ON SOME MARINE INTERSTITIAL GASTROTRICHS FROM THE BEACH SANDS OF WALTAIR COAST

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Abstract

The paper reports for the first time the occurrence of thirteen species of interstitial Gastrotrichs in the beach sands of the Waltair Coast which were previously reported from European waters. Eight of the species representing seven genera belong to the order Macrodasyoidea and the remaining five representing three genera come under the Chaetonotidea. The distribution of these forms is described with reference to the tidal levels, the grain size of the sand, the temperature and salinity ranges of the environment.

Introduction

The interstitial Gastrotricha inhabiting the intertidal zone of marine beaches has received considerable attention during recent years, in some parts of the world, particularly in Europe. Many interesting new genera and species have been described as the most typical inhabitants of the intertidal sands. This habitat has been neglected in India and no previous records of the Gastrotricha are known from the Indian coasts. In the course of a general systematic and ecological investigation of the interstitial fauna of the beach sands of Waltair Coast, we encountered several species of gastrotrichs of the orders Macrodasyoidea and Chaetonotidea. The present paper lists altogether thirteen species which have been described from the European waters. All these local species present characters similar to those occurring on the European coasts except for minor variations in body size and the number of the adhesory tubules. The description of some of the new species encountered on this coast will form the subject of a separate paper.

The gastrotrichs were collected in the following manner. Sand samples were brought to the laboratory in large glass jars and kept with the lids open to facilitate aeration. In 2–3 days, the fauna concentrated in the top 2 cm. layer of the sand. A small sample of the surface sand was placed in a glass beaker and vigorously swirled with sea-water when the animals were shaken

off to the surface. The supernatant water was quickly decanted off into a petridish from where the forms were picked up with a pipette under binocular microscope. The gastrotrichs being highly thigmotactic, the addition of a few drops of concentrated magnesium chloride solution to sea-water during the washing process, proved useful in releasing the organisms which strongly adhere to the sand grains. The specimens are best observed in living condition.

The gastrotrichs were usually collected in the deeper layers of the sand near the half-tide level of the beach. The forms showed preference for substrates with coarse texture enough to form adequate interstices for their easy movement. The temperature in the habitat was fairly stable throughout the year varying from 26° C. in winter to 30° C. in summer. The salinity of the interstitial waters ranged from 24% to 34%. The following terminology is used in the text to express the approximate limits of mean grain size of the texture of substrate. Fine sand 200 μ; medium sand 200–500 μ; coarse sand 500 μ.

Order: **MACRODASYOIDEA.**

Family: LEPIDODASYIDAE.

Genus: *Acanthodasys* Remane, 1927 *a*.

***Acanthodasys aculeatus* Remane, 1927** (Figs. 1–2)

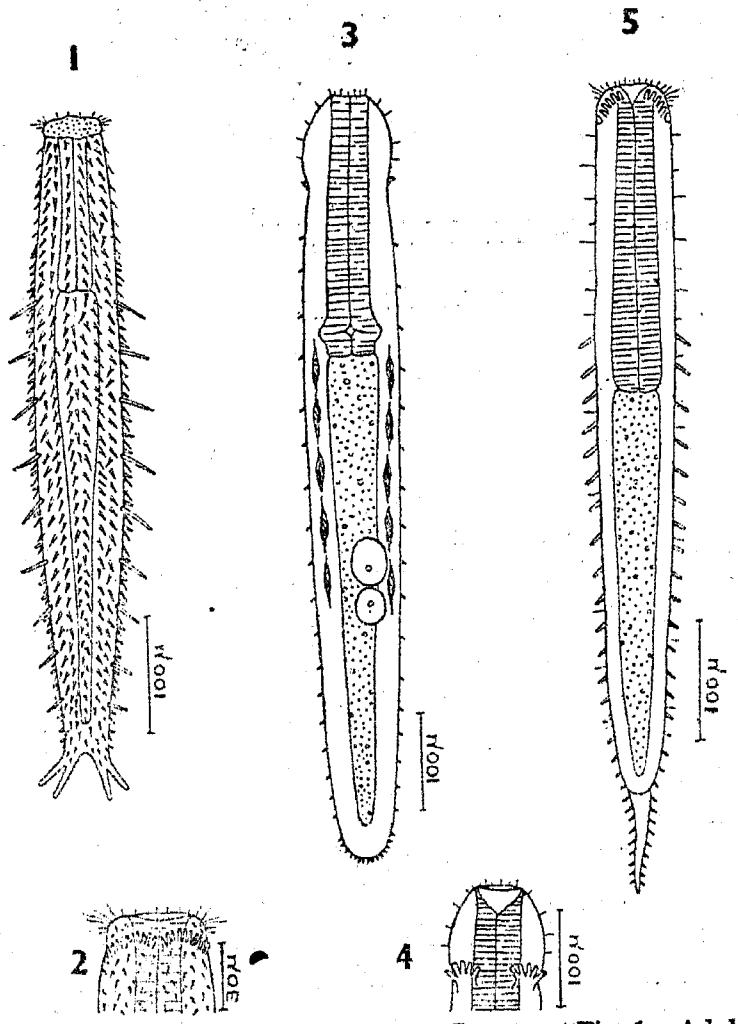
Remane (1927 *a*) described the species from the beach sands at Helgoland and later its occurrence has been reported from Roscoff (Levi, 1950), Calvados (Kaplan, 1958), Naples (Wilke, 1954), North Wales (Boaden, 1963) and Maldives (Gerlach, 1961). The observation of the species made by these authors from different places shows some variation of the type in the number and disposition of adhesory tubules (*see* Gerlach, 1961). The local forms however, resemble the Maldive specimens in the structure of the cuticular armature and the disposition of the adhesory tubules except for a slight variation in the number of the dorso-lateral tubules. The local forms bear 7 pairs of dorso-lateral tubes against the 6 pairs present in the Maldive specimens. The anterior and ventro-lateral tubules are numerous. The individuals on this coast are smaller in size attaining a length of about 600 μ while the European species according to Levi vary from 500–800 μ. The width of the specimens reaches 60 μ measuring about 1/10 of the length of the body. The pharynx forms a fourth of the length of the digestive tract. The species is

rare on this coast and only a few specimens were collected in medium sand 20 cm. below surface near the mid-water level.

Genus: *Paradasys* Remane, 1934.

***Paradasys turbanelloides* Boaden, 1960** (Figs. 3–4)

Boaden (1960) described the species from the Swedish West Coast and later reported its occurrence in the beach sands at North Wales (Boaden, 1963). The individuals on this coast conform to the original description except for some variation in body size and the number of the adhesory tubules. Boaden gives the length of the type specimens as 1 mm. and width 115 μ while the local forms are smaller attaining approximately 800×90 μ. The anterior adhesive foot consists of 6–7 tubules in the type specimen while



FIGS. 1–5. Figs. 1–2. *Acanthodasys aculeatus* Remane. Fig. 1. Adult animal dorsal view. Fig. 2. Anterior region, ventral view. Figs. 3–4. *Paradasys turbanelloides* Boaden. Fig. 3. Adult animal, dorsal view. Fig. 4. Anterior region, ventral view. Fig. 5. *Macrodasys caudatus* Remane. Adult animal, ventral view.

5 tubules only have been observed in the local forms. Sixteen to twenty lateral tubules are present. The posterior tubules are about 10–15 in the type form as against the 14–18 tubules present in the local specimens. The pharynx measures about a third of the length of the digestive tract. The species was occasionally encountered in coarse and medium sands 10–15 cm. below surface between the low and the mid-water levels.

Family: MACRODASYIDAE.

Genus: *Macrodasys* Remane, 1924.

Macrodasys caudatus* Remane, 1927 *a (Fig. 5)

Remane (1927 *a*) described the species from the beach sands at Naples. Later it has been reported at Naples (Wilke, 1954; Boaden, 1965), Marseilles (Swedmark, 1956 *a*), Roscoff (Swedmark, 1956 *b*) and North Wales (Boaden, 1963). Wilke observed at Naples some variations of the species from the original description, particularly in the structure of the penis and the tail. Individuals on this coast are in agreement with the type description. The local specimens approximately attain a length of 0·7 mm. including the tail and a width of 60 μ. The relative width of the body to its length is about 1/12. The anterior tubules are arranged in an arc of five on each side of the ventral surface of the head. The lateral tubules seem to be arranged in the same way as in the type and vary from 16 to 22 pairs, their length progressively decreasing towards the posterior end. The tail attains a length of about 80 μ and bears 8–12 pairs of tubules laterally. The pharynx forms slightly less than half the length of the digestive tract. The species was rarely encountered in coarse sands 15–20 cm. below surface between the low and the mid-water levels of the beach.

Genus: ***Urodasys*** Remane, 1926 *a*

***Urodasys viviparus* Wilke, 1954** (Fig. 6)

Wilke (1954) described the species from the Italian coast at Naples and later it has been reported from Marseilles (Swedmark, 1956 *a*) and Maldives (Gerlach, 1961). The specimens on this coast agree well with the type description. Wilke gives the length of the Naples individuals as 360 μ excluding the tail while the Marseilles forms according to Swedmark attain 400 μ. The local forms are smaller than the Mediterranean species reaching 330–350 μ while the tail measures about 900 μ in length. In the arrangement of the adhesory tubules the local forms resemble the Maldive specimens reported by Gerlach. The pharynx measures about 2/5 the length of the digestive tract. A developing embryo was seen in the body of a mature specimen.

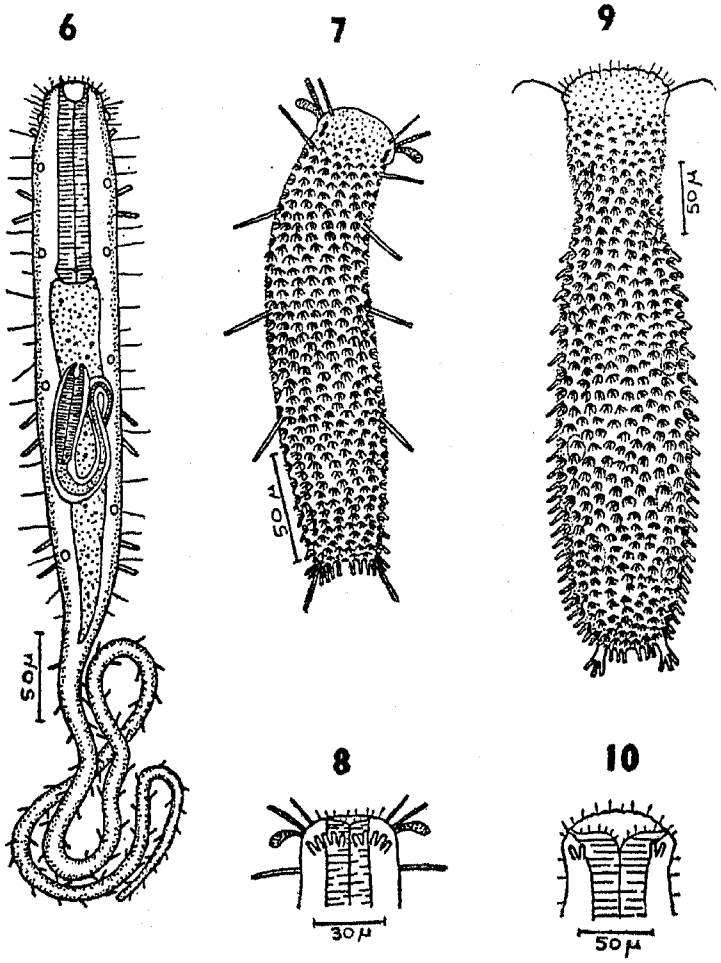
About 4–5 pairs of epidermal glands re present dorso-laterally. This species is rare on this coast and only a few specimens were collected in medium sands 20 cm. below surface between the low and the mid-water levels.

Family: THAUMASTODERMATIDAE.

Genus: *Thaumastoderma* Remane, 1926 *a*.

Thaumastoderma heideri **Remane, 1926 *a*** (Figs. 7–8)

Remane (1926*a*) described the species from the intertidal sands of the Baltic and North Sea. Later its occurrence has been reported from Roscoff



FIGS. 6–10. Fig. 6. *Urodasys viviparus* Wilke. Adult animal, dorsal view. Figs. 7–8. *Thaumastoderma heideri* Remane. Fig. 7. Adult animal, dorsal view. Fig. 8. Anterior region, ventral view. Figs. 9–10. *Tetranchyroderma megastoma* (Remane). Fig. 9. Adult animal, dorsal view. Fig. 10. Anterior region, ventral view.

(Levi, 1950), Arcahon (Remaud-Debyser, 1963), North Wales, (Boaden, 1963) and Maldives (Gerlach, 1961). The local forms approximately

measured 230 μ in length and 45 μ in width. The structure of cephalic tentacles resemble Maldive specimens. The adhesory tubules seem to be arranged in the same way as in the type. There are 5 pairs of anterior and 18–22 pairs of lateral tubules. The two pairs of reddish eye spots characteristic of the species are present in the local forms. The tetrancres are disposed in 10–11 longitudinal rows, each scale measuring about 4–5μ in size. The pharynx measures about 1/3 the length of the digestive tract. All other features agree with the type description. The species was occasionally encountered in medium sands 25 cm. below surface near the mid-water level.

Genus: *Tetranchyroderma* Remane, 1926 *a*.

Tetranchyroderma megastoma* Remane, 1927 *a (Figs. 9–10)

Remane (1927 *a*) described the species from the Mediterranean coast and later its occurrence has been reported from Naples (Wilke, 1954), Arcachon and Roscoff (Swedmark, 1956 *b*) and Calvados (Kaplan, 1958). Swedmark showed variation of size and shape of the body of the individuals at Archachon and Roscoff compared with the Mediterranean forms. Remane gives the length of the Mediterranean specimens as 400 μ while the forms at Roscoff and Arcachon according to Swedmark vary from 450 to 600 μ. The local forms approach the Mediterranean species in size attaining a length of about 400 μ but their body shape and the number and arrangement of the adhesory tubules resemble the Atlantic forms. The local forms bear 2 pairs of anterior tubules, 24–32 pairs of lateral tubules and 6 tubules between the two pedicles on the posterior border of the body. The pentancres are arranged on the dorsal surface in about 10–12 longitudinal rows, each scale measuring 3–4 μ in size. About 5–8 pairs of well-developed epidermal glands are disposed dorso-laterally. The species was occasionally encountered in medium sands 20 cm. below surface near the half tide level.

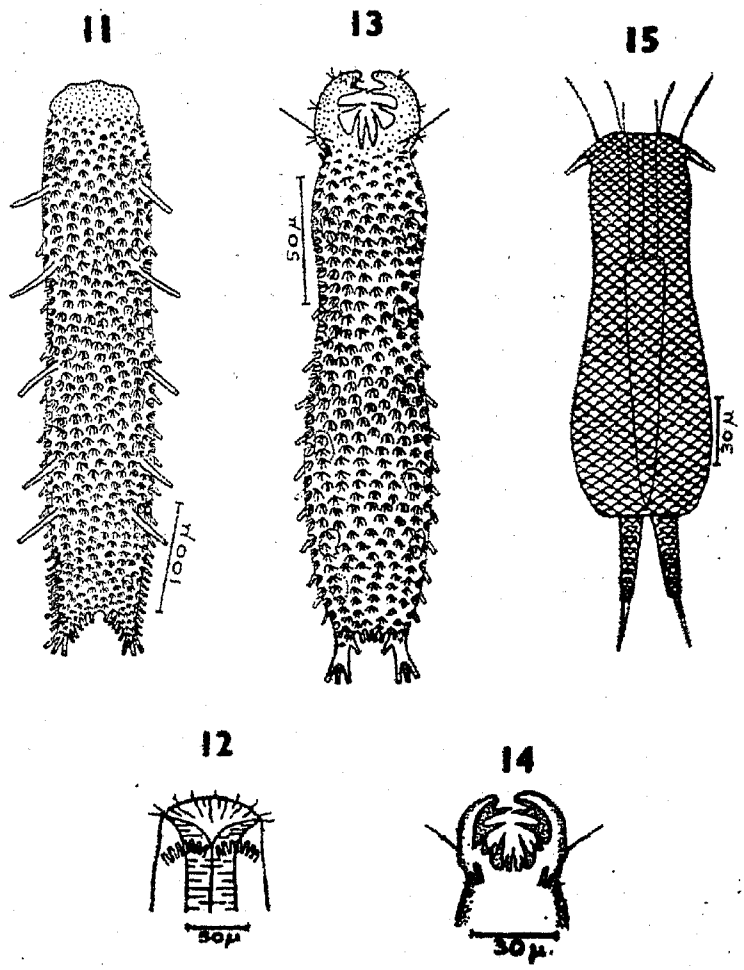
***Tetranchyroderma cirrophora* Levi, 1950** (Figs. 11–12)

Levi (1950) described the species from the beach sands at Roscoff. The local forms agree with the original description except for some variation in the number of the adhesory tubules. Levi gives the length of the Roscoff individuals as 600 μ while the local forms are slightly smaller attaining a length of about 500 μ. The width of the specimens varies between 80–90 μ measuring about 1/6 the length of the body. The Roscoff specimens bear 8 pairs of anterior and 24 pairs of lateral tubules as against the 6–7 pairs of anterior and 18–21 pairs of lateral tubules seen in the local forms. The five pairs of dorso-lateral cirri characteristic of the species measured about 30–50 μ long

in the local specimens. In the type specimens, three pairs of the cirri are dorso-lateral and two pairs dorsal, while no such demarcation could be observed in the local forms, all the cirri being disposed more or less dorso-laterally. All other features agree with the type description. About 10 tubules are present between the two pedicles on the posterior border against the 12 tubules given for the type. The tetrancres are arranged in 10–11 longitudinal rows, each scale measuring 4–5 μ in size. Only a few specimens of the species were collected in coarse and medium sands 20–30 cm. below surface between the low and the mid-water levels.

Genus: *Pseudostomella* Swedmark, 1956.

Pseudostomella roscovita* Swedmark, 1956 *b (Figs. 13–14)



FIGS. 11–15. Figs. 11–12. *Tetranchyroderma cirrophora* Levi. Fig. 11. Adult animal, dorsal view. Fig. 12. Anterior region, ventral view. Figs. 13–14. ***Pseudostomella roscovita*** Swedmark. Fig. 13. Adult animal, dorsal view. Fig. 14. Anterior region, ventral view. Fig. 15. *Xenotrichula velox* Remane. Adult animal, dorsal view.

Swedmark (1956 *b*) described the species from the beach sands at Roscoff. Later the species has been reported from Kiel (Forneris, 1961) and Arcachon (Renaud-Mornant and Jouin, 1965). The individuals on this coast conform to the original description except for some variation in the number of the adhesory tubules. Swedmark gives the length of the Roscoff specimens as 230–300 μ, while the local forms are smaller reaching only 210–230 μ. The width of the specimens reaches about 35 μ measuring 1/5 of the length of the body. The structure of the "cephalic net" is in agreement with the type species. The type form bears 4 groups of lateral tubules and no other tubules are present on the posterior border between the two pedicles. The local specimens bear 8–12 pairs of lateral tubules distributed more or less at equal distances from each other and four tubules on the posterior border between the pedicles. The tetrancres are distributed in 9–10 longitudinal rows, each scale measuring 4–5 μ in size. About 5–7 pairs of dorso-lateral epidermal glands are present. The species was commonly encountered in medium sands 15 cm. below surface near the mid-water level.

Order: CHAETONOTOIDEA.

Family: XENOTRICHULIDAE.

Genus: *Xenotrichula* Remane, 1927 *b*.

Xenotrichula velox Remane, 1927 *b* (Fig. 15)

Remane (1927 *b*) described the species from the intertidal sands of the Baltic coast. Later it has been reported from Baltic (Karling, 1954), Roscoff (Levi, 1950), Arcachon (Renaud-Debyser, 1963), Marseilles (Swedmark, 1956 *a*) and North Wales (Bodaen, 1963). Remane and Karling gave the length of the Baltic specimens as 265–300 μ while the Mediterranean species according to Swedmark reach 230 μ including caudal furca. The local forms agree well with the European species measured approximately 250 μ in length including the caudal furca. The lateral cephalic tentacles are 20 μ long bearing two long sensory bristles of 35 μ length at their base. The dorsal surface bears about 16 longitudinal rows of scales, each consisting of more than 40 scales of 3 μ in size. The pharynx is 55 μ long. The ventral cirri resemble the type description. The species was frequently encountered in medium sands 20 cm., below surface near the mid-water level.

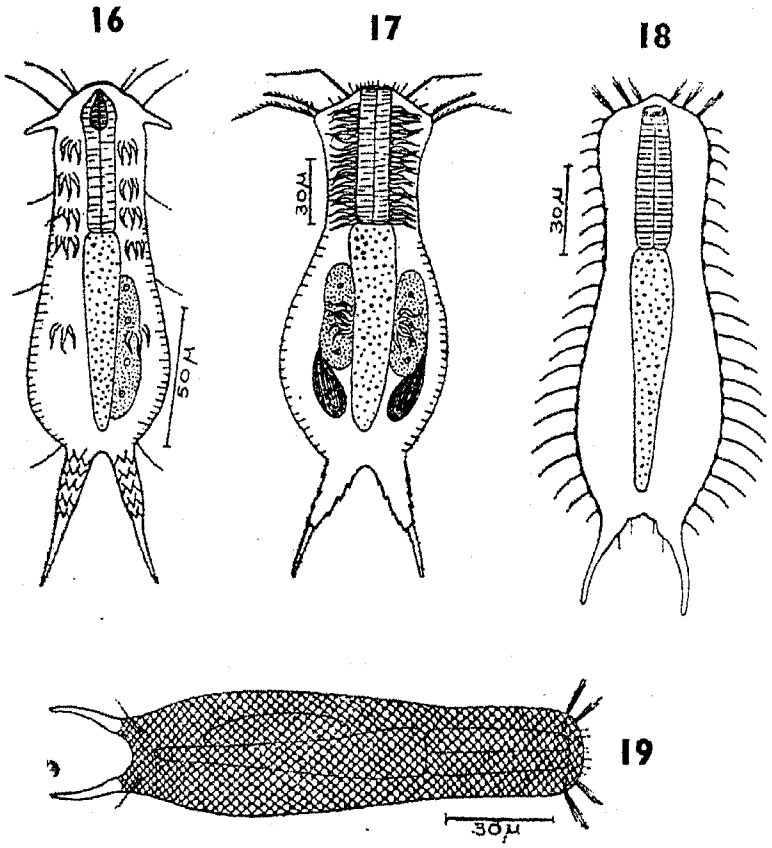
Xenotrichula subterranea Remane, 1934 (Fig. 16)

Remane (1934) described the species from the Baltic coast. Boaden (1963) reported its occurrence in the beach sands at North Wales. The

individuals on this coast conform to the original description. Remane gives the length of the Baltic specimens varying between 80–270 μ while the local forms reach 120–140 μ excluding the tail forks which measure about 40 μ in length. The lateral cephalic tentacles are 15 μ long bearing sensory bristles of 25 μ length at their base. The ventral cirri are arranged in five-paired groups of three cirri. The pharynx is 50 μ long measuring about 2/5 the length of the digestive tract. The species was occasionally encountered in fine and medium sands 30 cm. below surface near the half tide level.

Xenotrichula beauchampi Levi, 1950 (Fig. 17)

Levi (1950) described the species from the beach sands at Roscoff. Later it has been reported on the coasts of the Mediterranean (Gerlach, 1953; Wilke, 1954; Delamare—Deboutteville, 1954) and North Atlantic (Kaplan, 1958). Levi gives the length of type specimens as 180 μ excluding tail forks



FIGS. 16–19. Fig. 16. *Xenotrichula subterranea* Remane. Adult animal, ventral view. Fig. 17. *X. beanchampi* Levi. Adult animal, ventral view. Fig. 18. *X. atrox* Wilke, Adult animal, dorsal view (shown without spined scales covering body). Fig. 19. *Aspidophorus marinus* Remane. Adult animal, dorsal view.

while the Italian forms according to Gerlach attain 210–220 μ. The local forms resemble the Roscoff individuals in size and reach 180 μ excluding tail forks which reach about 55 μ in length. Variation of the local forms from the type specimens is seen in the structure of the cephalic bristles. The two pairs of the posterior sensory bristles are conspicuously denticulated in the local forms while they are more or less naked in the type specimen. The structure and disposition of the ventral cirri resemble the type description. The pharynx forms approximately 2/5 the length of the digestive tract. The species was rarely encountered in fine and medium sands 20 cm. below surface near the mid-water level.

Family: CHAETONOTIDAE.

Genus: *Chaetonotus* Ehrenberg, 1830.

***Chaetonotus atrox* Wilke, 1954** (Fig. 18)

The species has been simultaneously described at Naples (Wilke, 1954) and Brittany (Swedmark, 1955), with a variation in the disposition of the ventral spines. Later it has been reported at Marseilles (Swedmark, 1956 *a*) and North Wales (Boaden, 1963). The local specimens conform to the description of the Mediterranean species given by Wilke and reach a length of 140 μ. The caudal furca measure about 22 μ in length. The paired tufts of sensory bristles on the head are 15–20 μ long. The structure and arrangement of the spined scales resemble the type description. The pharynx is 45 μ long. The species was rarely encountered in fine and medium sands 15–20 cm. below surface between the low and the mid-water levels.

Genus: *Aspidophorus* Voigt, 1904.

Aspidophorus marinus* Remane, 1926 *a (Fig. 19)

This species has a wide geographical distribution being reported from different parts of the world. Remane (1926 *b*) described the species from the beach sands at Kiel. Later its occurrence has been reported at Roscoff (Levi, 1950), Calvados (Kaplan, 1958) Arcachon (Renaud-Debyser, 1963), North Wales (Boaden, 1963), Maldives (Gerlach, 1961) and Japan (Saito, 1937). The local forms conform to the type description. Remane gives the length of the Kiel specimens as 120–150 μ while the local forms are 140 μ long excluding the caudal furca which measure about 20 μ in length. The pair of lateral refractive bodies characteristic of the species are present on the head. The two pairs of lateral tufts of sensory bristles on the head are 15–20 μ long. The stalked dorsal scales number about 45 in each longitudinal row, each

scale measuring about 2–2·5 μ in size. The pharynx is nearly 1/3 the length of the digestive tract while it has been given $\frac{1}{4}$ for the type specimens. The species was rarely encountered in fine and medium sands 20–30 cm. below surface, near the half-tide level.

SUMMARY

The present paper reports the occurrence of thirteen species of marine interstitial gastrotrichs in the beach sands of Waltair Coast. All the species are reported for the first time from Indian waters.

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