

## ON MARINE POLYCHAETA FROM MANDAPAM (SOUTH INDIA)

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### INTRODUCTION

DURING a stay at the Central Marine Fisheries Research Station, Mandapam Camp (S. India), in April 1958, an opportunity arose to collect some Polychaetes from the Gulf of Marmar. Special attention was paid to the small forms which hitherto have been rather neglected in Indian waters. The 17 samples taken comprise 50-55 species, most of which cannot be identified at present owing to lack of literature. Eight of them, from groups more familiar to the author, have been selected for a detailed study. Of these, *Prionospio sexoculata* Augener has already been recorded in this area ; but *Prionospio malmgreni* Claparède and *Oriopsis armandi* (Claparède) are new to India ; *Poecilochaetus serpens* (Claparède) and *Raphidrilus nemasoma* Monticelli are new to the Indian Ocean while *Dorvillea mandapamae*, *Oriopsis coalescens* and *Augeneriella hummelincki* Banse, subsp. *indica* are new to science.

Fauvel (1953) estimated that the 450 species of Polychaetes known from India, represent hardly more than one half of the number to be expected. It may be added that comparatively few small species have been collected from the region of the Indo-West-Pacific so far ; thus, it may be assumed that among the smaller forms of Polychaetes, as well as of other invertebrate groups, a vast number still remains to be discovered in this region. It may be mentioned that in the present material, of the subfamily Exogoninae of the Syllidae, alone, three species have been found (*Exogone* sp., *Sphaerosyllis* sp. and *Brania* sp.) though biotopes favoured by them, like the phytal proper, or coral reefs, have not been touched. This subfamily was not previously recorded from India. Among the Sabellidae also, *Amphiglenea mediterranea* (Leydig) is new to India.

### METHODS

For studying the micro-fauna, often one has to employ methods other than those used for collecting larger animals. In the present case, the samples were taken by diving, and the animals, after having been concentrated from the raw samples, were sorted out under the microscope. During diving, the surface of the piles of the pier of the Research Station ('rock-bottom') was scrapped into a glass-jar. On sand and soft bottom, the sediment was sampled by means of the jar itself in order to avoid loss of the surface layers as it may happen when using a grab. On sand bottom, also the deeper layers were collected because the interstitial spaces of the sand give room to a great variety of forms (Remane,

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1933). On mud-bottom only the surface layer was collected, in order to avoid the 'dilution' of the populated sediment by barren material which makes the sorting more difficult. The sand (eventually algae) was washed repeatedly, and the water, after having allowed the sand grains to settle, was strained through plankton gauze No. 12 (mesh size about 100  $\mu$ ). After the third or fourth washing, some drops of formalin were added for each litre of water. Many forms of the sand fauna, from exposed localities, tend during agitation of the sediment, to stick to sand grains (Remane, *l. c.*). They start swimming only under special conditions so that they can be separated mechanically from the substrate. One part of the fresh sample as well as those from rock, mud bottom and from algae were allowed to stand in a high glass-jar for about half a day (Remane, *l. c.*). The depletion of oxygen in the glass makes the animals to collect on the surface of the sediment or even on the surface of the water from where they can be pipetted off easily. Even tube-dwelling forms may be collected in an undamaged state by this way. The necessary time of quiet standing depends on the temperature and the amount of organic matter present, clean coarse sands needing a relatively longer period.

The methods described are not quantitative either in the case of algae (*see* Colman, 1940) or in the case of mud-bottom samples. For concentrating the living fauna of soft-bottom more quantitatively from the raw sample, Riedl (1955) has described a simple device but which has not been employed here.

The present material was collected at 0 to 4 m depth near the pier of the Research Station, on the northern shore of the Gulf of Mannar at about 9° 16' N, 79° 08' E. Owing to protecting islands and the shallow depth of the gulf inside of them, scarcely exceeding 10 m swell is absent but only small waves are observed. The effect of the tides is negligible but changes in water-level due to the prevailing winds have a greater influence on the fauna living near the surface. During the southwest monsoon, the waters are very turbid. Near the pier of the Research Station, the annual mean range of the water temperature is about 7°C., the extremes being 23.5° and 32.3°C. (Prasad, 1957; five years' observation), that of salinity 7.4‰, the extremes being 24 and 37‰ (Jayaraman, 1954; three years' observation). At the localities where the species have been collected, the extremes of temperature may be a little higher, those of salinity a little lower than mentioned, owing to the effect of insolation in the shallow water and of a sewage outlet near the pier. This remark concerns neither the situation where *Prionospio malmgreni* was found, nor *Poecilochaetus serpens* which was caught in the plankton.

#### SYSTEMATIC DESCRIPTION

##### HESIONIDAE

##### *Dorvillea mandapamae* n. sp. (Fig. 1a-h)

Three large complete and two younger specimens were found in two samples.

*Descriptions* : One specimen examined has 35 setigers, it is 2.4 mm long and 0.2 mm broad (without parapodia and cirri). The blunt, rather flat prostomium (Fig. 1a) carries four reddish eyes, two club-shaped antennae and two very long palps of unequal length, with small bulbous terminal joints. In the young indi-

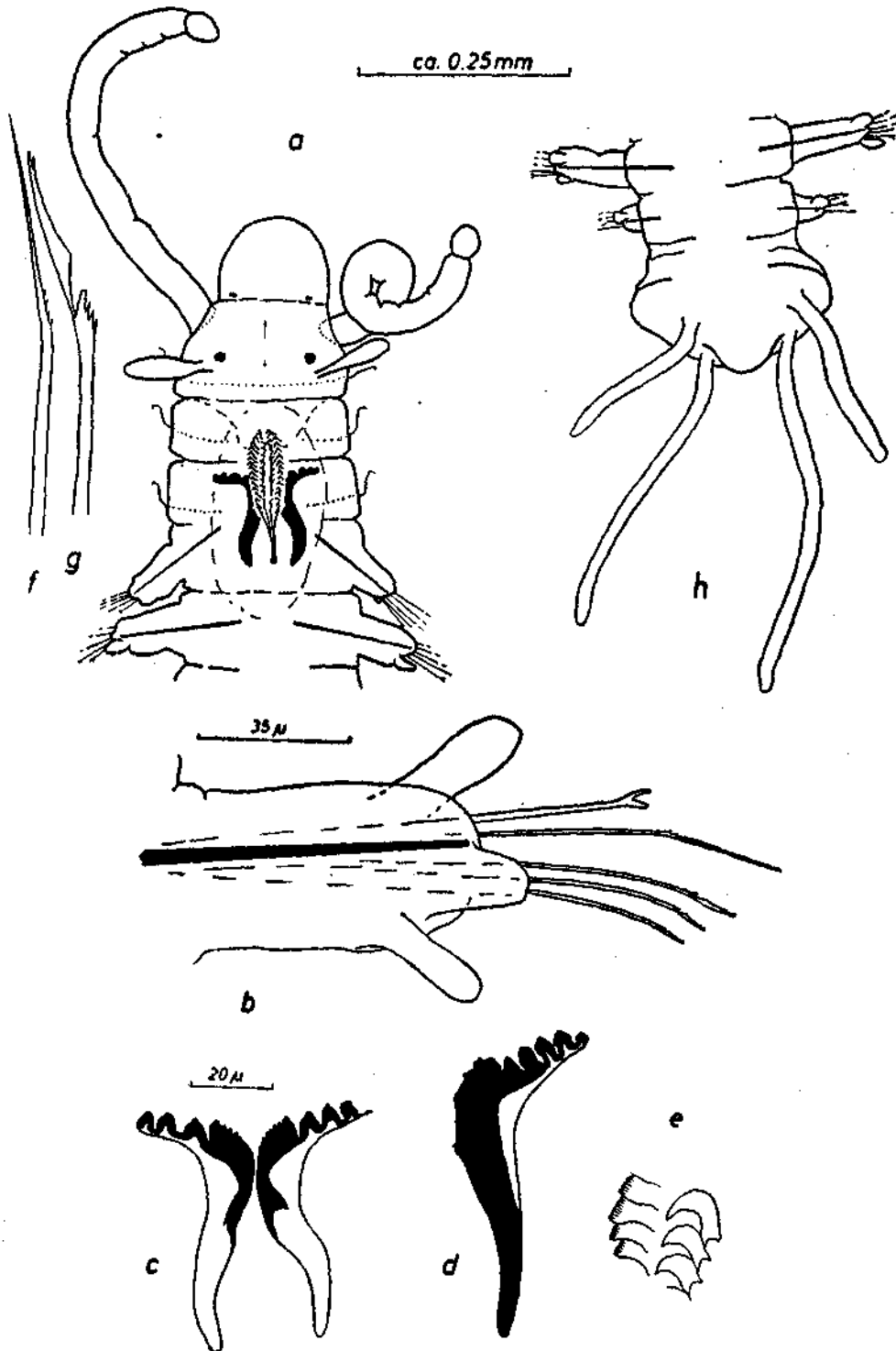


FIG. 1. *Dorvillea mandapamae* n. sp. a. Anterior part from the dorsal side. b. Parapodium from behind. c. Lower jaws of a younger specimen. d. Lower jaws of an older specimen. e. Sketch of a part of the 'upper jaws'. f. Capillary. g. Compound seta. h. Pygidium from the ventral side.

viduals only the anterior pair of eyes is present, while in one of the older specimens this pair had disappeared so that only the posterior pair persisted. The palps are inserted laterally in shallow pockets and are often bent upwards in the preserved animals; while alive they are mobile in all directions. The prostomium is followed by two achaetous segments of equal size in which the jaws are seen. The 'upper jaws', a part of which is shown in Fig. 1e, could not be seen clearly in the undamaged specimens. On each side, they appear to consist of two rows of small plates, the inner (ventral) ones being somewhat spatulate while the outer (dorsal) ones are hook-like. Caudally, the plates in each row seem to be fused and have a serrated appearance. These 'upper jaws' are 90  $\mu$  long. The lower jaws are figured from a young individual in Fig. 1c.; in those of the larger specimens the effect of long usage is seen (Fig. 1d).

The cross-section of the setigerous segments is oval. Except the first, all feet are alike, and one from the middle part of the body is figured (Fig. 1b). There is a small dorsal cirrus near the distal end of the parapodium (without cirrophore and supporting acicula) and a similar ventral one, together with a posterior lobe. The dorsal cirrus is absent on the first foot. In all parapodia, there is one colourless acicula, one dorsal Y-shaped bristle, one capillary (Fig. 1f) and three heterogomph falcigers; the tip of the shaft of the latter is serrated, and the terminal portion is slightly bifid (Fig. 1g). The Y-shaped bristle occurs on all setigers, and its arms are smooth. The pygidium (Fig. 1h) carries two pairs of slender cirri of which the dorsal pair is longer than the ventral one (upto 0.3 mm). The colour of the living animals is pale-yellowish.

From the damage to the lower jaws in the larger individuals it may be concluded that these are adult animals. For the younger ones (the complete specimen has 27 setigers and a length of 1.7 mm, excluding the cirri; the broken animal would seem to be of about the same age) the differences regarding the eyes have already been mentioned. In the feet the posterior lobe between the cirri is lacking, so that the tip of the parapodium is simply rounded, or curved by the end of the acicula. On the prostomium and the two achaetous segments of the broken animal, dorsally and laterally long cilia are found, as indicated by dots in Fig. 1a; they form a complete half circle on the prostomium.

The young animals have been observed in a living state. Though their bodies can be very adhesive, they move quickly and behave like typical interstitial sand-dwellers.

*Diagnosis* : A species of the genus *Dorvillea* Parfitt without dorsal cirrophore and acicula; length 2.5 mm; eyes present; antennae very short, club-shaped; two achaetous segments of equal size; parapodia with distinct posterior lobe; forked seta present; dorsal cirri absent on the first setiger.

*Holotype* : The holotype, as well as paratypes, will be deposited in the Zoological Museum of the University of Hamburg, Germany.

*Habitat* : South India, Gulf of Mannar, near the pier of the Research Station, Mandapam Camp, in fine sand at 1.5 m and in coarse muddy sand with the phanerogam *Halophyla ovalis* at 4 m.

*Discussion* : *Dorvillea mandapamae* n. sp. appears to be closely related to *D. kefersteini* (McIntosh) and *D. gracilis* (Hartman). These three species are distinct from the other members of the genus by the absence of the cirrophore and the supporting acicula. This feature is also found in *Ophryotrocha* Claparède & Metchnikow. The new species may be separated from *D. kefersteini* by its short antennae, by the absence of a dorsal cirrus on the first foot, and by the smooth anal cirri ; from *D. gracilis* by its smooth palps, by the equal size of the two achaetous segments and by the presence of a posterior lobe in its more slender parapodia.

#### SPIONIDAE

##### *Prionospio malmgreni* Claparède

Syn. *Pr. malmgreni* Fauvel (1927) p. 61.

There is one complete specimen measuring 7 mm, excluding the 1 mm long anal cirrus, and possessing 45 setigers.

The animal agrees with the description given by Fauvel (1927). Eyes are present. Hooks are found ventrally from the 14th setiger ; dorsally, single hooks are seen from the 22nd setiger, several from about the 30th onwards. This may be due to age (cf. Hannerz, 1957 : In his material from Sweden the dorsal hooks start on the 22nd/23rd setiger). The stout acicular bristle, observed by Day (1949) in the 10th to 14th neuropodia in material from St. Helena, occurs in the present animal from the 10th to the 34th setigers.

New to India (Previously known, in the Indian Ocean, from the Agulhas Bank). Found in the Gulf of Mannar, near the pier of the Research Station, Mandapam Camp, in 4 m depth on medium-fine muddy sand with the eel-grass *Cymodacea ciliata*.

##### *Prionospio sexoculata* Augener

Syn. *Pr. krusadensis* Fauvel (1930) p. 38. *Pr. krusadensis* Fauvel (1953) p. 326. *Pr. sexoculata* Day (1957) p. 97.

There is one complete specimen that first was indentified as *Prionospio krusadensis*, possessing 75 setigers and a length of 15 mm. It agrees mostly with the description by Fauvel (1930). On the prostomium, there are only two single eyes, the left of which is accompanied by an additional pigment-spot. The first setiger bears bristles only in the neuropodium. The three pairs of branchiae are not of equal length, the first pair being 0.8 mm, the second 0.4 mm, and the third about 0.1 mm long. Ventrally in the neuropodium, the stout bristle is found from the 10th setiger down to the last segments ; in some parapodia two of these bristles may be observed. The ventral hooks start on the 16th setiger, the dorsal ones on the 28th/29th. *Pr. krusadensis* Fauvel has been regarded as a synonym to *Pr. sexoculata* Augener by Day (1957).

Found in the Gulf of Mannar near the shore on medium-fine sand with great amounts of organic debris, exposed to the action of smaller waves, in 1 m depth.

## POECILOCHAETIDAE

*Poecilochaetus serpens* Allen

Syn. *P. serpens* Hannerz (1957) p. 137. *Poecilochaetus* sp. Ganapati & Radhakrishnan (1958) p. 223.

Two larvae were caught by a horizontally towed net in the Gulf of Mannar. The complete specimen has 29 setigers and a length of 3.6 mm, the second, an anterior fragment of about the same age, has 18 setigers left. In September 1958, from the same place, some broken individuals were kindly lent by my colleague Mr. D. S. Reddy.

There are three pairs of eyes. The palps reach the 4th setiger. The stout curved setae are found on the second and third feet. The dorsal cirri are similar to those in the adult *Poecilochaetus serpens*, they are elongate on the 7th to 11th parapodia; on the fragments collected in September, which were of about the same age as the animals collected in April, the cirri of the 21st and 22nd setigers have the same shape as the preceding ones. In both animals collected in April, the dorsal plumose setae start on the 15th setiger, the ventral modified bristles (Fig. 23 k, not l, in Fauvel, 1927) on the 18th. In each foot, only one of the latter setae is found, accompanied by several unmodified bristles. It appears that the adult features in the larvae with 29 setigers from Mandapam are definitely more developed than in the 34 setiger stage of Hannerz (1957) from Sweden. The pigment in the Indian material is less conspicuous than in that from Plymouth (Allen, 1904). At the proximal part of the cirri, as well as along a thin line between the parapodia, small red-brown chromatophores are present. This line reaching the animal's ventral surface, ends in a large black spot on each side. On the last segments, some bands of pigment cross the dorsum.

Ganapati & Radhakrishnan (1958) described from Waltair, on the east coast of India, a *Poecilochaetus* larva that is similar to those from the Gulf of Mannar; but the authors did not notice black spots on the ventral side.

New to the Indian Ocean.

## CIRRATULIDAE

*Raphidrilus nemasoma* Monticelli (Fig. 2)

Syn. *R. nemasoma* Fauvel (1927) p. 110. *R. nemasoma* Banse (1959) p. 307.

There are three specimens from one sample. The largest of them is 3.1 mm. long and has 19 setigers.

As already mentioned in the case of material from the Adriatic Sea, (Banse, 1959) the parapodia are biramous, each with 2 long and 2-3 short capillaries. The figure given by Monticelli (*cit.* after Fauvel, 1927, p. 110, Fig. 39e) shows only one ramus. The animal figured here is about 2.5 mm long. Being the youngest of the three specimens it still has many branchiae; their ends are thickened and very adhesive. The two other individuals do not exhibit branchiae any longer;

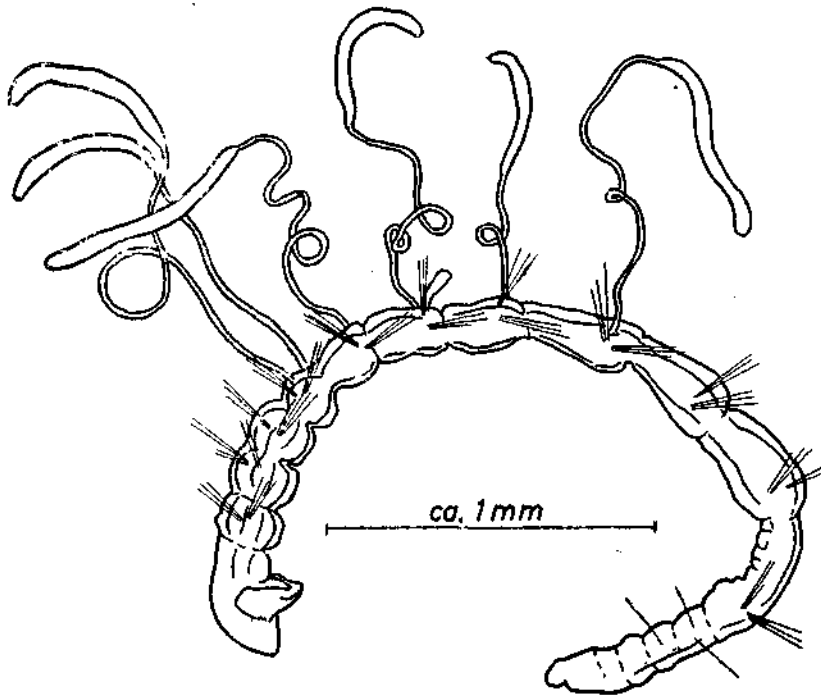


FIG. 2. *Raphidrilus nemasoma* Monticelli, young animal.

on some segments rudiments of the branchiae are to be seen like that shown on the 6th setiger of the animal in Fig. 2, but not before the 4th setiger. In all specimens the first four setigers are short, the number of bristles being the same in the following segments. I am not quite sure that the Adriatic and Indian material really belong to the species erected by Monticelli.

New to the Indian Ocean. Found on the piles of the pier of the Research station, Mandapam Camp, in a comparatively sheltered position within a colony of *Amphiglena mediterranea*, in 20 cm depth, exposed to the sun only in the morning and in the evening. In the Adriatic, the species has been collected in great numbers from a sponge, *Geodia* sp. but Monticelli has described it from the *Amphioxus*-sand of Naples.

#### SABELLIDAE

##### *Oriopsis armandi* (Claparède) (Fig. 3a)

Syn. *O. armandi* Banse (1957) p. 71, 105.

There are two badly preserved specimens from one sample.

One of the animals is 1.5 mm long, including the tentacular crown of 0.5 mm. There are three pairs of radioli and one pair of thick ventral filaments. The length of the latter is half that of the tentacular crown, and apparently the filaments lack

the cartilaginous cells which may serve as a skeleton. Owing to the condition of the material, a preparation of the tentacular crown was not possible.

The collarette is shown in Fig. 3a. It is characterized by a broad dorsal gap. On the first setiger a pair of large otocysts is seen. In the thoracic setigers, two bundles of bristles with 4 narrow-winged capillaries (150-170  $\mu$  long), and 4-5 uncini (45-50  $\mu$  long) are found. The teeth above the main fang of the uncini are conspicuous but there is no gap between the main fang and the first tooth as in *Oriopsis coalescens* n.sp. (Fig. 3e). In the abdomen, 2-3 capillaries (120  $\mu$  long) are accompanied by 8-9 uncini (10  $\mu$  long) resembling those of the Mediterranean *O. armandi*, the basal tooth not being stronger than the others. On the pygidium, two eyes are to be seen.

Apart from the very broad dorsal gap of the collarette, the animals agree with *Oriopsis armandi* which is known from the Red Sea (Banse, 1959). In the Red Sea material, however, mature females were included and the number of thoracic uncini was only three, a very low figure; in European material, up to 10 uncini can be found. It is not known in which segments the eggs are developed in Indian material (Europe: Setigers 5-8, Red Sea: Setigers 5 and 6).

New to India. Found on the piles of the pier of the Research Station, Mandapam Camp, among the calcareous alga *Amphiroa fragilissima* at 1/2m depth, immediately below the *Balanus*-belt, exposed to the action of smaller waves. Together with *Oriopsis coalescens*, *Augeneriella hummelincki* and *Amphiglena mediterranea*.

*Oriopsis coalescens* n. sp. (Fig. 3b-f)

About 15 living specimens of different age have been studied. The largest animal (contracted) has a total length of 2.5 mm, including the length of the tentacular crown of 0.7 mm.

*Description:* The general form of the body is the usual one for the thoracogonate Fabriciinae. The tentacular crown (Fig. 3b) makes up for 1/4 to 1/3 of the total length of the animals. On each side of the crown, there are 4 limbate radioli with 5-7 pairs of pinnulae, a ventral filament of half the length of the tentacular crown, and a ventral lip. In some animals, two filaments have been observed ventrally, originating from a common stem. A dorsal lip was not detected but might be present. The pinnulae end at about the same level as the radioli. Beyond the origin of the distal pair of pinnulae, the length of the free radioli is about 1/3 of its total length. At their bases, the radioli show two rows of small black dots which disappear in preserved specimens.

The collarette (Figs. 3b and 3c) is low dorsally with a narrow interruption, ventrally it forms a protruding lobe which is fused with the elevation of the peristomium where the mouth is situated. There are two eyes. Ventrally on the triangular anterior border of the first setiger, a single row of cilia occurs. On the first setiger two small otocysts have been observed. The dorsal thoracic furrow is distinct.

In the thoracic parapodia, 4-6 capillaries with very long tips (Fig. 3d; 180  $\mu$  long) and 4-5 shafted hooks (Fig. 3e; 40-45  $\mu$  long) are found. On the apex of



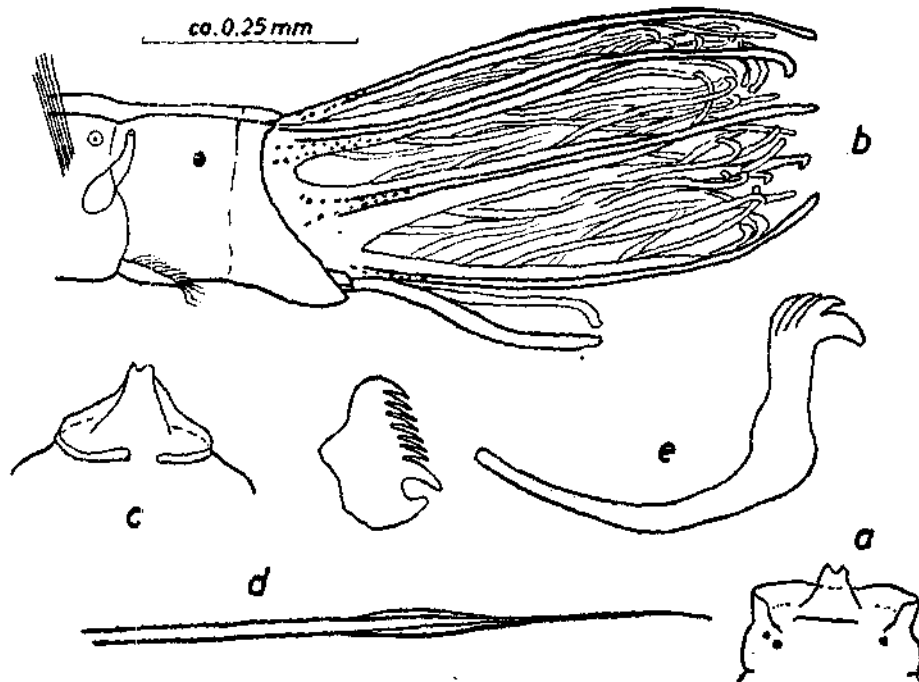


FIG. 3 a. *Oriopsis armandi* (Claparède) Peristomium from the dorsal side.

FIG. 3b-f: *Oriopsis coalescens* n. sp. b. Anterior part from the right side. c. Peristomium from the dorsal side. d. Thoracic capillary. e. Thoracic hook. f. Abdominal hook.

these uncini, there is a gap between the main fang and the first tooth. In the 6 abdominal setigers, capillaries are lacking; up to 13 uncini, each with a strong basal tooth ('rostrum', Fig. 3f; 13-15  $\mu$  long) are present. The pygidium carries two red eye-spots.

**Diagnosis:** A species of the genus *Oriopsis* Caullery & Mesnil with 6 abdominal setigers and a length of 2.5 mm. Tentacular crown  $1/4$ — $1/3$  of total length: On each side, ventrally one lip and 1-2 filaments, 4 radioli with 5-7 pairs of pinnulae; dorsal lip unknown; collarette ventrally protruding and coalescent with the elevation of the peristomium. Thorax: 4-6 capillaries, 4-5 uncini with a gap above the main fang. Abdomen: Up to 13 uncini, each with strong basal tooth, no capillaries.

**Holotype:** The holotype has been destroyed for the study of the bristles. Paratypes will be placed at the Zoological Museum of the University of Hamburg, Germany.

**Habitat:** South India, Gulf of Mannar, among algae in  $1/2$  to 2 m depth on the piles of the pier of Research Station, Mandapam Camp, exposed to the action of smaller waves, together with *Oriopsis armandi*, *Augeneriella hummelincki* and *Amphiglena mediterranea*.

*Discussion*: *Oriopsis coalescens* is close to *O. michaelsoni* Banse and to a form of uncertain position, from Southeast Australia (*Oridia limbata* Augener, 1927, p. 31; Banse, 1957, p. 85; only one individual). In *O. michaelsoni*, the dorsal gap in the collarette is broader than in the new species. Further, the fusion of the ventral lobe of the collarette with the elevation of the peristomium has not been seen in the rather badly-preserved material of *O. michaelsoni*. The shape of the uncini is different in the two species: In *O. michaelsoni*, there is no gap above the main fang of the thoracic hooks; in the abdominal uncini, the strong basal tooth is lacking (judging from the conditions in *O. armandi*, this character is only of limited value). The form of the uncini of the new species seems to agree with that of the above mentioned form of uncertain position from Australia; but in that animal there are 5 capillaries present in the abdominal segments, which is a fairly high number, whereas they are totally lacking in *Oriopsis coalescens*.

*Augeneriella hummelincki* Banse, subsp. *indica*, n. subsp. (Fig. 4a-d)

The description is based on about 20 specimens, some of which are juveniles. Living animals have also been studied. The largest individual (contracted) has a total length of 2.5 mm, of which the tentacular crown makes up 1/4—1/3, and is 0.25 mm broad.

*Description*: The shape of the body is that of the related thoracogoneate Fabriciinae. The tentacular crown (Fig. 4a) consists of 3 pairs of radioli, a pair of median lips and a pair of slender ventral filaments, containing a blood vessel and dividing near its origin into two branches. These filaments which can be as long as the radioli, are not supported by cartilaginous cells and can, therefore, be bent backwards. They are not covered by cilia. The number of pinnulae on each radiolus is 3-4 pairs; they end on the same level. The corresponding pinnulae do not start from the radiolus at precisely the same level but branch off somewhat alternating (Fig. 4a). In the 'armpit' of each pinnula dark pigment is to be seen, which disappears in preserved specimens. The length of a radiolus, beyond the origin of the distal pair of pinnulae, is nearly 1/3 of its total length. In the dorsal base of each lophophore, a branchial heart is observed. Apparently, the two hearts are pulsating and filling the filaments not strictly alternating as in *Manayunkia* Leydig. The blood is bright green in colour.

In a juvenile animal, with merely one abdominal setiger (each radiolus has only one pinnula), the still unpaired ventral filaments are used as tentacles, as in the adult *Fabriciola baltica* Friedrich. Seldom, the filaments are as long as the tentacular crown; probably due to injuries, often unbranched ones are observed which are very short.

The peristomium is shown in Fig. 4b; the collarette forms a prolonged lobe on the ventral side, dorsally it is low and, perhaps, interrupted (in most of the preserved specimens, it appeared similar to those of *Augeneriella hummelincki hummelinckii* Banse, 1957, Fig. 9b). In life, the peristomium is much more elongated than indicated in Fig. 4b; its ventral surface, including the collarette, is covered by short cilia up to the border of the first setiger. There are two black eyes.

In each parapodium, the thoracic setigers contain 4-5 winged capillaries (190  $\mu$

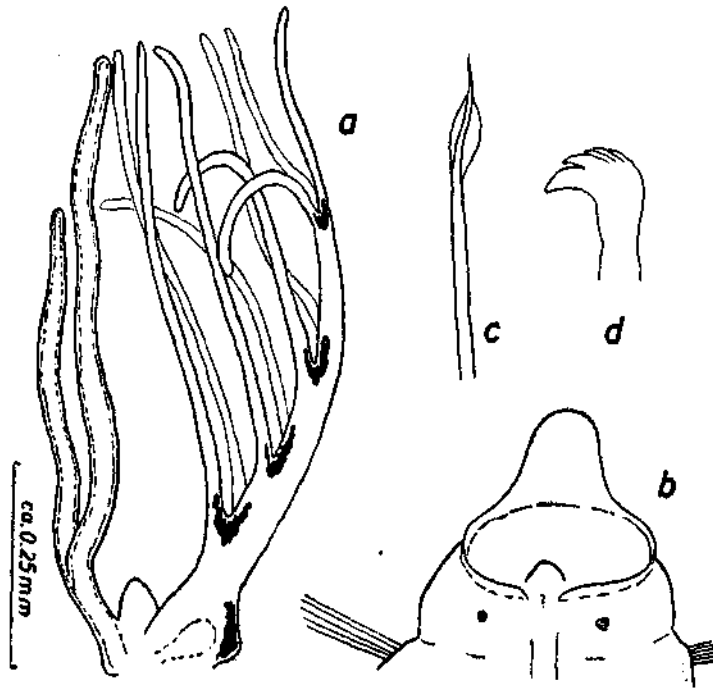


FIG. 4. *Augeneriella hummelincki Indica*, n. subsp. a. Part of the right lophophore from the left (inner) side. b. Peristomium from the dorsal side. c. Spatulate bristle. d. Thoracic hook.

long), two of which, from the 3rd to the 6th setiger, become replaced by spatulate bristles (Fig. 4 c, 70  $\mu$  long). In setigers Nos. 7 and 8 two intermediate bristles are found which approach the shape of the winged capillaries. Ventrally, from the 2nd setiger onwards, 6-7 (8) shafted uncini are present with a very strong tooth above the main fang (Fig. 4d, 50  $\mu$  long). The three abdominal setigers possess 2-3 slender capillaries (170-190  $\mu$  long) and 20-25 long-handled uncini (23-25  $\mu$  long). The uncini have 4-5 parallel rows of about 8 teeth. The thoracic furrow is not very conspicuous. There are two eye-spots on the oval pygidium.

The colour of living animals is green due to the blood lacune surrounding the digestive tract. Some specimens are dusky anteriorly. The body is very slimy in life. At the bottom of a Petri dish, the animals behave like *Fabricia* or *Manayunkia*. Suspended individuals do not swim like *Fabricia* but sink to the bottom.

**Diagnosis:** A subspecies of *Augeneriella hummelincki* Banse with a length of 2.5 mm by 0.25 mm. Tentacular crown 1/4-1/3 of total length. Each radiolus with 3-4 pairs of pinnulae. In living animals, dark pigment in the 'armpits' of the pinnulae. Dorsal gap in the collarette? Thorax: 4-5 capillaries, 2 spatulate bristles starting at the 3rd setiger, and 6-7 hooks with a conspicuous tooth above the main fang. Abdomen: 2-3 capillaries and 20-25 uncini.

**Holotype:** The holotype has been destroyed for the study of the bristles.

Paratypes will be placed at the Zoological Museum of the University of Hamburg, Germany.

*Habitat* : South India, Gulf of Mannar, near the pier of the Research Station, Mandapam Camp, among algae on stones and piles, exposed to bright sunshine and to the action of smaller waves. Near the water line the biotope is similar to the typical one of *Fabricia sabella sabella* (Ehrenberg).

*Discussion* : The new subspecies may be distinguished from *A. hummelincki hummelincki* by the apices of the thoracic hooks; further, the spatulate bristles commence on the 3rd setiger, and not on the 4th. In living animals, the pigment of the tentacular crown may be useful if it is absent in the type species. If the collarette really has a dorsal gap, the new form can be regarded as new species.

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