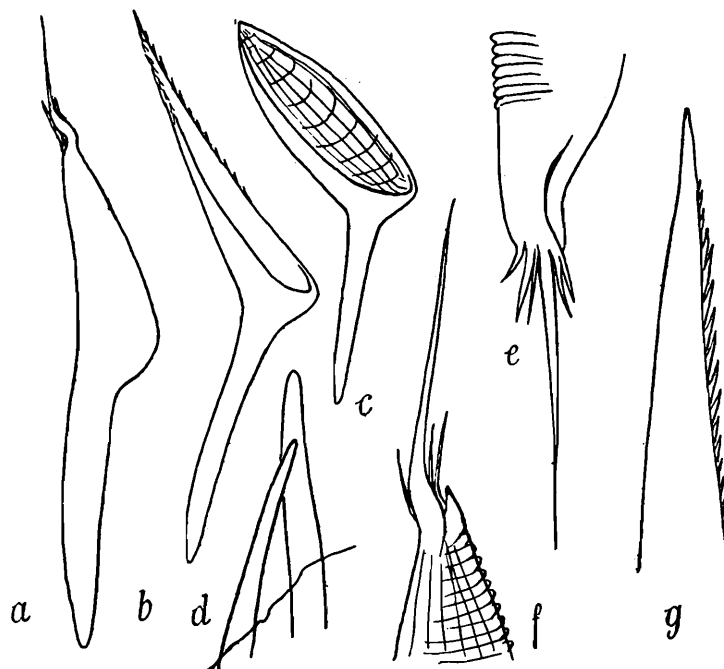


FIG. 34.—*Sabellaria cementarium*: a. outer palea. $\times 65$; b. inner palea. $\times 65$; c. middle palea. $\times 65$; d. dorsal interpeduncular hooks. $\times 150$; e, f. tips of outer palea. 150; g. tip of inner palea. $\times 150$.

The inner paleae are hollow, elongated and denticulate along the edge (Fig. 34, b, g) and recall those of *S. pectinata*. (Moore figures them with a smooth edge, but the small teeth on their edge may not have been noticed by him. The hairs he mentions on the slender process of the outer paleae are very likely microscopic algae which are so often met with on the bristles of Polychaetes and which have misled many workers. The middle paleae are short, smooth, spoon-like (Fig. 34, c).

Habitat.—Pacific (Alaska), India.

***Sabellaria pectinata* Fauvel.**

Sabellaria pectinata, Fauvel 1928b, p. 163, fig. 3, a-g; 1930a, p. 53, fig. 15.

Specific Characters.—Outer paleae having broad paddle-shaped tips with a central triangular spike bearing numerous lateral spines. The middle paleae cup-shaped with a short smooth tip. Inner paleae elongated spoon-shaped with spinous edges. A few dorsal acicular setae. A median cirrus between the opercular lobes. This species differs from *S. spinulosa* in the form of its operculum.

Var. **intermedia**, var. nov.

(Text-fig. 35.)

Matlah River, Gangetic Delta.

Lumps of small aggregate tubes made of rather small sand grains loosely cemented and brittle yielded a few small *Sabellaria* ranging from 6 to 12 mm. in length and 0.5 to 1 mm. broad. Some are filled with eggs.

The opercular pillars are fused along about two-thirds of their length. There are a few dorsal acicular bristles and a median cirrus between the opercular lobes. The first 4 or

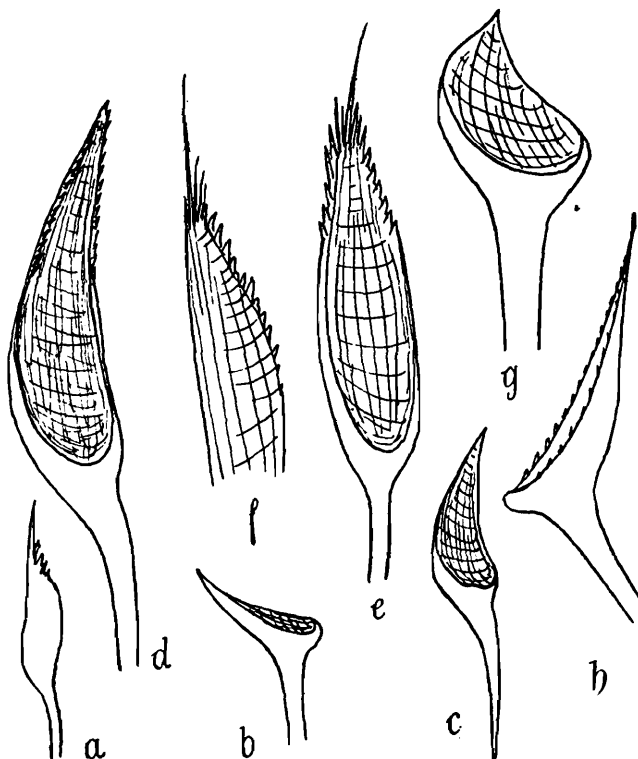


FIG. 35.—*Sabellaria pectinata*, var. *intermedia*: a-c. outer, inner and middle paleae drawn at the same scale. $\times 65$; d. middle elongated palea. $\times 120$; e. outer palea. $\times 150$; f. tip of outer palea, side view. $\times 150$; g. short middle palea. $\times 120$; h. inner palea. $\times 120$.

5 abdominal segments bear large gills which seem to be absent on the next abdominal segments of the smaller specimens.

The outer paleae are denticulate and gradually decrease in size, but resolve at the tips into few smooth spines (fig. 35, e, f). The inner paleae are like those of the typical *S. pectinata* (fig. 35, h), but the middle paleae are either short and broad or elongated, toothed and erect, or alternating, as in *S. alcocki* (Fig. 35, d, g). The outer paleae are of a type intermediate between those of *S. cementarium* and the typical *S. pectinata* of which this form is merely a variety.

Habitat.—The Gangetic Delta.

Genus **PALLASIA** Quatrefages.

Opercular stalks elongated, bearing each two concentric rows of paleae. Dorsal hooks Grooved, frilled, elongated palps. Numerous filiform tentacles on the ventral side of the opercular stalks. Three or four biramous parathoracic segments with oar-shaped setae. Dorsal filiform gills. Broad dorsal abdominal pinnules with pectinate uncini; ventral capillary setae. Tail smooth, achaetous. Thick tube of firmly cemented sand grains.

Three parathoracic segments. Outer paleae bent and denticulate, inner paleae smooth and slender

Subgenus *Pallasia* s.s. *P. pennata*.

Four parathoracic segments. Outer paleae smooth

Subgenus *Lygdamis*. *P. (L.) indicus*.

Pallasia pennata Peters.

Pallasia pennata, Augener 1914, p. 79.

Pallasia pennata, Fauvel 1917, p. 262 (Synonymy) ; 1931, p. 25, pl. iii, figs. 7-10.

Pallasia pennata, Willey 1905, p. 296, pl. vii, figs. 1-2.

"Investigator" St. 625, Camorta Island, Nicobars ; St. 657, Chiriya Tapu, Andamans ; St. 666 Andamans, on coral reef ; St. 673, Kachal, Nicobars ; St. 709, Nankauri Harbour, Nicobars ; Manora Shoal, Karachi.

Specific Characters.—Outer paleae curved, strongly serrated. Inner paleae acuminate, smooth and more slender. One to three pairs of stout dorsal hooks. Three parathoracic segments bearing narrow oar-shaped setae with laciniate tips.

Most of the specimens have only two dorsal hooks. The tubes from St. 666 and from Manora Shoal are very thick and hard.

Habitat.—Indian, Pacific and Atlantic Oceans.

Pallasia (Lygdamis) indicus (Kinberg).

Lygdamis indicus, Kinberg 1867, p. 350.

Lygdamis indicus, Johansson 1926, p. 8, fig. 2.

Sabellaria laevispinis, Grube 1877, p. 542.

Tetreres laevispinis, Caullery 1913, p. 200.

? *Pallasia laevispinis*, Augener 1927, p. 242.

? *Pallasia murata*, Allen 1904, p. 299, pl. x.

? *Pallasia murata*, Fauvel 1927a, p. 214, fig. 75, a-k.

? *Tetreres murata*, Caullery 1913, p. 200.

? *Tetreres murata*, McIntosh 1922, p. 7, pl. 118 ; 1924, p. 41.

? *Lygdamis murata*, Johansson 1926, p. 8.

"Investigator" St. 658, Andamans.

Specific Characters.—Outer paleae straight, smooth, tapering, inner paleae shorter and stouter. One pair of stout dorsal hooks. A median tentacle between the opercular stalks. Large elongated, grooved and frilled palps. Four parathoracic segments bearing narrow oar-shaped setae.

The only specimen, which is not accompanied by its tube, is 45 mm. long and 5 mm. broad. Each opercular stalk bears a score of inner paleae set in a row. They are short, blunt, yellow spikes transversely striated. The outer paleae are more numerous, straight, slender and smooth. On either side, a dozen pigmented conical papillae lie under the paleae. A straight median tentacle, abruptly truncated at the tip, arises between the opercular stalks. There are only a pair of stout, curved, dark-brown dorsal hooks, without conspicuous fleshy papillae at their base. The palps are elongated, grooved and frilled on their edges. Under the buccal veil the lower lip is lobed. The tentacular filaments are borne on about ten fleshy pads set under the opercular stalks. The second segment bears a gill, a three-pointed lobe, a few very slender setae and a ventral cirrus.

There are four parathoracic segments with a gill, a square, flattened dorsal ramus, bearing oar-shaped setae, and a small dorso-posterior conical lobe. The ventral ramus is conical, with similar but smaller setae and an auricula, a kind of fleshy lobe behind the ventral setigerous lobe. There are 48 abdominal segments and a few very small regenerated

ones with a short stump of a tail. The gills disappear from about the 28th abdominal segment. The absence of very long capillary setae on the last segments appears to be a result of regeneration.

As already noted by Johansson, the *Pallasia murata* Allen, from the English Channel, is a very closely allied species, if not identical with the present species. The only differences as far as can be ascertained, are (1) the striated paleae, (2) the absence of papillae at the base of the dorsal hooks, and (3) the ventral thoracic auriculae. A comparison of the type-specimens is necessary to settle the question of their identity.

Habitat.—Banka Straits, Andamans, Upolu, Atlantic Ocean, Ascension, Cape of Good Hope, English Channel ?.

Family STERNASPIDIDAE Malmgren.

Body very short and plump. Prostomium small, without appendages. First three segments armed, each with an incomplete belt of bristles. A pair of sexual papillae on the 7th setigerous segment; next eight segments achaetous. A ventral posterior shield with radiating bristles. A bundle of anal gills.

Genus STERNASPIS Otto.

Body swollen at both ends, segments short and few. Mouth subterminal. Anterior bristles short and stout. Horny shield composed of two trapezoid plates with radiating bundles of capillary setae. Filiform gills set on two posterior plates. Anus terminal.

Sternaspis scutata Ranzani.

Sternaspis scutata, Fauvel 1927a, p. 216, fig. 76, a-g. (Synonymy); 1913, p. 11.

Sternaspis scutata, Augener 1926, p. 283.

Sternaspis fossor, Stimpson 1853, p. 29, pl. ii, fig. 19.

The Andamans; Mergui Archipelago; Madras, St. 3; Ganjam Coast.

Specific Characters.—Body sausage-like, narrowed in the middle, expanding at both ends. The anterior segments often retracted into the following ones. Densely with small filiform papillae. Prostomium reduced to a mere small knob. Shield-plate divided into two unequal parts by a slanting line and marked with ridges and striae.

In small specimens from the Andamans the shield is brick-red, whilst in a larger one it is dull violet, and it is greyish in the Madras specimen. All of them agree very well with European specimens of *S. scutata*, more than with *St. costata*, as figured by Marenzeller; both species, however, are closely allied, if not synonymous, the differences noticed being slight.

Habitat.—Atlantic Ocean, Mediterranean Sea, Indian Ocean, Pacific (Australia, New Zealand).

Family AMPHICTENIDAE Malmgren.

Segments few, body short, conical, divided into three regions: (1) thoracic, (2) abdominal, with biramous segments, and (3) caudal (scapha), very small and leaf-like, with hooks at the base. An operculum of one anterior row of large golden setae (paleae). Two pairs

of anterior foliated branchiae ; very exceptionally absent. A free, slightly conical, tube of sand grains.

Antennal veil fringed. A distinct stricture between abdomen and scapha

Pectinaria.

Antennal veil smooth. Stricture less distinct

Petta.

Genus **PECTINARIA** Lamarck.

Antennal veil fringed. Dorsal rim smooth or serrate. Uncini from the 4th setigerous segment. Dorsal setae of two kinds : (1) with slender smooth tips, and (ii) with serrated tips. Uncini pectinate, with numerous, and often unequal, teeth. Tube thin-walled, straight or curved.

- | | |
|---|---|
| 1. Dorsal cephalic rim serrate | , Subgenus <i>Amphictene</i> . <i>P. crassa</i> . |
| Dorsal cephalic rim smooth | . 2. |
| 2. 15 setigerous segments, 12 uncinigerous segments | . Subgenus <i>Lagis</i> . <i>P. abran-chiata</i> . |
| 17 setigerous segments, 13 uncinigerous segments | . Subgenus <i>Pectinaria</i> . <i>P. antipoda</i> . |

Pectinaria antipoda Schmarda.

Pectinaria antipoda, Schmarda 1861, p. 46, pl. xxiv, fig. 199.

Pectinaria antipoda, Nilsson 1928, p. 69, fig. 22.

Pectinaria antipoda, Pruvot 1930, p. 78, pl. iii, figs. 93-95.

Cistenides antipoda, Augener 1927a, p. 231, fig. 13.

“ Investigator ” St. 344, Persian Gulf, 31 fms.; Koweit Harbour, between tide marks.

Specific Characters.—17 setigerous and 13 uncinigerous segments. Achaetous antescaphal segments absent, but the 17th segment has only capillary setae. Dorsal rim of cephalic plate smooth. Antennal veil fringed and funnel-shaped above the buccal tentacles. Dorsal setae narrow winged, with a straight smooth tip, or a geniculate spinulous tip. Uncini with 6-7 large decreasing teeth and 2-3 very small ones above the basal gouge-like process. Scapha ovate, with indented edges. Ligule very faintly bilobed, with a very small anal cirrus.

The specimen from Koweit Harbour is in a good state of preservation, 30 mm. long and 7 mm. broad, still enclosed in fragments of a tube made of small, white, rounded sand grains, a few debris of Echinoid radicles and bits of broken shells. The animal agrees very well with Pruvot's figures and description ; but the edge of the ligule is faintly lobed and sinuous. The specimen from St. 344 is soft and devoid of tube.

A few specimens from Stations 166, 168 and 170, in the Bay of Bengal, are incomplete. They have a smooth cephalic rim, but cannot be identified with any certainty.

Pectinaria antipoda is closely allied to *P. belgica* Pallas. The only difference seems to lie in the lower teeth of the uncini, and may be in the tube (?).

Habitat.—Australia, New Caledonia, Persian Gulf.

***Pectinaria (Amphictene) crassa* Grube.**

Pectinaria crassa, Grube 1870, p. 321.

Amphictene crassa, Nilsson 1928, p. 58, fig. 18.

Amphictene crassa, Pruvot 1930, p. 80, pl. iii, figs. 89-92.

"Investigator" St. 332, Andaman Sea, 279 fms.; St. 610, Arabian Sea, 245-300 fms.

Specific Characters.—17 setigerous and 13 uncinigerous segments. Achaetous antescaphal segments absent. Dorsal rim of cephalic plate serrated. Antennal veil fringed and funnel-shaped above the buccal tentacles. Dorsal setae winged, with a straight smooth tip, or a geniculate spinulose tip. Uncini with two parallel rows of each 6-7 large decreasing teeth and 2-3 very small ones above the basal gouge-like process. Scapha longer than broad, with denticulate edges and small cirriform processes. Semicircular ligule.

Though rather soft the two specimens agree with Pruvot's description and figures. This species is closely allied to *A. auricoma* Müller.

Habitat.—New Caledonia, Ceylon, the Andamans, Philippines, Arabian Sea.

***Pectinaria (Lagis) abranchiata*, sp. nov.**

(Pl. VIII, figs. 10-14).

Cochin Backwater, near Ernakulam, September, 1914. (*F. H. Gravely*.)

Specific Characters.—16 segments with capillary setae, 12 uncinigerous (from 4th segment to 15th). An achaetous segment in front of the scapha. Antennal veil fringed with 15-20 claviform papillae; it is funnel-shaped above the buccal tentacular cirri and is not bound to the first setigerous segment. Dorsal rim of the cephalic plate smooth. On each side, about 15 stout golden paleae with a very slender rolled-in tip, the inner paleae are shorter and more slender than the others. Two narrow dorsal elongated pads at the back of the third segment (pl. viii, fig. 10). Thoracic ventral shields with transverse glandular pads from the 2nd segment to the 5th (pl. viii, fig. 11) followed by a rounded median patch to the 6th (2nd uncinigerous). *Branchiae absent*. Glandular triangular lobes of the 4th segment absent. Ventral body walls thin and transparent. Dorsal capillary setae narrow-winged; some are long, straight, stiff, with a slender, very faintly spinous tip, while others have bent, finely serrated tips. Uncini pectinate, with several ventral rows of numerous teeth above the large gouge-like lower process (pl. viii, figs. 13, 14). The hooks at the base of the scapha about 10-12, are short, stout and set in a curved row on either side. Scapha short and stout, with erect edges bearing short ovate knobs. Anal ligule triangular, with a smooth edge and a very small cirrus (pl. viii, fig. 12). Tube straight (?) made of a single layer of transparent quartz grains held together by a yellowish cement.

The three small specimens, 11, 12 and 17 mm. long and 3 mm. broad, are of a whitish yellow hue, in alcohol, with golden paleae.

The worms were still enclosed in their very brittle tubes.

This species differs from any other known Amphictenidae in the utter absence of gills. All species of *Pectinaria* have two pairs of gills borne on the 3rd and 4th segments (as enumerated by Saint-Joseph and other authors) in a line with the dorsal glandular pad. On the *Pectinaria* from Cochin Backwaters, only a very slight and darker swelling is noticeable on the dorsal end of the glandular pad of the 4th segment, which should bear the second pair of gills (pl. viii, fig. 10).

The fact that the specimens of *Pectinaria* were still enclosed in their tube, testifies to their integrity. On the other hand, it is very unlikely that of the twelve gills which should have been borne by the three specimens, all told, all of them have disappeared without leaving any trace of a wound or a scar. It is much more likely that these specimens represent a normally abbranchiate species.

Pectinaria clava Grube, though having small gills, is not abbranchiate ; moreover it has 17 setigerous segments.

Pectinaria australis Ehlers, redescribed by Augener from New Zealand, is a small species of nearly the same size (8-11 mm.), with 15 setigerous segments. Even granting that a 16th segment with very small setae has escaped detection it clearly differs from the new species in having gills.

Pectinaria abbranchiata belongs to the subgenus *Lagis* in most characters, the absence of gills and the presence of a very small 16th setigerous segment bearing only a few very slender dorsal capillary setae are the only differences.

Habitat.—Cochin Backwaters.

Family AMPHARETIDAE Malmgren.

Body divided into two regions : (1) thorax with dorsal capillary setae and ventral uncinigerous pinnules and (2) abdomen bearing only uncinigerous pinnules. Prostomium conical or trilobed. Buccal tentacles long, smooth or pinnate, retractile into the mouth. Three or four pairs of subulate, seldom pinnate, branchiae inserted on the anterior segments and having in front two bundles of paleae, sometimes absent.

- | | |
|---|-----------------------|
| 1. Pinnate gills | <i>Schistocomus</i> . |
| Subulate gills | 2. |
| 2. Segments numerous, 50 or more | 4. |
| Segments few, 20 to 40 | 3. |
| 3. Paleae present. Tentacles smooth | <i>Amphicteis</i> . |
| Paleae absent. Tentacles smooth | <i>Amage</i> . |
| 4. A large, curved hook, on each side, behind the gills | <i>Melinna</i> . |
| Large hooks behind the gills absent | <i>Melinopsis</i> . |

Genus AMPHICTEIS Grube.

Prostomium with a median groove and two ridges. Buccal tentacles smooth. Four pairs of gills. 17 bristled segments. Uncinigerous pinnules commencing on the 4th setigerous segment. Uncini uniserial, subtriangular with few teeth. Anal segment with two cirri.

- | | |
|---|-------------------------------|
| 1. A close-set group of 4 gills on either side of the 1st and 2nd setigerous segments | <i>A. gunneri</i> . |
| 2. Fourth pair of gills set further back on the third setigerous segment | <i>A. posterobranchiata</i> . |

Amphicteis gunneri Sars.

Amphicteis gunneri, Malmgren 1865, p. 365, pl. xix, fig. 46.

Amphicteis gunneri, Fauvel 1897, p. 411, pl. xxv, figs. 150-161.

Amphicteis gunneri, Hesse 1917, p. 116.

Amphicteis japonica, McIntosh 1885, p. 431, pl. xxviiA, figs. 3-5.

"Investigator" St. 343, Gulf of Oman, 609 fms. ; St. 379, off Akayab, Burma, 250 fms. ; St. 711, Macpherson Straits, Andamans, 290 fms. ; St. 32, 16 miles E. of Devi, Orissa Coast.

Specific Characters.—17 thoracic setigerous and 15 abdominal uncinigerous segments. Numerous eye-spots. Golden paleae straight or curved at the tips, which are more or less tapering. Gills inserted on the 1st and 2nd setigerous segments in two close-set groups of four each. Feet with a clavate papilla at the ventral edge distally. Abdominal pinnules with a dorsal short process ; the dorsal cirri replace the absent dorsal ramus. Uncini with a single row of 4-7 teeth. Tube membranous, coated with mud.

The specimen from St. 379, though broken into two parts, is like the specimens of *A. gunneri* from Bohuslan, Sweden, with which I have compared it. The uncini have 5-6 likely large curved teeth.

In the small specimen from St. 343, the tips of the paleae are very slender, as is often the case in young specimens. From St. 711, there are three specimens still enclosed in their thick muddy tubes.

According to Hessle (1917, p. 117), *A. japonica* McIntosh is a mere variety of *A. gunneri* and I fully endorse this view ; the tips of the paleae and the number of teeth in the uncini being variable in the latter species.

Habitat.—Atlantic Ocean, Mediterranean Sea, Gulf of Oman, Bay of Bengal, Japan, Antarctic.

***Amphicteis posterobranchiata*, sp. nov.**

(Pl. IX, figs. 7-11.)

"Investigator" St. 133, Bay of Bengal, 678 fms. ; St. 241, Bay of Bengal, 606 fms. ; St. 321, S. of Ceylon, 660 fms. ; St. 366, Arabian Sea, 544 fms. ; St. 388, W. of Cape Comorin, 670 fms.

Specific Characters.—17 thoracic setigerous segments with dorsal capillary setae, 13 abdominal segments with uncinigerous pinnules. Prostomium lobed, with a median groove and two diverging glandular ridges (pl. ix, fig. 8). Edge of the nuchal organs raised into a curved pad. Buccal segment as long as the three succeeding segments (pl. ix, fig. 7). Golden yellow paleae ending into a very slender straight or curved tip, about 20-25 on each side. Eight large subulate gills, the first six disposed into two crowded groups of three, on the first setigerous segment, separated in the middle of the dorsal surface by a raised rectangular cushion. The fourth pair is set far back from the first three on the third setigerous segment (pl. ix, figs. 7, 8). Uncinigerous pinnules commence on the 4th setigerous segment. Dorsal ramus cylindrical, with a small club-shaped cirrus on the last thoracic segments. Capillary setae winged and smooth. Uncinigerous pinnules shaped as a flattened knob, pedunculate and bearing a single retrogressive row of pectiniform uncini with three large bent teeth (pl. ix, figs. 10, 11). The manubrium has a small dorsal spur on which a "*soie-tendon*" is inserted. In the abdomen, the pinnules are flattened, sub-rectangular, with a very short dorsal blunt process. The dorsal cirri, reduced to a pedunculate small knob, persist in place of the setigerous lobes (pl. ix, fig. 9). Two anal cirri. Tube membranaceous, coated with mud.

Length, up to 42 mm., 5 mm. broad. Colourless in alcohol.

As is clear from the above description, this species shows most of the main features of *A. gunneri*, nevertheless it is readily distinguished by two important characters, *viz.*, the position of the gills and the shape of the uncini.

In *A. gunneri* the eight gills are set in two crowded groups, of four each, separated from each other, in the middle of the back, by a rather broad space. In *A. posterobranchiata*, on the other hand, the first three pairs of large subulate gills are distributed into two groups, each composed of two gills, set side by side, on the first setigerous segment (the segment bearing the paleae not included) and a third immediately behind. Both groups are separated, in the middle of the back, by the teguments raised into a short rectangular pad. The fourth pair of gills is set farther back on the third setigerous segment, each gill being inserted a little above the inner side of the foot (pl. ix, figs. 7, 8). In one of the specimens, still retaining one of these gills, it reaches backwards to the 9th setigerous segment. In another specimen, both the posterior gills are still present and they are at least as long. The other gills have fallen off, but their scars are very conspicuous (pl. ix, fig. 7).

Such a disposition might at first consideration be taken as a mere anomaly. Wollebaek indeed (1912, p. 51) mentioned a somewhat analogous case in *Ampharete grubei* and Hessle (1917, p. 117) noticed in one *A. gunneri* var. *japonica*, from Sagami, the fourth pair of gills inserted far behind the others. But as this peculiar distribution of the gills is identical in all the specimens from six stations, all separated by fairly long distances from one another, it seems very unlikely to be a mere anomaly. Moreover, every one of the six specimens shows uncini clearly differing from those of *A. gunneri* in (1) their far greater size, (2) having only three large curved teeth instead of 5-6, and (3) the greater relative size of the small hook under the lower curved tooth (pl. ix, figs. 10, 11). On comparison with uncini of *A. gunneri* from Bohuslan (Sweden) and from the Indian Ocean, the differences became quite apparent. Hessle's anomalous specimen from Sagami Bay was very probably *A. posterobranchiata*. The paleae end in a very slender tip which may be straight or more or less rolled in, as is the case in most species of *Amphicteis*.

The buccal tentacles, which were extruded in one specimen, are many and smooth. The shape of the prostomium varies with the shutting and opening of the mouth, as in *A. gunneri* (pl. ix, figs. 7, 8).

Habitat.—Bay of Bengal, Arabian Sea.

Genus **AMAGE** Malmgren.

Body rather short. Bristled thoracic segments 14 to 17. Uncinigerous pinnules commencing on the 4th setigerous segment. Uncini sub-triangular, pectiniform. Prostomium with two ridges. Buccal tentacles smooth. Three or four pairs of gills. Anal segment with two cirri. Paleae absent.

Amage bioculata (Moore).

Samytha bioculata, Moore 1906, p. 253, pl. xii, figs. 52, 53 ; 1908, p. 350.

Samytha bioculata, Hessle 1917, p. 122.

Eight miles south of Puri, Orissa, Bay of Bengal, 13 fms.

Specific Characters.—17 thoracic setigerous segments. 13-14 abdominal uncinigerous segments. Prostomium quadrate, broader than long. Numerous eye-spots. Paleae absent. Four pairs of much crowded, slightly flattened, slender and elongated gills. First foot with a very small tuft of setae. In the abdomen, dorsal ramus reduced to a small achaetous papilla projecting from the dorsal angles of the body. Uncinigerous pinnules are compressed

lappets, constricted at the base, apparently lacking cirri. Uncini roughly triangular, bearing 4-5 long, slender, acute, overlapping teeth.

The only specimen is small, 9 mm. long, and very soft. The gills are missing; there appear to have been only three pairs of them. The abdominal segments are not easily counted, they are about 15, but may be fewer. The first thoracic foot is very small and inserted near the gills. The buccal tentacles are short, club-shaped and smooth. The specimen agrees with Moore's description, only it appears to have 3 pairs of gills (?) instead of 4, but in *A. adspersa* the number of gills varies between 3 and 4.

According to Hesse, *Samytha bioculata* should be referred to the genus *Amage*.

Habitat.—North Pacific, Gulf of Georgia, India.

Genus **SCHISTOCOMUS** Chamberlin.

"Like *Phyllocomus* in lacking tentacles and post-branchial spines, in bearing fifteen pairs of fasciae of capillary setae and four pairs of branchiae. It differs from that genus in having the branchiae of two types, one pair being of the ordinary, smooth, simple, subulate form and the other three with the edges divided, two pinnately, bearing two close series of lamellar branches, and one with an essentially single series of branches in the genotype" (Chamberlin).

Schistocomus hiltoni Chamberlin.

(Pl. VIII, figs. 15-19.)

Schistocomus hiltoni, Chamberlin 1919, p. 17.

Madras Coast, 5-10 fms.

Specific Characters.—Body swollen and somewhat abruptly truncate in front, tapering backwards to a slender tail. 15 thoracic setigerous segments, about 32 abdominal uncinigerous segments. Prostomium projecting forwards as a simple hood with rounded anterior corners devoid of ridges and eyes (pl. viii, figs. 15, 16). Buccal segment broad and short, concave dorsally, ventrally, with a lower lip closing the mouth. Buccal tentacles absent (?). Paleae and post-branchial hooks absent. Four pairs of branchiae of two types. On the first setigerous segment a pair of outer subulate gills and two inner pinnate gills attached near the middle of the dorsum. On the 2nd and 3rd setigerous segments a broad pinnate gill on each side (pl. viii, fig. 16). On the 5th setigerous segment, a transverse slender whitish ridge, faintly raised. Uncinigerous pinnules from the 4th setigerous segment; in the thoracic region they bear a small papilla at their upper border; in the abdomen this process becomes cirriform and the dorsal ramus is reduced to a flattened blunt achaetous lobe and a small rounded papilla (pl. viii, fig. 19). The ovate pygidium bears a crown of short cirri (pl. viii, fig. 18). Dorsal capillary setae winged. Uncini sub-rhomboidal with 6 large curved teeth (pl. viii, fig. 17).

The single specimen is light yellow variegated with brown spots. It is 24 mm. in length and the maximum breadth is 4 mm. It agrees very well with Chamberlin's description, which unfortunately is not accompanied by any figures.

As stated in the generic and specific descriptions, the first pair of gills are simple subulate. Those of the second pair are composed of a subulate stem bearing a single series of triangular lamellae, whilst those of the last two pairs bear a series of lamellae on each side of the stem,

thus recalling gills of some Crustacea, or the branchiae of *Pectinaria* (pl. viii, fig. 16). The buccal tentacles are very likely lacking; both Chamberlin and I failed to find any. Transverse glandular shields are conspicuous on the ventral side to the penultimate thoracic segment.

Chamberlin did not describe the feet, the pygidium and the setae.

The dorsal setigerous lobes are of the usual cylindrical form, bearing smooth capillary winged setae. The thoracic pinnules are somewhat square, flattened, with a blunt process at the upper corner. In the abdomen the pinnules are more elongated and their process grows cirrus-like. Above the pinnule arises a triangular, blunt, fleshy lobe bearing at the base of its upper border a small rounded or curved knob (pl. viii, fig. 19).

The uncini are, as in *Ampharete*, pectinated plates, somewhat squarish, or sub-rhomboidal in outline, with six rather large, sharp, bent fangs above the rounded lower process which bears a very small spur under the lower fang. The six large teeth are set in a single vertical row (pl. viii, fig. 17). The pygidium is large, ovate, smooth, speckled with brown spots and an irregular brown ring under the crown of small cirri surrounding the anus (pl. viii, fig. 18).

The shape and disposition of the head and gills is so very peculiar that the above specimen undoubtedly belongs to Chamberlin's species.

Habitat.—Laguna Bay, California; Madras Coast.

Genus **MELINOPSIS** McIntosh.

Differs from *Melinna* in the absence of hooks behind the gills and a dorsal membranous collar.

Melinopsis dubita (Hoagland).

Melinna dubita, Hoagland 1920, p. 624, pl. li, figs. 13-16.

"Investigator" St. 232, Laccadive Sea, 430 fms.; St. 281, Bay of Bengal, 300 fms.

Specific Characters.—Prostomium ending in a folded upper lip. Buccal segment largely covered by the following segment. Next four segments forming a collar-like structure with a prominently developed lateral region extending obliquely from ventral to dorsal surface. First two segments marked ventrally by a row of fine setae. Third segment with similar setae ventrally and a delicate tuft of similar but larger capillary setae dorsally. Fourth segment with a small prominent tuft of dorsal setae, but without any ventral setae. The succeeding 13 thoracic segments with a conspicuous dorsal cylindrical setigerous lobe bearing winged capillary setae. Uncinigerous pinnules from the 5th setigerous segment. Abdomen with numerous segments bearing only square uncinigerous pinnules without any process. A small dorsal globular knob. Uncini pectinate with four large teeth above the ligament process. Buccal tentacles of two kinds: (1) long slender, and (2) short, thick, smooth, grooved. Four pairs of gills, stout, tapering, broad and flattened. Tube composed of a tough inner membrane and a thick outer coating of fine mud.

The specimen from St. 281 is large but incomplete behind, the three from St. 232 are anterior fragments with a cylindrical tube, 140 mm. long, made of fine mud. The diameter of the tube is 8-10 mm. and the bore only 2-3 mm., the walls being very thick. These specimens agree very well with Hoagland's description.

The anterior end is sunk into a kind of groove made by the raised edges of the first four segments, but these edges are not as sharp as in *Melinna*. The sides of the first three of these segments bear a vertical or oblique row of very fine setae and the third has moreover a very small bundle of dorsal setae. The fourth segment has a small dorsal foot with capillary setae, but is without any ventral setae or uncini. *Melinopsis dubita* agrees with *Melinna* in the characters enumerated above but in that genus there are a pair of large dorsal hooks behind the gills, which and the transverse dorsal membrane are absent in this species. The dorsal ridge mentioned by Hoagland on the third segment is only a fold of the skin probably due to contraction. There are 14 thoracic setigerous segments with capillary dorsal setae, the first three segments with ventral rows of fine setae not included; otherwise, there would be in all 17 bristled segments. As far as can be judged from the incomplete specimens before me, the number of abdominal segments appears to be high. The difference between the slender and the stouter buccal tentacles is not so striking as stated by Hoagland. The more or less swollen gills, with long slender tips, agree very well with the author's figures 13-14; they are not fasciculate.

The ventral thoracic shields are broad and short glandular transverse streaks separated by deep grooves.

The dorsal thoracic feet are cylindrical, but they are not provided with a small cirrus-like process as in *Amphicteis*.

The uncinigerous pinnules are semi-circular in the anterior segments, but grow rectangular posteriorly and are without a dorsal process. In the abdomen, the dorsal setigerous lobe has a small rounded knob, very likely homologous with the dorsal ramus which has disappeared.

This species belongs to the genus *Melinopsis* McIntosh which differs from *Melinna* chiefly in the absence of post-branchial hooks of dorsal transverse membrane and non-fasciculate gills.

Habitat.—Mindanao, Philippine Islands, Laccadive Sea, Bay of Bengal.

Genus **MELINNA** Malmgren.

Body long slender, tapering behind, segments numerous, 50 and more. Prostomium without glandular ridges. Buccal tentacles smooth. Four pairs of long, subulate, fasciculate gills. Paleae absent. A pair of large hooked spines behind the gills. A dorsal transverse membrane on the 6th segment. Segments 2 to 6 coalesced in the form of a vagina partly ensheathing the mouth and the sides of the branchiae and bearing a ventral row of very fine setae. Uncinigerous pinnules from the 7th segment. Dorsal capillary setae winged. Uncini sub-triangular, with few teeth (4-5).

Melinna aberrans, sp. nov.

(Pl. IX, figs. 21-26).

Vizagapatam Harbour. January 20th. Dr. H. S. Rao. Vizagapatam Channel, connecting backwater with the sea.

Specific Characters.—14 thoracic setigerous segments with dorsal capillary setae (first foot very small, rudimentary). At least 30 abdominal uncinigerous segment. Body slender,

greatly tapering posteriorly. Prostomium broad, short, anterior border faintly lobed, without glandular ridges and bearing, on each side, a transverse row of many eyespots (pl. ix, fig. 22). Buccal segment partly sheathed into the next, which forms a ventral collar deeply notched in the middle. Buccal tentacles stout, smooth and few. Eight elongated, subulate, ringed gills crowded into two groups and bound together by a membrane reaching up to a third of their length ; in each group they are fasciculate at the base. Segments 2 to 5 form a long groove, the lateral edges of which are raised up, and united behind the gills by a transverse membrane ; the anterior margin of the membrane is convex and smooth (pl. ix, fig. 21). Segments 2, 3 and 5 bear a transverse row of very fine, sharp, wingless ventral setae (pl. ix, fig. 24). There is also a small bundle of dorsal capillary winged setae on the 5th segment. The 4th segment bears, on either side, behind the gills, a large bent hook (pl. ix, fig. 25). On the 6th segment, there is a small tuft of dorsal capillary winged setae, but ventral setae are absent. The next 12 segments bear dorsal capillary winged setae and uncinigerous tori. Uncini with a single row of 5 teeth (pl. ix, fig. 26). In the abdomen the uncinigerous pinnules are rectangular and devoid of cirriform process. Tube membranaceous, cylindrical, coated with a thick layer of fine mud and sand. Length about 20 mm., breadth 1 mm. Colourless in alcohol.

Of this small, slender, filiform species half a dozen specimens were extracted from their yellow mud-coated tubes.

The somewhat short and broad prostomium is more or less bilobed, with, sometimes, a faint indication of a third lobe at the bottom of the median notch. The eyes are set, on either side, in a transverse row of conspicuous small pigment spots. The buccal tentacles and gills are of the usual *Melinna*-type (pl. ix, figs. 21, 22). On the ventral side, the collar formed by the 2nd segment ensheathing the buccal segment is deeply notched in the middle (pl. ix, fig. 23). On either side of the anterior part of the body, on the ridge formed by the raised edge of the anterior segments, are set in three transverse rows of very fine and short ventral setae, wingless and more or less clearly lanceolate at the tips (pl. ix, fig. 24). These setae belong to segments 2, 3 and 5, if the two large hooks inserted behind the gills are considered as the modified setae of the 4th segment. The 5th segment bears, in addition to the transverse row of ventral setae, a very small tuft of dorsal capillary setae. On the 6th segment, the dorsal bundle is still present, but the ventral setae are lacking, as is probably the case with *Melinna palmata*. On the 7th segment (5th setigerous, 6th if the dorsal hooks are taken into account) the uncini make their appearance. There are thus 12 thoracic segments provided with dorsal setigerous lobes and ventral uncinigerous tori.

In the abdomen, the uncinigerous pinnules only are present, and their shape becomes rather rectangular and they are without any cirriform processes.

The uncini have a rounded manubrium, five sharp, bent teeth and a very small subrostral spur. They are very like those of *Melinna palmata* (pl. ix, fig. 26).

The thoracic membrane uniting the ridges of the anterior groove across the dorsum is very low and faintly developed ; it has a smooth border.

This species differs from most known species in the number of the thoracic segments which bear setae. In most species of *Melinna* there are generally 18 thoracic setigerous segments, the 4 segments of the groove included (19, if the dorsal hooks are taken into account) ; of these there are 16 segments with dorsal setae and 14 are uncinigerous.

Melinna denticulata Moore appears to have only 17 thoracic segments; *Melinna aberrans* has 16 thoracic setigerous segments (17, hooks included) and only 12 are uncinigerous.

It differs from *M. palmata* in (1) its prostomium which is bilobed, instead of trilobed, (2) very conspicuous transverse rows of eye-spots, and (3) the ventral notch of the collar of the second segment. On the other hand in this species the ventral setae are also probably absent on the 6th segment. The fasciculate gills, the thoracic membrane with a smooth edge, the setae, uncini and dorsal hooks are similar.

Habitat.—Vizagapatam, India.

Family TERESELLIDAE Grube.

Body divided into thorax with dorsal capillary setae and uncinigerous tori and abdomen generally devoid of dorsal setae but bearing uncinigerous pinnules. Prostomium bearing filiform grooved tentacles, which cannot be retracted into the mouth. Branchiae ramose, rarely filiform or subulate, 1 to 3 pairs (or none) inserted on segments 2, 3, 4. Paleae absent. Dorsal capillary setae generally winged, with smooth or spinulose tip. Uncini avicular or pectiniform. Ventral glandular scutes in the thorax. Membranaceous tube coated with sand.

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|---|-----------------------|
| 1. Thoracic and abdominal uncini of two kinds. A single pectinate gill | <i>Terebellides</i> . |
| Thoracic and abdominal uncini not of two kinds | 2. |
| 2. Thoracic uncini all set in single rows | 3. |
| Thoracic uncini set in double rows | 4. |
| 3. Filiform gills | <i>Thelepus</i> . |
| Gills absent | <i>Polycirrus</i> . |
| 4. Dorsal setae serrated at the tip, often of two kinds. Gills ramose | <i>Terebella</i> . |
| Dorsal setae with a smooth tip | 5. |
| 5. Uncini of the first segments with a long chitinous process | <i>Pista</i> . |
| Uncini without a long chitinous process | 6. |
| 6. Pectiniform uncini set back to back | <i>Loimia</i> . |
| Uncini avicular, not back to back | 7. |
| 7. Three pairs of gills. Well developed lateral lobes on the first segments | <i>Polymnia</i> . |
| Two pairs of gills. No lateral lobes of the first segments | <i>Nicolea</i> . |

Though *Streblosoma persica* Fauvel and *Lysilla pambanensis* Fauvel have already been recorded from the Gulf of Manaar they are not represented in the present collection.

Genus **LOIMIA** Malmgren.

Seventeen thoracic bristled segments. Three pairs of arborescent gills. First segments with lateral lobes. Dorsal capillary setae winged, smooth at the end. Uncini pectinate, opposed back to back in double rows from the 7th to the 17th thoracic setigerous segments. Statocysts in the second segment.

Loimia medusa Savigny.

Loimia medusa, Malmgren 1865, p. 380, pl. xxv, fig. 80.

Loimia medusa, Fauvel 1901, p. 94, figs. 43-45 ; 1914a, p. 145, pl. vii, figs. 6-9 (Synonymy).

Loimia medusa, Saint-Joseph 1901, p. 224, pl. viii, figs. 8, 9.

Loimia annulifilis, Grube Willey, 1905, p. 301, pl. iv, figs. 153, 154.

Loimia annulifilis, Augener 1927d, p. 142.

"Investigator" St. 59, off S. coast of Ceylon, 32 fms. ; St. 168, Bay of Bengal, 105 fms. ; St. 170, Bay of Bengal, 107 fms. ; St. 344, Persian Gulf, 31 fms. ; St. 395, off Tenasserim, Burma, 50 fms. Rameswaram Beach. Pamban Bridge. Tuticorin Pearl Bank.

Var. **annulifilis** Grube.

St. 657, Andamans. Waltair, St. 1. Vizagapatam Harbour, shore collecting. Pamban, on rocks under the bridge. Ceylon Pearl Bank. Tuticorin Pearl Bank.

Specific Characters.—Buccal tentacles uniformly coloured or ringed with a purplish tinge. First pair of arborescent gills exceeding the 2nd and 3rd in size.

Two large rounded foliaceous lobes on the first and second branchial segments. Abdominal pinnules rectangular. Well-marked ventral scutes. Dorsal setae capillary, winged, smooth. Uncini pectiniform with 4-7 large curved teeth in a single row.

Loimia annulifilis is at best a mere variety of *L. medusa*, for in typical *L. medusa* banded tentacles occur as frequently as the unicoloured ones.

The development of the lateral foliaceous lobes of the first segments, the number and shape of the ventral scutes vary greatly. In the variety *annulifilis* the uncini have fewer teeth, 4-5, instead of 5-6, and a more constant and more developed tiny spur under the lower tooth. This spur is often wanting or quite obsolete in the typical form, but many intermediate specimens are often met with (see Fauvel, 1930, p. 56).

Habitat.—Red Sea, Persian Gulf, Indian, Pacific and Atlantic Oceans, English Channel (Plymouth).

Genus **POLYMNIA** Malmgren.

Generally 17 thoracic setigerous segments. Eye spots numerous. Three pairs of arborescent gills arising from a main stem. Lateral lobes in the anterior segments. Well-marked ventral scutes. Dorsal capillary setae smooth at the tips ; they commence on the 3rd gill-bearing segment. Uncini with an elongated base, a lateral spur and denticles above the main fangs ; they are set in biserial rows on a number of thoracic segments.

Polymnia nebulosa (Montagu).

Polymnia nebulosa, Fauvel 1917, p. 267, fig. 28 ; 1927a, p. 257, fig. 89 (Synonymy) ; 1930a, p. 55.

Polymnia triplicata, Willey 1905, p. 300, pl. vi, figs. 149-152.

Polymnia trigonostoma, Augener 1914, p. 80.

"Investigator" St. 629, Nicobars ; 650, Maldives ; St. 655, Fuladu Island, Maldives ; Addu Atoll, weed washings. Andamans.

Specific Characters.—Body plump, soft, very brittle : 17 thoracic setigerous segments. A raised cephalic ridge with very numerous small eye-spots. Upper lip well developed. Buccal segment collar-shaped. Oval lateral lobes on segments 2-3. Ventral scutes wrinkled.

Three pairs of gills with a subdichotomously divided large stem. Nephridial papillae from 3rd to 8th segments. Uncini with an elongated convex base, a process for a ligament, a main fang, two large teeth and 1-5 small denticles on the vertex. Tube of shell-fragments and debris

As already stated (1930, p. 55), I have compared many specimens of *P. triplicata* from the Red Sea, Persian Gulf, Madagascar, Australia, and the above noted localities, with *P. nebulosa* from the Atlantic and the English Channel and have failed to find any material differences.

Habitat.—English Channel, Atlantic Ocean, Mediterranean Sea, Red Sea, Persian Gulf, Indian and Pacific Oceans.

Genus **NICOLEA** Malmgren.

15-22 thoracic setigerous segments. Eyes present. Two pairs of ramose gills. The first segments do not show lateral lobes. Ventral scutes. Dorsal capillary setae smooth at the tips. Uncini from the second setigerous segment, they are avicular with transverse rows of denticles on the vertex and are set in uniserial alternate or semi-opposite rows on a number of thoracic segments. Tube membranous, coated with sand.

Nicolea gracilibranchis (Grube).

Nicolea gracilibranchis, Marenzeller 1884, p. 207, pl. ii, fig. 2.

Nicolea gracilibranchis, Hesse 1917, p. 173.

Nicolea gracilibranchis, Fauvel 1930a, p. 56.

Terebella gracilibranchis, Grube 1878, p. 230, pl. xii, fig. 6.

Madras, St. 1.

Specific Characters.—Two pairs of gills. 17 thoracic setigerous segments with smooth capillary setae and very projecting abdominal pinnules with uncini bidentate above the main fang. The eyes are hidden under the cephalic folds. The posterior lip is bilobed. The anterior segments do not show lateral lobes. There are 14-15 ventral scutes. On the segment before the first setigerous lies a small papilla behind the second gill. Nephridia papillae are conspicuous on the 3rd and 4th setigerous segments.

Only three small specimens, which were available, do not differ from those recorded from Tuticorin. This species is very closely allied to *Nicolea venustula* Montagu from Europe; and only differs in having the nephridial papillae as long in the female as in the male.

Habitat.—Philippine Islands, Japan, Hawaii, Gulf of Manaar, Madras.

Genus **TEREBELLA** Linne.

Dorsal capillary setae on a very large number of segments, they commence on the 4th segment (3rd gill-bearing), they are winged with a serrated tip and often of two kinds. 2 or 3 pairs of arborescent gills. Lateral lobes on the first segments absent. Ventral scutes; Uncini from the 2nd setigerous segment, set in biserial opposite rows on a large number of segments.

Terebella ehrenbergi Grube.

Terebella ehrenbergi, Grubé 1870, p. 511.

Terebella ehrenbergi, Gravier 1906, p. 213, pl. iv, figs. 224, 225.

Terebella ehrenbergi, Hessle 1917, p. 188.

Terebella ehrenbergi, Fauvel 1930a, p. 55.

Leprea ehrenbergi, Marenzeller 1884, p. 201, pl. i, fig. 3.

Andamans, Port Blair. Diamond Island, Rock Pool Reef. Kilakarai, from Coral reefs. Rameswaram, near Fisheries Bungalow. Pamban Beach, in dead Coral.

Specific Characters.—Eyes conspicuous. Three pairs of gills. 13 ventral scutes. The dorsal setae are absent in the last segments. Posterior bristles with broadly winged tips, minutely pectinate and spirally twisted. Uncini biserial with 2-3 main teeth above the fang and 2-3 rows of small denticles. Nephridial papillae long on segments 3, 6, 7 and 8, short and little conspicuous on segments 9, 10, 11 and 12.

A specimen from Pamban is small and uncoloured, but well preserved. The nephridial papilla between the 1st and 2nd pair of gills is long and erect.

These specimens are like those from Krusadai Island (Fauvel, 1930a).

Habitat.—Red Sea, Japan, Gulf of Manaar, Pamban, Andamans.

Genus **PISTA** Malmgren.

Thorax with 15-17 setigerous segments. Eyes present sometimes. One, two or three pairs of bushy gills with a stout main stem. Lateral lobes often very conspicuous on the first segments. Distinct ventral scutes. Dorsal capillary setae smooth. Uncini from the second setigerous segment, those of the first segments with a long process.

- | | |
|---|-----------------------------|
| 1. Gills forming whorled tufts | <i>P. typha</i> . |
| Gills arborescent | 2 |
| 2. Uncini of the first segments with a stout inferior shaft | 3 |
| Uncini of the first segments with a slender process | 4 |
| 3. Shaft of the uncini of the first segment very broad | . <i>P. robustiseta</i> . |
| Shaft of the uncini of the first segments more slender | . <i>P. fasciata</i> . |
| 4. Gill divisions few and very thick | <i>P. pachybranchiata</i> . |
| Gills densely ramified | . 5 |
| 5. Uncini of the first two uncinigerous segments differing from the following | <i>P. herpini</i> . |
| Uncini of the first two uncinigerous segments not unlike the following | <i>P. macrolobata</i> . |

Pista typha Grube.

(Text-fig. 36.)

Pista typha, Caullery 1915, p. 77.

Pista typha, Hessle 1917, p. 155.

Pista typha, Augener 1927a, p. 254, fig. 17.

Terebella (Pista) typha, Grube 1878, p. 232, pl. xii, fig. 4.

"Investigator" St. 274, Laccadive Sea, 1,150 fms.; St. 311, Bay of Bengal, 1,192 fms.; Sandheads, 20 fms. (Capt. R. Smyth, Aug. 1922.)

Specific Characters.—17 thoracic setigerous segments. Two pairs of unequal gills with a long stem and oval whorled tuft of filaments. Semicircular lateral lobes on the 2nd and 3rd segments. Uncini of the first segments with a long and slender basal shaft.

The specimen from St. 311, nearly complete, has two pairs of gills with a long stem bearing a dense tuft of many spirally inserted filaments; these agree very well with Grube's fig. 4, pl. xii, and are quite like those of *P. cristata* Müller. The left gill of the first pair is larger than the other three which are subequal; it is inserted well in front. The gills of the second pair are borne on the segment preceding the first setigerous, their base runs along bound to the segment and their stem is free only above the preceding segment, just behind the first pair. The fleshy lateral lobes are present on three segments, but those of the first setigerous are smaller than the others.

Rather long nephridial papillae are conspicuous on the 3rd and 4th setigerous segments, as in *P. cristata*.

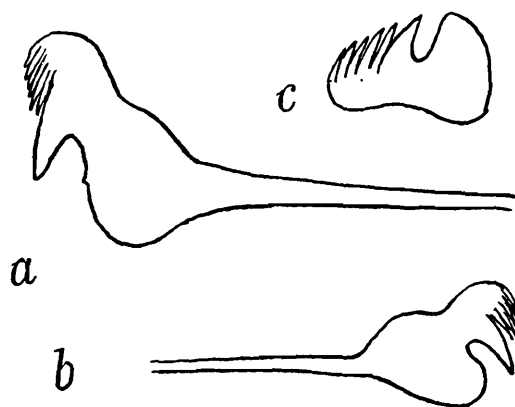


FIG. 36. *Pista typha*: a. hook from 2nd uncinigerous segment. $\times 500$; b. hook from 7th uncinigerous segment. $\times 500$; c. abdominal hook. $\times 500$.

The basal process of the uncini of the first thoracic segments is more developed than is mentioned by Caullery and rather recalls that of *P. brevibranchiata* Caullery, a species which has a different type of gills (fig. 36, a). On the other hand, Augener (1927, p. 256, fig. 17) figured anterior uncini with a still more slender and shorter basal process. In the specimens from St. 274 the uncini have a similar long slender process (fig. 36, a, b), but in the very well preserved specimen from Sandheads, which is typical in all other characters, the anterior uncini appear to lack the basal process. I am not certain whether this is owing to individual variation or the too faintly chitinised process has been dissolved by the preservatives. The uncinigerous tori are very small. As is so frequently the case in *P. cristata*, only three gills are present—both the gills of the anterior pair of which the right one is much larger than the other, and the right one of the second pair.

This species is very closely allied to the *Pista cristata* Müller of the European Seas.

Habitat.—Philippine Islands, Malayan Sea, Laccadive Sea, Bay of Bengal, Japan, South Australia.

***Pista robustiseta* Caullery**

(Text-fig. 37.)

Pista robustiseta, Caullery 1915, p. 71, fig. 1, A.

Pista robustiseta, Hesse 1917, p. 159.

"Investigator" St. 343, Gulf of Oman, 609 fms.

Specific Characters.—17 thoracic setigerous segments. Eye spots present. Two pairs of arborescent gills with a stout stem. Conspicuous lateral lobes on the first three segments.

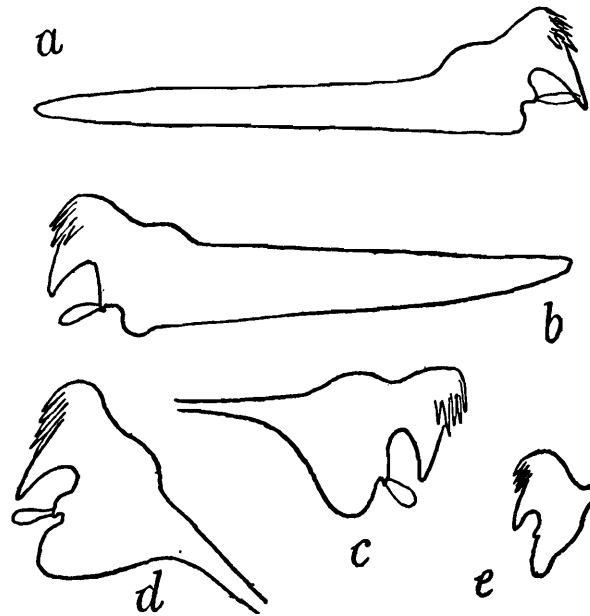


FIG. 37. *Pista robustiseta*: a, b. hooks from 1st uncinigerous segment. $\times 210$; c. hook from 3rd uncinigerous segment. $\times 210$; d. thoracic hook. $\times 210$; e. abdominal hook. $\times 210$.

Uncini of the first segments with a stout, broad and long shaft getting more slender in the succeeding ones (fig. 37). About 14-19 ventral scutes.

Both specimens agree with Hesse's description and Caullery's figures of the anterior uncini, which have a particularly stout shaft (fig. 37, a, b). The gills, borne on a short stem, have very many densely set divisions which, seen from above, appear as crowded pectinate lamellae, though they are merely branches with short divisions. The hooks recall those of *P. atypica* Hesse, but the gills are quite different.

Habitat.—Malayan Sea, Gulf of Oman, Japan.

***Pista fasciata* (Grube).**

(Text-fig. 38.)

Pista fasciata, Marenzeller 1884, p. 202, pl. i, fig. 4.

Terebella (Physelia) fasciata, Grube 1870, p. 513.

Terebella fasciata, Ehlers 1908, p. 148.

"Investigator" St. 159, Bay of Bengal, 112 fms.; St. 166, Bay of Bengal, 133 fms.; St. 168, Bay of Bengal, 105 fms.

Specific Characters.—17 thoracic setigerous segments. Two pairs of densely arborescent gills with a stout stem. Lateral lobes very large on the buccal segment which forms a ventral collar notched in the middle. Lobes of the second segment very short. 15-17 ventral scutes. Uncini of all the thoracic segments with a long, rather slender, basal process.

Though this species bears normally four branchiae, every one of the fifteen specimens from St. 159 had only three. The posterior pair was complete, but of the anterior only one was left; this is inserted well in front and nearly in the middle of the dorsum or very slightly to the right, and in one specimen somewhat to the left of the middle line. There was no trace of a scar of the missing gill. When the large anterior gill or those of the posterior

pair are missing the scar is easily detected. Very likely the anterior gills do not regenerate. In a specimen from St. 168 one of the posterior gills is very small and is clearly a regenerated

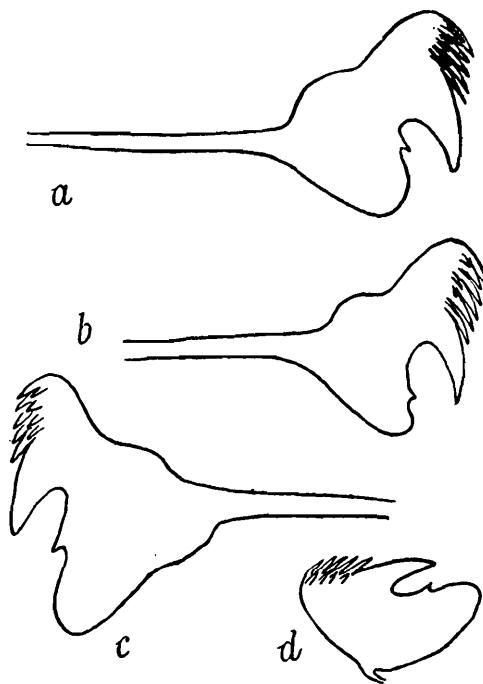


FIG. 38. *Pista fasciata*; a, hook from second uncinigerous segment. $\times 380$; b, hook from 3rd uncinigerous segment $\times 380$; c, hook from 11th uncinigerous segment. $\times 380$; d, abdominal hook. $\times 380$.

structure. The 3rd segment bears a small dorsal papilla on either side. The nephridial papillae of the 3rd and 4th segments lie above and slightly behind the foot.

This species differs from *P. robustiseta* chiefly in its anterior uncini, the process of which is much more slender (fig. 38, a-c).

Habitat.—Red Sea, Zanzibar, Algoa Bay, Japan, Bay of Bengal.

***Pista macrolobata* Hessle.**

(Text-fig. 39.)

Pista macrolobata, Hessle 1917, p. 157, pl. ii, figs. 4, 36.

Tor, Sinai Pensinsula (on coral reef), May, 1916 (*Capt. R. B. S. Sewell*.)

Specific Characters.—17 thoracic setigerous segments. Eyes absent. Two pairs of arborescent gills. Large lateral lobes on the buccal segment sheathing the head. Lateral lobes on the 3rd and 4th, none on the 2nd. 17-20 ventral scutes. All the thoracic uncini avicular, with very slender processes (fig. 39, a-c). Nephridia in 3rd, 6th and 7th segments.

This is a large species, for some of the specimens from Tor, though not quite complete, are as much as 70 mm. long and 4-5 mm. broad in the thoracic region. The ventral scutes are more or less squarish or rectangular. The first 7-8 are moreover divided into two or even three parts by longitudinal furrows.

The lobes of the buccal segment are very large and enclose the head. The second segment forms a kind of short ventral collar, without lateral lobes. The 3rd segment bears two large foliaceous lobes turned backwards. Both pairs of gills are inserted forwards in the middle of the dorsum and very close to each other. Those of the first pair have a long stem bearing dichotomously branching filaments set in a plane. Those of the second pair are smaller and in one specimen the right gill appears to be regenerated. The gills are very

unequal in size and very often one or two are missing. Both of Hesse's specimens had very small and not fully developed or regenerating gills.

The abdominal pinnules are elongated, rectangular and protruding.

The thoracic uncini are avicular, with a broad base, a main fang and several rows of numerous fine slender denticles. Those of the first two uncinigerous segments do not differ



FIG. 39.—*Pista macrolobata* : a, hook from 1st uncinigerous segment. $\times 380$; b, hook from 2nd uncinigerous segment. $\times 380$; c, hook from 15th uncinigerous segment. $\times 380$; d, abdominal hook. $\times 380$.

from the other thoracic segments (fig. 39, a-c). All of them bear only one or two very slender, soft, delicate basal processes which are rather "*soies-tendons*." These uncini are more like those of *Amphitrite* or *Lanice* than those of *Pista*, but the gills, the buccal and lateral lobes recall *Pista* (*Scione*) *maculata* Dalyell ; the anterior uncini in this later species have also a very delicate process, but this species is provided with a single pair of gills.

This species and *P. herpini* are connecting links between the species of *Pista* bearing uncini with a stout shaft, as *P. robustiseta*, *P. mirabilis*, and the other genera.

The specimens from Tor agree with Hesse's description and figures.

Habitat.—Japan, Red Sea.

***Pista herpini* Fauvel.**

Pista Herpini, Fauvel 1928, p. 160, fig. 2, a-h ; 1930a, p. 57, fig. 16, a-h.

"Investigator" St. 353, Persian Gulf, 13 fms. ; Pamban Bridge.

Specific Characters.—Body narrow, slender, elongate, slightly swollen anteriorly. 17 thoracic setigerous segments. Prostomium large, without lateral folds. Eye-spots wanting. Buccal segment expanded into two large rounded lobes encompassing the prostomium and united ventrally by a fold ending in a notched lower lip. Second segment short, with a ventral transverse ridge but without marked lateral lobes. On the third segment, two large, flattened, rounded lobes pointing forwards or bent backwards. There are no lobes on the 4th segment (1st setigerous). The 15-17 ventral shields are somewhat fused with the tori. Two pairs of branchiae, which may be either bushy or divided in a single plane ; they are often borne on a long stalk ; the first pair is the larger. No nephridial papillae could be distinguished. Pygidium with terminal anus surrounded by short papillae. Dorsal setae capillary, broadly winged at the end, with a short smooth tip. The uncini are in a single

row on the first six uncinigerous segments double-alternating in the ten following segments (from the 7th to the 16th uncinigerous, or last thoracic 17th setigerous) next in a single row. Uncini avicular, with a broad base, a small ligament, a transverse row of 3-5 teeth and 2-3 rows of small denticles above the main fang. The uncini of the first two uncinigerous segments have a long, narrow, faintly chitinated process. Tendinous processes (*soies de soutien*) in the abdominal tori, which are rectangular pinnules standing out boldly. Tube membranaceous, cylindrical, with a coating of sand, fragments of shells and algae. 10-15 mm. long, 2 mm. broad. Tentacular cirri white.

The small specimen from Pamban is from the type-locality. The basal process of the uncini of the first uncinigerous segment in this specimen is, however, more delicate and slender than in most of the type specimens, whilst the gills, lateral lobes and all other features are similar. Such variations of this process have already been noticed in other species, such as *P. typha* and *P. maculata*. When the process is still faintly chitinated, it appears to be more or less dissolved by the potash used for clearing the preparations, and is very difficult to detect in preparations mounted in glycerin or Canada balsam.

Habitat.—Gulf of Manaar, Persian Gulf.

***Pista pachybranchiata*, sp. nov.**

(Pl. IX, figs. 1-6.)

“Investigator” St. 274, Laccadive Sea, 1,150-1,170 fms., green mud.

Specific Characters.—Body cylindrical, not swollen anteriorly, abdomen very long. 17 thoracic setigerous segments. Prostomium rather small, without lateral folds. A narrow streak of very small dark eye-spots. Buccal segment expanded into two large rounded lobes encompassing the prostomium. On the third segment two rounded lobes (pl. ix, fig. 3). There are no lobes on the fourth segment (1st setigerous). 15-18 ventral scutes, first rectangular, then hexagonal. Uncinigerous tori rather short. Two pairs of gills with few branches, very thick, subulate, simple or furcate (pl. ix, figs. 1-2); the second pair is slightly smaller. Nephridial pores on 3rd, 4th and 5th setigerous segments. Uncini in a single row on the first uncinigerous segments, double alternating on the succeeding ones of the thorax. Uncini avicular with a broad base, numerous transverse rows of small teeth above the main fang. They are hardly unlike those of the first segments, and have only a very slender, faintly chitinated basal process (pl. ix, figs. 4, 6). The abdominal tori are small rectangular pinnules. Dorsal setae capillary, long, slender, with a single wing looking finely serrated under a high magnification. Pygidium? Tube? 100-120 mm. long, 4-5 mm. broad, feet not included, 6-6.5 mm. setae included.

This new species was collected with *Pista typha* and *Terebellides stroemi*. Only four anterior fragments and several long abdominal bits were available.

The cephalic collar is not well developed and is not provided with lateral lobes, as in some species. Behind there are numerous, small black eyes arranged in a narrow band near the base of a deep fold. Two large scollop-shaped lateral lobes encompass the prostomium and the mouth. They are unfortunately like those of the 3rd segment, soft and swollen and their exact connections with the buccal and 2nd segment cannot be described accurately (pl. ix, fig. 3). The 4th segment, the first setigerous, does not bear any lateral

lobes. Above the range of feet, on either side of the dorsum, lies a broad longitudinal, whitish, chalky streak (as is often present in *Lanice conchilega*) bearing nephridial pores in the 3rd, 4th and 5th setigerous segments.

The gills supply the most characteristic feature of the species. There are two pairs of them, differing little in size, and very thick. The stout stem bears only a small number, 4, 5, 6, 7, of thick, finger-like, hardly subulate, simple or forked branches, all of them arising on one side of the main stem; their disposition is sympodic rather than dichotomous. The gills of the first pair lie close to each other on the middle of the back, those of the second pair are farther apart (pl. ix, figs. 1, 2). These massive and little ramified branchiae recall those of *Amphitrite alcicornis* Fauvel. As in the latter species, the dorsal thoracic setae are long and slender, with a narrow wing on one side. They appear smooth, but, when examined under a high magnification, the wing appears very finely serrated near the tip.

The uncini with a broad base and a high vertex bearing numerous long and slender denticles above the main fang, are very similar to the hooks of *Amphitrite*. Their shape is also very like that of the uncini of *Pista macrolobata* Hesse and, as in the latter species, those of the first thoracic segments are provided with a very slender, faintly chitinated process resembling the ligament (*soie-tendon*) which is so commonly found in the Terebellids (pl. ix, figs. 4, 6).

The anterior uncini do not agree with those of most species of the genus *Pista*, which are provided with the long, stout, basal process, or shaft, and which is regarded as one of the most important features of the genus.

As mentioned above, the genus shows a tendency in a descending series of forms having the uncini with a huge chitinous shaft as in *Pista robustiseta* and *P. mirabilis*, those with an already less developed process as in *P. cretacea*, *P. typha*, *P. fasciata*, the process becoming more and more slender and reduced as in *P. herpini*, *P. cristata*, *P. maculata* and lastly the hardly different form of a mere "*soie-tendon*" as in *P. macrolobata* and *P. pachybranchiata*.

Nevertheless the attribution of *P. pachybranchiata* to the genus *Pista* must remain somewhat doubtful.

In spite of its smooth-tipped (?) setae and its large lateral lobes, the shape of its uncini and the presence of only two pairs of gills distinguish it from the genus *Polymnia*. *Nicolea* generally has only two pairs of gills, but most of the species lack lateral lobes; their uncini are unlike and they are moreover characterised by the long erect nephridial papillae on the 6th and 7th segments. *P. pachybranchiata*, as already mentioned, has, however, many features in common with *Amphitrite alcicornis* Fauvel (1914 b, p. 295, pl. xxvii, figs. 1-12). The gills with short, thick and few branches, and the uncini, are very similar. The dorsal capillary setae are long, slender, single winged and very faintly serrate at the tips; the lateral lobes of the anterior segments are similarly well developed. *P. pachybranchiata*, like *A. alcicornis* and *A. cirrata* var. *profunda*, is a deep-sea form and, as I have already remarked on the influence of great depth in the case of several species, exhibits the reduction and thickening of the gills. *A. alcicornis* is provided with three pairs of gills, as are all other species of the genus *Amphitrite*, though the third pair is very small. If the characters of the number of gills and the setae smooth at the tips were not considered the new species could perhaps be ascribed to the genus *Amphitrite* rather than to *Pista*.

Habitat.—Laccadive Sea.

Genus **THELEPUS** Leuckart.

Dorsal setae on a large number of segments. Two or three pairs of filiform gills in a transverse series. Numerous eye-spots. No lateral lobes at the first segments. Uncini commence on the third setigerous segment; they are always in a single row.

- | | |
|---|--------------------------|
| 1. Two pairs of gills | <i>Th. cincinnatus</i> . |
| Three pairs of gills | 2 |
| 2. Abdomen tapering, pinnules square and projecting | <i>Th. setosus</i> . |
| Abdomen smooth, swollen, abruptly decreasing; pinnules small, lacking in the posterior part of the tail | <i>Th. plagiostoma</i> . |

Th. setosus, though a cosmopolitan species is not represented in the collection.

Thelepus plagiostoma Schmarda.

Thelepus plagiostoma, Augener 1914, p. 95 (Synonymy); 1926a, p. 239.

Thelepus plagiostoma, Fauvel 1919, p. 455, fig. 10.

Thelepus rugosus, Ehlers 1901, p. 211; 1904, p. 59; 1908, p. 146.

Thelepus japonicus, Marenzeller 1884, p. 12, pl. ii, fig. 4.

Telepus crispus, Johnson 1901, p. 428, pl. xvii, figs. 175-179.

Malacca Strait (*Col. Alcock*).

Specific Characters.—Three pairs of filiform gills. Posterior part of the body generally swollen, but abruptly tapering to the pygidium. Dorsal setae nearly to the end of the body. Posterior segments very short, densely crowded, nearly smooth and lacking uncini. Abdominal pinnules small, not projecting. Uncini with a transverse row of two teeth above the main fang and a basal knob.

The single specimen was labelled *Neottis robusta*, but it agrees closely with the descriptions of *Th. plagiostoma*. It is a large individual broken into two fragments. The posterior part is somewhat swollen and then tapers into a short, nearly smooth cone, the numerous short and densely crowded small segments of which cannot be accurately counted. The abdominal pinnules are small and do not protrude as in *Th. setosus*. They appear to be missing in the last segments. The dorsal capillary setae are missing only on about the last ten uncinigerous segments. The hardly characteristic uncini bear a pair of teeth and a median one above the main fang.

I agree with Augener in considering this species distinct from *T. spectabilis* Verrill.

Habitat.—Indian Ocean, Australia, New Zealand, Chili, California, Japan.

Thelepus cincinnatus (Fabricius).

(Text-fig. 40.)

Thelepus cincinnatus, Fauvel 1927a, p. 271, fig. 95, i-m (Synonymy).

Thelepus cincinnatus, Hessle 1917, p. 212.

Andamans, Port Blair, St. B-14.

Specific Characters.—Two pairs of filiform gills. Abdomen long, gradually tapering, often coiled. Eye-spots numerous. Ventral scutes indistinct. Dorsal setae sometimes nearly to the end of the body. Abdominal pinnules rectangular, protruding. The specimen from Port Blair closely agrees with European specimens. The uncini have, above the main

fang, a transverse row of two rather large teeth, a median tooth and often two small denticles (fig. 40, *a-d*). The basal knob is less enlarged at the tip, but in specimens from the Monaco

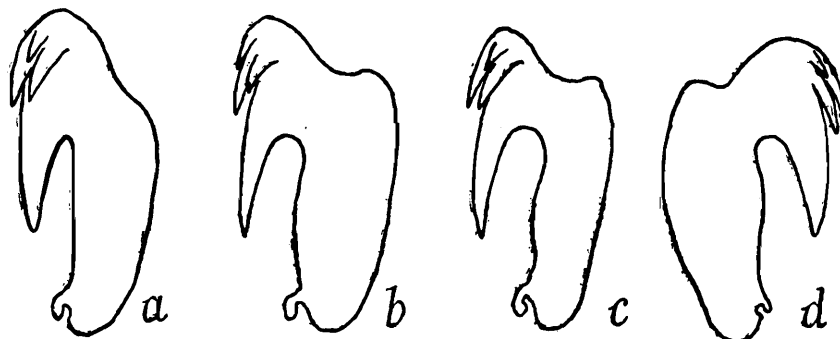


FIG. 40.—*Thelepus cincinnatus*; *a-d*. four hooks, side and slightly oblique view. $\times 500$.

Harbour I observed a great deal of variation in the shape of the knob and of the notch behind it; some of the uncini were similar to those of the Andaman specimen.

Habitat.—Atlantic Ocean, Mediterranean Sea, Japan, Andamans.

Genus **POLYCIRRUS** Grube.

Branchiae absent. Capillary setae smooth or serrated. Number of thoracic segments very variable. Uncini elongated toothed plates, all alike or of two kinds. Ventral scutes. Eyes absent. Tentacular cirri very numerous. Nephridia well developed. Circulatory apparatus absent.

Polycirrus sp.

Krusadai Island.

This small *Polycirrus* having smooth setae is not *P. coccineus*, but it cannot be identified as the nephridia cannot be accurately counted. The number of bristled segment varies with age and size.

Genus **TEREBELLIDES** Sars.

Cephalic lobe rounded-ovate, a dense series of grooved tentacles. A single gill with four pectinate divisions. Dorsal setae long, tapering and winged. Uncini uniserial, of two kinds: (1) elongated, acicular thoracic, and (2) pectiniform abdominal.

Terebellides stroemi Sars.

Terebellides stroemi, Malmgren 1865, p. 396, pl. xx, fig. 48.

Terebellides stroemi, Fauvel 1927a, p. 291, fig. 100, i-q (Synonymy); 1930b, p. 554.

Terebellides stroemi, Augener 1926, p. 343; 1927, p. 258.

Terebellides ypsilon, Grube 1878, p. 241, pl. xiii, fig. 6.

Terebellides intoshi, Caullery 1915, p. 111, fig. 1.

Aponobranchus perrieri, Gravier, 1906, p. 232, pl. v, figs. 239-242.

“Investigator” St. 86, Ganjam Coast, 26 fms.; St. 233, Andaman Sea, 185 fms.; St. 274, Laccadive Sea, 1,150 fms.; St. 280, Bay of Bengal, 446 fms.; St. 379, off Akyab, Burma, 250 fms. Madras Coast, 5-10 fms. Andamans. North Andaman.

Specific Characters.—Body rather short, 50-60 segments. 18 thoracic setigerous segments. Eyes absent. A single gill with a stout stem bearing 4 pectinate lobes with reniform lamellae. It is inserted on segments 3-4. Segment 3 to 6 have, ventrally, a free anterior border. Dorsal setae commence on the third segment. Uncini of the 6th setigerous

segment are long, acicular, kneed, unidentate hooks, those of the next 12 segments end in blunt tips with small denticles above. Abdominal uncini avicular, with a short base and transverse rows of teeth above the main fang. Abdominal pinnules distinct.

The peculiar gill of *Terebellides stroemi* assumes very different appearances, according to the more or less contracted condition of the organ depending on preservation. Soft specimens are often misleading and one or more of the four branchial lobes are sometimes missing as is the case with the very contracted specimens from Madras and which closely resemble those of *T. ypsilon* Grube. Those from the Andamans, St. 280, have four long, well apart, branchial divisions, like those of *T. intoshi* Caullery, which appears to be a mere variety of *T. stroemi*.

In specimens from Bohuslan (Sweden) and from Spitzbergen, I observed similar variations in the shape of the gill.

Habitat.—Atlantic Ocean, Mediterranean Sea, Indian and Pacific Ocean, Arctic and Subantarctic Seas.

Family SABELLIDÆ Malmgren.

Body somewhat cylindrical or slightly flattened, divided into two regions: (1) thoracic consisting of a few segments, with dorsal capillary setae and ventral uncinigerous tori, and (2) abdominal, much longer, with dorsal uncinigerous tori and ventral capillary setae. Ventral glandular shields divided by a longitudinal groove. First segment with a more or less developed, entire or notched collar. Gills forming a funnel surrounding the mouth; they are composed of two semi-circular, or spiral lobes bearing a number of filaments or radioles, with two rows of barbules. *Operculum absent*. *Tube formed of mucous, or membranaceous or horny*.

Sabella porifera Grube, recorded from Rameswaram (Fauvel, 1930a, p. 60), is not represented in the collection.

- | | |
|---|------------------------|
| 1. Thoracic tori with a single row of avicular hooks, pickaxe-shaped setae absent | 2 |
| Thoracic tori with a row of avicular hooks and a row of pickaxe-shaped setae | 3 |
| 2. Gill-filaments with dorsal stylodes | <i>Dasychone</i> . |
| Gill-filaments without dorsal stylodes | <i>Sabellastarte</i> . |
| 3. Gill-filaments with subterminal eyes | <i>Branchiomma</i> . |
| Gill-filaments without subterminal eyes | 4 |
| 4. Dorsal thoracic setae of one kind only | <i>Sabella</i> . |
| Dorsal thoracic setae of two kinds | 5 |
| 5. Setae of the first thoracic setigerous segment set in a tuft | <i>Potamilla</i> . |
| Setae of the first thoracic setigerous segment set in slanting rows | <i>Hypsicomus</i> . |

Genus **DASYCHONE** Sars.

(*sensu auct.* BRANCHIOMMA Johansson.)

Body short. Both branchial lobes equal. Dorsal stylodes on the branchial filaments which also bear paired eye-spots. Subterminal eyes absent. A collar. Pickaxe-shaped setae absent. Abdominal dorsal uncini avicular and ventral setae winged.

- | | |
|--|-----------------------------|
| Dorsal stylodes long, narrow and free | . . . <i>D. cingulata</i> . |
| Dorsal stylodes small, short, appressed, hardly raised | <i>D. serratibranchis</i> . |

Dasychone cingulata Grube.

Dasychone cingulata, Willey 1905, p. 308, pl. vii, figs. 170-173.

Dasychone cingulata, Augener 1914, p. 122 (Synonymy).

Dasychone cingulata, Fauvel 1930b, p. 62.

Branchiomma cingulata, Johansson 1927, p. 61.

Madras St. 1. St. 7. Pamban, from coral reefs. Andamans. Burma Coast. Great Coco Island (Col. Alcock). Mergui Archipelago. Ain Musa, Gulf of Suez. Koweit Harbour, Persian Gulf. From ship's condenser, Marine Survey. Addu Atoll, weed washings.

Specific Characters.—Branchial lobes equal, semi-circular, not spiral. Gill-filaments with paired dorsal, long and slender stylodes and pairs of small eyes. Lateral eye-spots between dorsal and ventral rami. Body with dark scattered spots.

This very widely distributed species of the warm seas is very variable. The specimens obtained from the ship's condenser still retain their characteristic markings and are typical. Others are more or less discoloured in alcohol. Most of them have long slender dorsal stylodes.

Habitat.—Red Sea ; Persian Gulf ; Indian Ocean ; Pacific.

Dasychone serratibranchis Grube.

Dasychone serratibranchis, Grube 1878, p. 262, pl. xiv, fig. 7.

Dasychone serratibranchis, Ehlers 1907, p. 28.

Dasychone serratibranchis, Augener 1926a, p. 257.

Pamban, under the bridge.

Specific Characters.—Branchial lobes equal, semi-circular, not spiral. Dorsal stylodes short, appressed, appearing as small triangular serrations of the branchial filaments. A few paired branchial eye-spots.

The single small specimen agrees well with Grube's description, only the dorsal pairs of stylodes are fewer, but their form resembles that of the species. The gills still bear white, yellow and purple bands.

I cannot agree with Augener who considers *D. odhneri* Fauvel as synonymous with *D. serratibranchis*; the latter species has semi-circular gills and sharp stylodes, whilst the former has spiral gills and obsolete stylodes. Johansson also considers the two species as distinct.

Habitat.—Philippine Islands ; India ; New Zealand ; Australia.

Genus **BRANCHIOMMA** K  lliker.

(MEGALOMMA Johansson.)

Body elongated. Branchial lobes symmetrical, semicircular, not spiral. Branchial filaments destitute of dorsal stylodes. Subterminal compound eyes. A two or four lobed collar. Capillary setae winged. In the thorax, avicular uncini and pickaxe-shaped setae. Tube coated with sand.

Collar low and very slanting. A double fold overlying the eye near
the tip of the gills *B. intermedium*.

Collar high, hardly slanting. Tip of the gills without any fold *B. pacificum*.

Branchiomma pacificum Johansson.

Branchiomma pacificum, Johansson 1927, p. 130, fig. 15.

"Investigator" The Moscas Islands.

Specific Characters.—Eight thoracic setigerous segments with short, elongated, narrow winged dorsal setae, avicular uncini with a rather long base and pickaxe-shaped setae. Abdominal capillary setae slightly broader than in the thorax but not paleae-like. Collar hardly slanting, dorsal lobes rather low, ventral lobes higher with two lateral and a median deep notches. Subterminal eyes very large, encircling about half of the filament and appearing as double eyes.

The single specimen agrees with Johansson's description as regards the collar, the setae and the eyes. But every gill filament is not provided with eyes. Some eyes are very large, looking like a close set pair half circling the filament but others vary greatly in size. The branchial filaments are more numerous than in Johansson's type specimens.

Habitat.—Gilbert Islands, Pacific, Moscas Islands.

Branchiomma intermedium Beddard.

Branchiomma intermedium, Beddard 1887, p. 261, pl. xxi, figs. 4-7.

"Investigator" St. 593, Paway Island, Bay of Bengal, coral reefs, shore collecting.

Specific Characters.—8 thoracic setigerous segments with long and short narrow winged dorsal setae, avicular uncini and pickaxe-shaped setae. Abdominal capillary setae hardly broader, not enlarged into paleae-like structures. Collar very low and slanting to 3rd setigerous segment. Branchial lobes borne on long stalks marked with a dark stripe. Gill-filaments with a single subterminal eye. Towards the extremity there is a double fold, just overlying the eye.

The tube of the single specimen was not preserved. According to Beddard it is of considerable thickness and is coated with mud and broken shells.

The low slanting collar with only a median ventral notch, the elongated bases of the branchial lobes, still showing a dark transverse band, the peculiar double, transparent folds overlying the eyes and the setae agree closely with Beddard's description.

On the other hand, it shows a peculiar likeness to Pruvot's *Sabella nudicollis* (1930, p. 82, pl. ii, figs. 33-38) in regards to the collar, the gill-stalks and the setae; but Pruvot was unable to detect any trace of branchial eyes. His only specimen was very soft and macerated, and the eyes may have fallen off, as is often the case (?). I have elsewhere given reasons why I adopt the usual name *Branchiomma*, instead of the new one *Megalomma* suggested by Johansson.

Habitat.—Mergui Archipelago.

Genus SABELLASTARTE Krøyer.

Branchial lobes symmetrical. Branchial filaments destitute of dorsal stylodes. Capillary setae winged, not paleae-like. In the torax, only ventral avicular uncini; pickaxe-shaped setae absent. In the abdominal region dorsal avicular uncini and ventral capillary setae.

Sabellastarte indica Savigny.

Sabellastarte indica, Augener 1914, p. 115, pl. i, fig. 20 (Synonymy).

Sabellastarte indica, Fauvel 1919, p. 461.

Sabellastarte indica, Pruvot 1930, p. 85, pl. ii, figs. 39-50.

Sabellastarte indica, Johansson 1927, p. 154.

Eurato notata, Willey 1905, p. 310, pl. vii, figs. 174-175.

Eurato sancti-josephi, Gravier 1903, p. 105, pl. vii, figs. 281-283 ; pl. viii, figs. 284, 285.

Sabella pottaei, Quatrefages 1865, p. 436.

“ Investigator ” St. 503, Mergui Archipelago ; St. 592, Elephant, Druid and Bedford Rocks, shore collecting ; St. 593, Paway Island, coral reefs, shore collecting ; St. 659, Rutland Island, Andamans. Manora Shoal, Karachi ; Ye, Burma Coast ; Akyab, Prythaw Harbour, from surf line ; Andamans (*J. Wood-Mason*) ; Madras.

Specific Characters.—Body large, stout, often of a dark violet colour. About 8 thoracic segments with dorsal capillary setae, all similar, with a narrow wing, and ventral avicular uncini ; pickaxe-shaped setae absent. Abdominal ventral setae with a broader wing. Collar well developed, with two dorsal lobes and a ventral lobe ending in two processes. Gill-filaments numerous and densely crowded, eyeless and without dorsal stylodes. It differs from *Sabella* chiefly in the absence of pickaxe-shaped bristles in the ventral thoracic tori and by its very numerous and thickly crowded gill-filaments which look as set on two concentric rings in contracted specimens.

De Saint-Joseph misled by this appearance, created a new genus *Eurato* for the species the branchial filaments of which were set in a normal fashion. Later Augener and other authors cleared the synonymy of this widespread and somewhat variable species. Pruvot described and figured it anew from numerous specimens from New Caledonia.

Several specimens from Mergui and from the Andamans and Madras are very large, up to 90 and 120 mm., and still retain a dark violet colour, or are grey with scattered dark spots. The tube recalls that of *Bispira volutacornis* (Montagu).

Habitat.—Red Sea ; Indian Ocean ; Japan ; Pacific Australia ; New Caledonia.

Genus **HYPSICOMUS** Grube.

Body long and slender. Branchial lobes symmetrical. Gill-filaments with rows of dorsal eyes. Dorsal stylodes absent. A collar. Capillary setae of the first thoracic segment set in a slanting row. Thoracic dorsal setae of two kinds ; (i) capillary, and (ii) paleae-like. Ventral avicular uncini and pickaxe-shaped setae. In the abdomen, dorsal avicular uncini, ventral capillary setae and paleae.

Hypsicomus phaeotaenia Schmarda.

Hypsicomus phaeotaenia, Gravier 1908, p. 84, pl. vi, figs. 255-259.

Hypsicomus phaeotaenia, Fauvel 1919, p. 460, 1927a, p. 312, fig. 108. a-1 (Synonymy).

Hypsicomus pigmentatus, Gravier 1908, p. 81, pl. vi, figs. 252-254.

Hypsicomus marenzelleri, Gravier 1908, p. 78, pl. vi, figs. 247-251.

“ Investigator ” St. 650, Fehendu, Maldives ; St. 703, Nankauri Harbour, amongst corals ; Mergui Archipelago ; Great Coco Island (*Col. Alcock*) ; Kilakarai, from coral reefs ; Pamban, from coral reefs.

Specific Characters.—Branchial lobes borne on a long stalk. Gill-filaments bearing on their rachis two longitudinal rows of simple eye-spots, single or in more or less numerous

groups. Collar low and straight, entire or notched. Short setae of the first setigerous segment set in a sigmoid row. Paleae spoon-shaped with a rounded winged end, with or without a sharp tip. Colour very variable.

In the specimen from Kilakarai the gills are banded with transverse brown stripes. In a small, hard specimen from Nankauri, the branchial eye-spots are disposed as in Gravier's fig. 256, pl. vi.

Habitat.—Red Sea, Persian Gulf, Indian Ocean, Japan, Australia, Atlantic Ocean, Mediterranean.

Genus **POTAMILLA** Malmgren.

Branchial lobes symmetrical. Gill-filaments with or without eyes, without dorsal stylodes. Setae of the first setigerous segment in a tuft. Dorsal thoracic setae of two kinds: capillary and paleae; ventral uncini and pickaxe-shaped setae. In the abdomen, dorsal avicular uncini and ventral winged setae. Tube horny.

- | | |
|---|-------------------------|
| 1. Gill-filaments without eyes | 2 |
| Gill-filaments with eyes | <i>P. ehlersi</i> . |
| 2. Abdominal setae narrow, with a very long and slender tip | <i>P. leptochaeta</i> . |
| Abdominal setae spatulate, with unequal wings and a shorter tip | <i>P. ceylonica</i> . |

Potamilla ceylonica Augener, recorded from Ceylon and Krusadai, is not represented in the collection.

Potamilla ehlersi Gravier.

Potamilla ehlersi, Gravier 1908, p. 87, pl. vi, figs. 60-64.

Potamilla ehlersi, Fauvel 1911, p. 423; 1930a, p. 62.

Potamilla oligophthalmos, Augener 1914, p. 109.

Koweit Harbour, between tide marks.

Specific Characters.—A number of gill-filaments bearing one to 4-7 large dorsal eyes set in a longitudinal row. Collar well developed, with four lobes. Straight, narrow winged dorsal setae and paddle-shaped paleae with a slender tip. Abdominal setae with unequal wings and a very long and slender tip.

There is only a small specimen with 20 thoracic segments, 8-9 gill-filaments on each side, bearing 4-7 large eyes; pickaxe-shaped setae with rather short tips. The specimen agrees with Gravier's description.

Habitat.—Red Sea, Persian Gulf, Gulf of Manaar, Australia (?).

Potamilla leptochaeta Southern.

Potamilla leptochaeta, Southern 1921, p. 651, pl. xxxi, fig. 28.

Calcutta, creek near Chingrighatta, Dec. 31, 1914; Vizagapatam, bottom of channel and small creek near the ferry, at low water.

Specific Characters.—Thoracic segments few, 6-7. 8-11 gill-filaments destitute of eyes. Collar sloping backwards, deeply notched and bilobed ventrally. Thoracic and abdominal capillary setae with elongate narrow wings and very long filiform tips. Thoracic spatulate setae pear-shaped blades with finely pointed tips. Pickaxe setae with long slender tips.

From Chingrighatta there are large numbers of small, slender tubes densely enclosed in a lump of very fine black mud. They were collected in water of low salinity (D.=1,0050 at 19.8°C.). The specimens are about 10-12 mm. long and 0.5 mm. broad. Many are females filled with large eggs.

The number of gill-filaments (radioles) varies from 8 to 11, but 9 and 11 are most frequent. The collar is very slanting.

In specimens cleared in lactic acid and glycerin I was unable to detect any statocysts.

As stated by Southern "the most remarkable feature about the setae of this species is the great length and extreme slenderness of the tips of the capillary setae." Otherwise it comes very near *P. ceylonica* Augener, a recently described eyeless species living in sea-water. *P. leptochaeta* is a brackish water species, and this may account for the differences in the setae.

Habitat.—Port Canning, lower Bengal, Vizagapatam, Chingrighatta, near Calcutta.

Family SERPULIDÆ Burmeister.

Body divided into two regions: (1) thoracic consisting of a few segments bearing dorsal capillary setae and ventral uncinigerous tori, (2) abdominal, which is much longer, and has dorsal uncinigerous tori and ventral capillary setae. Ventral glandular shields divided by a longitudinal shallow groove. First segment with a more or less developed collar. *A thoracic membrane*. Gills forming a funnel surrounding the mouth and composed of two semi-circular or spiral lobes bearing a number of filaments or radioles with two rows of barbules. *Usually an operculum. Tube calcareous.*

- | | | |
|--|----|--------------------------|
| 1. Body symmetrical | 2 | |
| Body asymmetrical. Calcareous spirally coiled tube | | <i>Spirorbis</i> . |
| 2. Opercular stalk smooth or winged | 3 | |
| Operculum absent, or 1-2 opercula with stalk-bearing barbules | 13 | |
| 3. First thoracic segment with only dorsal (collar) setae | 4 | |
| First thoracic segment without either dorsal (collar) setae or uncini | | <i>Ditrupe</i> . |
| 4. Collar setae bayonet-shaped, with two conical processes at the base | 5 | |
| Collar setae without basal conical processes | 6 | |
| 5. Operculum simple, funnel-shaped | | <i>Serpula</i> . |
| Operculum compound, with a central crown of spines | | <i>Hydroides</i> . |
| 6. Abdominal setae geniculate | 7 | |
| Abdominal setae trumpet-shaped, opercular stalk winged | 10 | |
| 7. Collar setae bayonet-shaped or deeply serrated | 8 | |
| Collar setae simple blades | | <i>Vermiliopsis</i> . |
| 8. Collar setae serrated | 9 | |
| Collar setae bayonet-shaped, covered with fine hair-like processes | | <i>Omphalopomopsis</i> . |
| 9. Operculum fig-shaped, smooth | | <i>Ficopomatus</i> . |
| Operculum crowned with rows of horny spines | | <i>Mercierella</i> . |
| 10. Collar setae very small and fine | 11 | |
| Collar setae bayonet-shaped and covered with fine hair-like processes | 12 | |
| 11. Operculum flat, with winged pedicle | | <i>Pomatoleios</i> . |
| Operculum conical or bearing processes. Pedicle winged and fringed | | <i>Pomatoceros</i> . |

- | | |
|---|------------------------|
| 12. Operculum with several horny discs or a spinulose cone . | <i>Pomatostegus</i> . |
| Operculum bearing generally a group of branched spines | <i>Spirobranchus</i> . |
| 13. Tubes very slender, filiform, colonial, Collar setae serrated | 14 |
| Tubes large, not colonial. Collar setae winged . | 15 |
| 14. Operculum spoon-like, at the end of a branchial filament | <i>Filograna</i> . |
| Operculum absent | <i>Salmacina</i> . |
| 15. Operculum globular | <i>Apomatus</i> . |
| No operculum . | <i>Protula</i> . |

Genus **SERPULA** Linné.

Collar setae bayonet-shaped, with two conical processes at the base of the blade. Operculum funnel-shaped with numerous radii ending in serrations along the margin. Uncini with only few stout teeth. Thoracic setae winged, abdominal setae trumpet-shaped.

Serpula vermicularis Linné.

Serpula vermicularis, Fauvel 1927a, p. 351, fig. 120 (Synonymy).

Serpula vermicularis, Pixell 1913, p. 71.

"Investigator" St. 246, Persian Gulf, 31 fms. Moscos Island. Pulao Bidang. Madras, St. 2. Santapalli, Madras Presy. "Golden Crown." Orissa Coast, 20 fms., "Golden Crown".

Specific Characters.—Collar setae with two large conical blunt processes at the base. Uncini with 4-7 teeth, the lower one more stout and blunt. Tube very variable, cylindrical, wrinkled, with 5-7 longitudinal ridges, smooth, or serrated, or echinulate, rather bell-shaped at the mouth. It is more or less crooked, and generally of a red or pink colour, more rarely white.

The tubes of two specimens from the Orissa Coast are thick, wrinkled, ridged, but uncoloured. The animals are typical, as also are the numerous specimens from Pulao Biddang, which are in a very good state of preservation but are without their tubes.

S. vermicularis has already been recorded from the Persian Gulf (Fauvel 1911, p. 426).

Habitat.—Atlantic Ocean, English Channel, Mediterranean Sea, Red Sea, Persian Gulf, Indian Ocean, Kerguelen, Magellan Strs.

Genus **HYDROIDES** Gunnerus.

Collar setae bayonet-shaped, with two conical processes at the base of the blade. Uncini with a few coarse teeth, the lower one larger than the others. Thoracic setae winged, abdominal setae trumpet-shaped. *Operculum funnel-shaped, with a crown of horny spines arising from the centre.*

- | | |
|---|-------------------------|
| 1. All opercular spines alike | 2 |
| Opercular spines of two kinds | 3 |
| 2. More than one pair of lateral processes. Tips of the spines sharp | <i>H. norvegica</i> . |
| One pair of lateral processes only. Tips of the spines half-moon-shaped | <i>H. lunulifera</i> . |
| 3. Only one spine without lateral processes, large and hooked | <i>H. heteroceros</i> . |
| Only one very large spine with a lateral hook on either side | <i>H. monoceros</i> . |

Hydroides monoceros Gravier was recorded from Rameswaram in the "Littoral Fauna of Krusadai Island" (1930a, p. 63).

Hydroides norvegica Gunnerus.

Hydroides norvegica, Fauvel 1911, p. 427, pl. xxi, figs. 55-58; 1927a, p. 356, fig. 122, *i-o* (Synonymy).

Hydroides norvegica, Pixell 1913, p. 74.

Hydroides multispinosa, Marenzeller 1884, p. 216, pl. iv, fig. 2.

Hydroides multispinosa, Augener 1914, p. 139.

Eupomatus elegans, Haswell 1883b, p. 633, pl. xii, fig. 1; 1885, p. 660, pl. xxxi, figs. 11, 12; pl. xxxii, fig. 11; pl. xxxiii, figs. 1-6.

Madras St. 1, 2, 7, 10, 11, 12.

Specific Characters.—Radii of the operculum forming rounded lobes on the edge of the funnel, spines of the central crown equal with several sharp lateral processes. Tubes white, cylindrical, faintly wrinkled and more or less erect or spirally coiled.

There are numerous specimens from Madras St. 1. Their milk-white tubes are cylindrical, wrinkled and faintly coiled. Those from St. 2 are coiled or erect, mixed up with young *Serpula*. Others are entangled amongst Hydroids or fixed to an Ascidian.

The collar setae of this small *Hydroides* have several small spines at the base, below the conical processes, which are not very large. They agree with those of specimens from the Persian Gulf (Fauvel 1911, pl. xxi, figs. 57, 58), but such spinous setae are also very often met with on young European specimens of *H. norvegica* and even of *Serpula vermicularis*.

H. multispinosa Marenzeller does not differ materially from *H. norvegica*.

Habitat.—Atlantic; English Channel; Mediterranean; Red Sea; Persian Gulf; Indian Ocean.

Hydroides lunulifera (Claparède).

Hydroides lunulifera, Rioja, 1923, p. 86, fig. 144.

Hydroides lunulifera, Fauvel 1927, p. 358, fig. 122, *p-s*.

Hydroides lunulifera, Potts 1928, p. 701.

Eupomatus lunulifera, Claparède 1868, p. 441, pl. xxxi, fig. 3.

Madras St. 1, 12.

Specific Characters.—Radii of the operculum forming sharp lobes on the edge of the funnel, spines of the central crown equal with flattened half-moon or anchor-shaped tips. Tubes slender, white, cylindrical, more or less coiled.

A few specimens were found amongst the tubes of *H. norvegica*, as is very often the case with the Mediterranean specimens.

As far as my information goes, it is the first record of this species in the Indian Ocean.

Habitat.—Mediterranean Sea, Madras, Suez Canal.

Hydroides heteroceros (Grube).

Hydroides heteroceros, Fauvel 1911, p. 428.

Hydroides heteroceros, Pixell 1913, p. 75, pl. viii, fig. 2.

Hydroides uncinata (non Philippi), Gravier 1908, p. 114, pl. viii, figs. 286-287.

Eupomatus heteroceros, Willey 1905, p. 313.

Eupomatus heteroceros, Grube 1868, p. 639, pl. vii, fig. 8.

Koweit Harbour, between tide marks.

Specific Characters.—Radii of the operculum with a terminal knob. Seven spines in the central crown, six are long, bent at the tip and with lateral hooks, the seventh is much larger, bent, alpenstock-shaped and destitute of lateral processes.

It agrees with Pixell's description and figures and with specimens from the Persian Gulf.

Habitat.—Red Sea ; Persian Gulf ; Zanzibar ; Ceylon.

Genus **POMATOLEIOS** Pixell.

“ Collar setae and eye-spots absent. Uncini with fairly numerous teeth, the most anterior being larger and gouged underneath. Abdominal setae trumpet-shaped with one side produced into a long spine. Operculum flat with winged pedicle. Tube with a flap over the entrance ” (Pixell).

Pomatoleios crosslandi Pixell.

Pomatoleios crosslandi, Pixell 1913, p. 85, pl. ix, fig. 10.

Madras, St. 6.

Specific Characters.—“ All thoracic setae simple striated blades. Uncini with 10 or 11 teeth in both thorax and abdomen. Branchiae with very high inter-branchial membrane and long bare terminal filaments.” (Pixell).

The operculum of the Madras specimen is tipped with a hollow calcareous cup destitute of spines. The pedicle has thick lateral wings with straight edges, as in Pixell's fig. 10, *a*, pl. ix.

Both Pixell and I have not been able to detect any collar setae.

The tube, fixed on an Ascidian partly covered by a Molluscan spawn, is crooked, cylindrical, wrinkled, without the flap over the entrance mentioned by Crossland, but not as described by Pixell, who did not have any tubes for examination. It is not easy to conceive such a flap on a calcareous tube and it is a pity it was not more fully described by Crossland. But for this peculiarity and the constant (?) absence of collar setae, this genus might be combined with *Pomatoceros*, as has already been suggested by Pixell.

Habitat.—Red Sea ; Madras.

Genus **SPIROBRANCHUS** Blainville.

Operculum with a calcareous plate generally bearing a group of branched spines. Pedicle with broad lateral wings. Collar setae bayonet-shaped and covered with fine hair-like processes. Abdominal setae trumpet-shaped, the edges compressed and toothed and produced at one place into a long fine point. Uncini with numerous teeth, the anterior one larger and hollowed out underneath like a gouge. Uncinigerous tori of the two sides widely separated ventrally in front and gradually approaching one another towards the end of thorax, thus leaving a triangular depression. (Pixell.)

- | | | | |
|---|---|---|---------------------------|
| 1. Operculum without processes | . | . | <i>Sp. maldivensis</i> . |
| Operculum with processes | | 2 | |
| 2. Opercular plate with two antler-like processes. Pedicle winged | . | . | <i>Sp. giganteus</i> . |
| Operculum with several much branched processes. Pedicle wingless | | | <i>Sp. jousseau mei</i> . |

Spirobranchus giganteus Pallas.

Spirobranchus giganteus, Ehlers 1887, p. 286, pl. lxxvii, figs. 1-7.

Spirobranchus giganteus, Fauvel 1923b, p. 52 (Synonymy).

Spirobranchus giganteus, Pruvot 1930, p. 88.

Spirobranchus multicornis, Grube Fauvel 1911, p. 430.

Spirobranchus tricornigerus, Grube, Willey, 1905, p. 318.

Spirobranchus tetraceros, Johansson 1918, p. 7.

Spirobranchus semperi, Augener 1914, p. 148 (Synonymy).

Cymospira gaymardi, Quatrefages 1865, p. 539, pl. 16, bis, fig. 13.

Pomatocerospis coutieri, Gravier 1908, p. 125, pl. viii, figs. 294-299.

"Investigator" St. 292, Persian Gulf, 53 fms.; St. 703, Nankauri Harbour, amongst corals. Nicobars; Great Coco Island (*Alcock*); Near Puri, "Golden Crown".

Specific Characters.—Opercular plate with two antler-like processes, which sometimes, however, branch close to their bases. Abdomen about 11 times as long as its greatest breadth and with numerous (200-300) segments (Pixell).

There is a considerable range of variation to be found in the operculum, the antlers of which may be more or less developed and branched. When they branch close to their bases, they appear as four distinct horns (var. *tetraceros*). The opercular disc may be flat, or concave, or even cone-shaped carrying horns at the top or bearing a mere stump, as branches are often more or less broken off.

In the specimens from Nankauri the pair of antlers has only few and blunt branches, especially the two processes behind the base are small.

The opercular wings are neither notched nor lobed. The body is yellow with a deep blue thoracic membrane. The gills are blue at the base and with white, blue and pink stripes.

The tube of the specimen from St. 292 is pink, somewhat coiled, triquetrous with three high serrate ridges. The operculum bears a rather long stem, branched at the tip, as in *Sp. gardineri* Pixell, which is very likely a mere variety.

The tubes of the specimens from Puri are fixed on an oyster shell. They are pink-coloured, sinuous, broadly expanded on the substratum and bearing a high, thin, wavy, smooth ridge overlying the aperture. The gills are streaked with blue stripes.

The wings of the opercular pedicle are fringed with blunt lobes or merely wavy. The opercular plate is slightly concave on one specimen, rather convex on the other. From the centre arise 7-8 long, radiating branched processes, as in *Sp. coutieri* Gravier, redescribed by Pixell, and in *Sp. jousseaumei* Gravier, but the pedicle of the latter species is not winged.

The range of variation of the operculum is so great in *Spirobranchus* that hardly two specimens are alike. In the closely allied genus *Pomatoceros* very wide variations in the form of the operculum are also common, as also variations in the pedicle wings and the collar, such as have been mentioned by Pixell for *Spirobranchus*.

Habitat.—Intertropical regions of the Atlantic, Indian and Pacific Oceans, especially in coral reefs.

Spirobranchus jousseaumei (Gravier).

Spirobranchus jousseaumei, Potts 1928, p. 701.

Pomatocerospis jousseaumei, Gravier 1908, p. 130, pl. viii, figs. 292, 293.

Palan Biddang.

Specific Characters.—Opercular plate with several distinct, much branched processes. Pedicle wingless. Tube with several wavy ridges.

Only a single anterior fragment of the species is represented in the collection. The gills are of a deep violet-blue colour. The interbranchial membrane forms triangular sharp teeth between the gill-rays. The opercular plate is a shallow, slightly slanting disc bearing three separate, erect, much branched processes which agree with Gravier's fig. 293; only they are less numerous. The opercular pedicle is slightly flattened, but not at all winged. This species may turn out to be a mere variety of *Sp. giganteus*.

Habitat.—Red Sea, Suez Canal, Palan Biddang.

Spirobranchus maldivensis Pixell.

Spirobranchus maldivensis, Pixell 1913, p. 84, pl. ix, fig. 9.

"Investigator" St. 87, off C. Negrais, Burma, 40 fms.

Specific Characters.—"Operculum a thick calcareous plate, without processes, supported by a tall pedicle with thin lateral wings. Collar setae with a short wide finely striated fin-like process at the base of the narrow anterior blade. Branchiae about 32 pairs with numerous long pinnae except at their distal ends, which are bare and filamentous. Thoracic uncini have about 15 teeth in addition to the large gouge-shaped one and the abdominal 13. Abdominal setae narrow compressed trumpets with one side produced into a long process." (Pixell.)

Three tubes were collected. The larger is yellowish, more or less coiled, with a faint dorsal ridge cut into blunt serrations. The sides are firmly fused with the support. The other two tubes are smaller, white and coiled with three ridges, of these the dorsal one is well developed and cut into long low teeth.

The operculum agrees exactly with Pixell's fig. 9, *a*. It is tipped with a shallow, rounded, calcareous plate without any processes. The wings of the pedicle are long, narrow and smooth. The gills are very long, straight, with a short interbranchial membrane.

There are 6 uncinigerous thoracic segments and the collar setae agree with Pixell's fig. 9, *b*. The operculum is very much like that of *Pomatoleios crosslandi*, but the latter species has no collar setae.

Habitat.—Maldive Archipelago, Burma Coast.

Genus **POMATOSTEGUS** Schmarda.

Collar setae bayonet-shaped and covered with fine hair-like processes. Operculum with a slanting calcareous plate or several horny discs united by a central vertical column. Opercular pedicle with lateral wings. Abdominal setae trumpet-shaped or *Salmacina*-like.

Operculum with a slanting plate. Abdominal setae trumpet-shaped *P. polytrema*.

Operculum with horny discs. Abdominal setae *Salmacina*-like *P. stellatus*.

P. polytrema var. *indica* Fauvel, recorded from Krusadai and Pamban, is not represented in the collection. This species may be referred to another genus if the differences in the operculum and abdominal setae are deemed of generic importance, as has been suggested by Johansson (1918, p. 11).

Pomatostegus stellatus Abildgaard.

Pomatostegus stellatus, Gravier 1908, p. 133.

Pomatostegus stellatus, Pixell 1913, p. 79.

Pomatostegus stellatus, Augener 1916-18, p. 598.

Pomatostegus stellatus, Johansson 1918, p. 10, figs. 10, 11.

Pomatostegus actinoceros, Willey 1905, p. 314, pl. viii, fig. 34.

Pomatostegus actinoceros, Augener 1914, p. 152.

Ceylon, Pearl Bank. Krusadai. Pamban. West coast of India, 29 fms. Andamans, Port Blair. Malacca Straits. Palan Biddang.

Specific Characters.—Operculum with several, horny denticulated discs piled up very close and strung on a hollow pillar with rows of star-like diverging spines and a circle of spines under each plate. Pedicle flat, with broad smooth wings. A high collar. Abdominal setae sickle-shaped.

As is so often the case, the *Salmacina*-setae lose their curved appearance and become straight in reagents, as in Johansson's fig. 10, or the curvature is inverted.

Habitat.—Atlantic, Indian and Pacific Oceans.

Genus **VERMILIOPSIS** Saint-Joseph.

“Collar setae simple blades. Uncini with fairly numerous teeth, the most anterior are larger and blunter than the rest. Abdominal setae geniculate. Some thoracic setae are bladed sickles (setae of *Apomatus*), thus differing from the genus *Vermilia* with ordinary bladed setae only. Operculum with a horny somewhat cylindrical or conical cap.” (Pixell.)

Vermiliopsis sp.

Malacca Straits.

A long, nearly straight, cylindrical, faintly wrinkled tube contained a macerated worm whose setae agree with those of genus *Vermiliopsis*, but the operculum is absent and it is not possible to identify the worm.

V. acanthophora Augener and *V. glandigera* Gravier have already been recorded from the Gulf of Manaar.

Genus **PROTULA** Risso.

No operculum. Collar setae simple tapered blades. Uncini with very numerous fine teeth and a long basal spine. Winged, and often *Apomatus* thoracic setae. Abdominal setae either sickle-shaped or bayonet-shaped.

Protula sp.

Andamans.

An anterior fragment, very soft and macerated, with woolly gills and a very large thoracic membrane, destitute of operculum, may be a *Protula*. Unfortunately the abdominal setae are absent and it is not possible to be definite about the identification of the fragment available.

Willey recorded *Protula* (*Protulopsis*) *palliata* from Ceylon.

Genus **SPIROBIS** Daudin.

Body asymmetrical. Thoracic setigerous segments less than five. Opercular peduncle without pinnules. Tubes spirally coiled, dextral or sinistral. Hermaphroditic forms.

Spirorbis foraminosus Moore.

Spirorbis foraminosus, Augener 1926b, p. 472.

Spirorbis foraminosus, Fauvel 1930a, p. 68.

"Investigator" St. 614, Nakkauri Harbour, 24 fms.; Rameswaram Beach.

Specific Characters.—Collar setae smooth, without fin-like extensions, accompanied by a few capillary setae. Abdominal setae with large falciform serrated blades. Operculum cylindrical, transparent, dotted and crowned with a rim, with longitudinally grated plates. 3 thoracic segments. Tube dextral, keeled, wrinkled, more or less pitted with alveoles.

The tubes were fixed on algae and weeds.

Habitat.—Ceylon, Krusadai, Nicobars, Pacific Ocean.

Genus **DITRUPA** Berkeley.

Operculum an inverted cone with a horny plate. Pedicle smooth, wingless. A collar. Uncini with numerous teeth, the lower one gouged. Collar setae absent. Thoracic setae capillary and winged setae. Abdominal setae capillary. Tube calcareous, *free*, open at both ends, *Dentalium*-shaped.

Ditrupa arietina (O. F. Müller).

Ditrupa arietina, Saint-Joseph 1898, p. 443, pl. xxiii, figs. 249-254.

Ditrupa arietina, Fauvel 1927a, p. 374, fig. 128, a-g.

Ditrupa gracillima, Grube 1878, p. 279.

"Investigator" St. 233, Andaman Sea, 785 fms.

Specific Characters.—Operculum vesicular, opercular plate horny, thick, brown, flat or convex, often encrusted. Tube smooth, elephant's tusk-shaped, curved and tapering, narrowed at the mouth, white or with brown rings; made of two calcareous layers, the inner opaque white, the outer translucent.

Empty tubes were fixed on an *Onuphis* tube containing macerated debris only. These *Ditrupa* tubes agree with those of the typical form.

Habitat.—Atlantic; Mediterranean; Red Sea; Philippine Islands; Andaman Sea.

Var. **monilifera**, var. nov.

(Pl. ix, fig. 12.)

"Investigator" St. 322, Andaman Sea, 378 fms.

Distinctive Characters.—Tubes with a number of more or less regular annular enlargements giving it a moniliform appearance.

Three very peculiar tubes of *Ditrupa* were fixed on an *Onuphis* tube and accompanied by several empty tubes of a species of *Dentalium* which may belong to the genus *Gadila* (?)

These *Ditrupa* tubes are smooth, without any keel or ridge, and present a number of annular swellings, ten in the largest tube which is probably complete, seven on another and only five on the shorter tube (pl. ix, fig. 12). The tubes are white, with fine dark scattered lines, very likely resulting from parasitic algae.

The animal does not differ from *D. arietina*. On tubes of *D. arietina*, from the European Seas, a few casual enlargements or narrowings have already been observed, and the above specimens may, therefore, be considered as a mere variety.

The tube of *D. crenata* Ehlers (1908, p. 163, pl. xxxiii, figs. 7-15) is similarly moniliform, but is beset with serrated keels.

Habitat.—Andaman Sea.

Genus **FICOPOMATUS** Southern.

“Modified setae present on the first thoracic segment, having blades provided with very stout teeth. Beneath the blades is a transverse row of more than two teeth. Uncini with relatively few teeth, the lowest of which is in the form of an elongate bifid spine. Ventral abdominal setae geniculate. Operculum fig-shaped, without any outgrowths”, (Southern).

Ficopomatus macrodon Southern.

Ficopomatus macrodon, Southern 1921, p. 655, pl. xxx, fig. 27, *a-m*.

Ennur Backwater, Madras Coast; Sunderbans; Taléh-Sap, Gulf of Siam, St. 11, St. 17, St. 21, St. 29, and St. 32.

Specific Characters.—Operculum soft, vesicular, fig-shaped, flat or convex at the tip, without any outgrowths; stem rather flattened. Branchial filaments 13-17 in number, bearing 18-20 pairs of barbules. 7 thoracic setigerous segments. Collar high. Free margin of the thoracic membrane entire. Collar setae of two kinds: (1) stout setae with a series of very coarse teeth diminishing in size towards the smooth tips, beneath these teeth for some distance the shaft is smooth; this is followed by a transverse row of teeth, and (2) slender setae with finely tapering tips and minutely bispid edges. Thoracic setae capillary, flattened. Abdominal setae geniculate. Tube free or erect, circular in section, with a single dorsal ridge.

The tubes of the specimens from the Sunderbans are attached to pieces of wood, on fragments of stems with a few roots still adhering. These small tubes are white, sinuous, with a high, thin, wavy, dorsal ridge ending over the opening in a blunt tooth. The sides of the tube spread on the wood. Other tubes are more smooth, with only an obsolete ridge.

The operculum of the animal is full of yellow bodies (clotted blood) as in *Mercierella*. The collar setae are typical. They differ from those of *Mercierella* in having coarser teeth, set in a single row, with the exception of the lowest ones which recall the basal processes of *Hydroides*. The edge of the thoracic setae is striated and those of the last segments, at least, appear to have a finely serrated wing. The uncini agree with Southern's description. The tubes from the Ennur Backwater are somewhat different; they are attached to Oyster shells with numerous tubes of *Mercierella*.

These *Ficopomatus* tubes are rather square in section with three dorsal ridges, and recall those of *Serpula concharum*, but the animals enclosed in them are typical *Ficopomatus*. Many specimens from Taléh-Sap are fixed on brick-red stones others on an empty oyster shell; the latter are small delicate tubes with an erect end, circular in section, wrinkled, but without the protruding funnel-shaped remnants of successive peristomes, so conspicuous in *Mercierella*.

The worms are typical but they appear to have been partly dried up and the operculum looks like a collapsed India-rubber ball, flattened and spoon-shaped.

The occurrence of *Ficopomatus* with *Mercierella* on one and the same oyster-shell is noteworthy. In Taléh-Sap, as well as in the Ennur Backwater and other stations, it apparently lives in brackish waters.

Habitat.—Cochin Backwater, Ennur Backwater (Madras Presidency), Taléh-Sap, Gulf of Siam.

Genus **MERCIERELLA** Fauvel.

Operculum non-calcareous, vesicular, crowned with concentric rows of simple horny spines. Opercular pedicle smooth, wingless. Branchial filaments without eyes. Interbranchial membrane absent. Collar entire. A thoracic membrane. A pair of palps. Lowest tooth of the uncini stout and gouged. Collar setae with two rows of sharp teeth. Dorsal thoracic setae winged. Abdominal setae geniculate. Tube circular in section.

Mercierella enigmatica Fauvel.

Mercierella enigmatica, Fauvel 1923d, p. 124, fig. 1; 1925b, p. 237, figs. 1, 2; 1927a, p. 360, fig. 123, a-o; 1931, p. 1067.

Mercierella enigmatica, Monro 1924, p. 155, figs. a-e.

Mercierella enigmatica, Rioja 1924, p. 160, figs. 1-30, pl. v, figs. 1-3.

Mercierella enigmatica, McIntosh 1924, p. 1; 1926, p. 402, pl. xvi, figs. 1-6; pl. xiv, figs. 1, 2, 4.

Mercierella enigmatica, Fischer 1925, p. 347.

Mercierella enigmatica, Annenkova 1929, p. 138.

Ennur Backwater, Madras Coast (*Annandale*).

Specific Characters.—Seven thoracic setigerous segments. Branchial filaments stout, short, with a naked tip variable in length. Interbranchial membrane absent. Operculum somewhat fig-shaped, bearing concentric rows of simple, horny, sharp, blackish spines. Pedicle stout, thick, smooth, subtriangular in section, wingless, with a shallow dorsal groove. Two finger-shaped palps. Collar tall, erect or turned down, without lateral notches, edges entire; it is continuous with the thoracic membrane which is very broad and terminates in a back flap. Collar setae of two kinds: (1) slender, filiform capillaries, and (2) strongly serrated setae with two longitudinal rows of teeth, a few transverse rows at the base and without an intervening smooth part of the shaft. Other dorsal thoracic setae straight, or faintly bent, smooth or very finely hispid. Uncini with a single row of 5-7 teeth, the lowest of which is larger and gouged. Abdominal uncini more triangular, with more numerous teeth. Abdominal setae long, geniculate, serrated. Pygidium conical, with two rounded knobs. Tube calcareous, whitish, thin, cylindrical, wrinkled and bell-shaped at the entrance; the successive peristomes forming collars all along. It is coiled at the base, then erect. Animal from 6 to 25 mm. in length and 1-2 mm. broad. Operculum of a chestnut colour with a white or yellow ring. Gills greenish with brown spots. In alcohol, abdomen uncoloured, thoracic tori chestnut, gills ringed with chestnut and chalky white. Lives in brackish waters.

A large number of small white tubes, in more or less dense groups, were found fixed on oyster-shells amongst young mussels and barnacles.

The attached base of the tube is more or less coiled, wrinkled and the longitudinal faint ridges give it a tessellated appearance, but the erect part is cylindrical with the typical bell-shaped mouth and the successive peristomial collars.

The worms still retained the chestnut hue of the thoracic tori and the brown streaks of the gills.

The characteristic operculum bears concentric rows of simple horny spines. The collar setae, thoracic setae, abdominal setae and uncini agree closely with those of the typical European specimens.

The genus *Mercierella* has several features in common with *Ficopomatus* to which it is closely allied ; both are brackish-water forms. The operculum, collar setae, abdominal setae and uncini are, somewhat similar in shape. *Mercierella enigmatica* differs from *Ficopomatus macrodon* in the following characters : (1) Its tube is cylindrical, bell-shaped at the mouth, with protruding collars. It is neither ridged nor enlarged at the entrance. (2) The operculum bears rows of horny spines ; it is unarmed in *Ficopomatus*. (3) The collar setae of *Ficopomatus* have a smooth intervening part of the shaft between the single longitudinal row of teeth and the basal processes, whilst in *Mercierella* such a smooth part does not exist and the teeth are set on two longitudinal rows becoming single only at the tip. (4) The thoracic setae of *Mercierella* are wingless, smooth or very faintly and finely hispid. (5) The lowest tooth of the uncini is much broader, nearly semi-lunar in *Ficopomatus*. (6) The colour is different. Further, the differences in the tubes and the operculum are sufficient to admit of a generic separation of the two forms.

The discovery of *Mercierella* in Ennur (Madras) is of very great interest, and solves a puzzling problem.

This Polychaete was found, for the first time (1922) nearly simultaneously, in the canal connecting Caen in Normandy with the sea by Mercier, and in London docks by Monro. In both cases it was found in brackish or nearly fresh water, fixed on stones, shells, pieces of wood, reeds and ship's hulls.

In 1925 Fischer found it again in large quantities in river Rance, between Dinan and Saint-Malo, in Brittany.

Later it was recorded from Gandia, near Valence, in Spain, by Rioja who published a detailed description and a good coloured plate of the animal.

It was next found in Tunis by Prof. Seurat and in Morocco near Rabat by R. Dollfus, in all cases in brackish water.

Annenkova mentioned it from the Caucasian coast of the Black Sea.

Some time ago I received fine specimens from Oakland, in the Bay of San Francisco.

The only records of *Mercierella* living in sea-water are those by Fischer, who observed it at Granville and Saint-Malo in the harbour. But these specimens were small and stunted, compared to the thriving colonies found living in brackish waters. Previously Herpin had succeeded in keeping alive in pure sea-water colonies of *Mercierella* from Caen canal, but they did not reproduce at the breeding season.

The discovery of this species, in large quantities in localities where it had never been observed before by the numerous naturalists working there suggested the possibility of a migration.

In the first description of *Mercierella* I wondered if it was not an exotic species brought on ship's bottoms to London and thence to Caen by the colliers plying between England and France. But what was its country of origin ? The European fauna was so well known that it was not likely that such a common and thriving animal could have escaped

detection. I had always been struck with the analogies between *Mercierella* and the Indian *Ficopomatus*, also found in brackish waters.

The discovery of *Mercierella* in the Ennur backwater, and its association with *Ficopomatus* on oyster-shells solves the question. It must have been brought to London docks on ship's bottoms. We know, indeed, that it can live in pure sea-water, though apparently it does not reproduce in it. From London it was brought to the French ports by colliers and thence the coasters carried it on their bottoms into estuaries where it prospered. When a ship lies long enough in brackish water *Mercierella* may grow to maturity and lay eggs which develop and give rise to colonies. The wide, scattered distribution of the species, its abundance in brackish water, its rarity and stunted condition in sea-water are thus explained satisfactorily.

Habitat.—Madras Coast, English Channel, Atlantic (Morocco), Mediterranean and Black Seas, Oakland, Bay of San Francisco.

INCERTAE SEDIS.

Talehsapia annandalei, gen. et sp. nov.

(Pl. ix, figs. 13-20).

Taléh-Sap, St. 27, Gulf of Siam.

The body of these two small worms from Taléh-Sap has the general appearance of a *Lumbriconereis*. They are respectively 30 and 32 mm. in length and 1 mm. in breadth. The larger has about 80 segments, it is broken and bears a small posterior regenerated bud with two short cirri (or regenerating feet?). The shorter specimen has only 54 setigerous segments, the last 30-35 of which are conspicuously moniliform (pl. ix, fig. 14). In both specimens the body is filiform, cylindrical and teguments are smooth and shining. The breadth is nearly uniform, the 20-30 first segments are distinct, but not marked by deep strictures (pl. ix, figs. 13, 20).

The colour is yellowish white, with broad, rounded, purple spots on the sides; of these there are usually five encircling the foot. This pattern, which recalls that of *Ancistrosyllis*, fades gradually backwards and disappears on the last segments.

The first five segments are slightly swollen. The prostomium is a small blunt cone destitute of eyes, tentacles and processes of any kind. It overlies a broad mouth (pl. ix, fig. 20). The half protruded proboscis is soft, cylindrical, transparent and without any papillae.

The feet consist of a blunt cylindrical setigerous lobe with a very small ventral cirrus. There is no dorsal cirrus. A stout aciculum, often reddish at the tip, does not protrude outwards. The setae are all simple, straight or slightly curved, and minutely hispid. In front view they look faintly bipectinate (pl. ix, figs. 18, 19). Above the setigerous lobe a stout acicular bristle arises from a broad blunt cone (pl. ix, figs. 15, 17). The tip of that bristle, often broken, is usually capped with a red pigmented ball. In one instance only I detected a single very slender filiform capillary seta accompanying the acicular bristle.

In one specimen, cleared in lactic acid and compressed, the pharynx was found to be soft, transparent and extending to the middle of the 5th setigerous segment. The ventricle

(?) was cylindrical, opaque, with very thick walls, and extended to the 10th setigerous segment; it had two brown, curved, sharp jaws (pl. ix, figs. 13, 16, 20). In the other specimen, with half extruded proboscis, the ventricle reached from the fourth setigerous segment to the 9th foot and had a pair of horny jaws, shaped, on each side, as a brown sharp hook with an accessory paragnath. Unfortunately in such compressed specimens, it was not possible to ascertain if the jaws are made of two overlying pieces or of a single one and a paragnath.

The systematic position of this worm is very doubtful, it does not appear to fit conveniently in any known family of Polychaetes and it would be rash to create a new family on such scanty material.

The general appearance is that of a *Lumbriconereis* but neither the jaws nor the setae agree. *Drilonereis* has a somewhat similar stout acicular seta, but it lies in the setigerous lobe and not above and well apart. The jaws and other setae are different.

Ancistrosyllis has a dorsal stout acicular bristle, straight or hooked, but it has a dorsal cirrus, an unarmed proboscis and a prostomium with tentacles. *Talehsapia* is perhaps a very aberrant Eunicid (??).

Habitat.—Taléh-Sap, Gulf of Siam (brackish water (?)).

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