CHAETOPTERIDS FROM JAPANESE WATERS[1)]

BY

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(With 12 Text-figures and 1 Plate)

Since MARENZELLER's (1879) description of *Chaetopterus cautus* from Japan, 5 species of Chaetopterids belonging to the three genera have been reported by several authors, viz., *Phyllochaetopterus claparedii* MCINTOSH (1885), *Chaetopterus variopedatus* RENIER (IZUKA, 1919), *Ch. kagoshimensis* IZUKA (1919), *Ch. takahashii* IZUKA (1919) and *Mesochaetopterus japonicus* FUJIWARA (1934). Of them the three species, *Ph. claparedii, Ch. variopedatus* and *M. japonicus* seem to be valid as well-established, while the other three species of *Chaetopterus* seem to be synonymous with *Ch. variopedatus* as later revised. During my sojourn at the Amakusa Marine Biological Station of the Kyushu Imperial University, at the beginning of this year, I found four species of Chaetopterids, of which two, *Telepsavus costarum* and *Mesochaetopterus minuta,* have not previously been recorded from Japan, and hence our knowledge of the Japanese Chaetopterids may be at present confined to the following five species.

1) *Phyllochaetopterus claparedii* MCINTOSH
2) *Chaetopterus variopedatus* RENIER
3) *Mesochaetopterus japonicus* FUJIWARA
4) *Mesochaetopterus minuta* POTTS
5) *Telepsavus costarum* CLAPARÈDE

With the exception of *Ph. claparedii,* which is absent from my collections, all these species were derived from Tomioka, Kumamoto

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Pref. and some of them also from Misaki, Kanagawa Pref., and also the Palau Islands.

I wish here to express my hearty thanks to Prof. Tohru UCHIDA, under whose guidance the work has been carried out. Further, I should like to express my gratitude to Prof. H. OHSHIMA, director of the Amakusa Marine Biological Station, for his valuable suggestions and generosity for providing me with a table in the Marine Biological Station, and also to Mr. K. BABA for his kindness in helping me in various ways during my stay at Tomioka. A part of the expenses of the work was defrayed through the grant of the Foundation for the Promotion of Scientific and Industrial Research of Japan.

Chaetopterus variopedatus RENIER

(Pl. V., a–c and Text-figs. 1–5)

Ch. variopedatus; JOYEUX-LAFFUIE, 1890, pp. 245–360, Pl. XV–XX; AUGENER, 1918, pp. 454–458, Text-fig. 69; FAUVEL, 1919, p. 446; IZUKA, 1919, pp. 2–3, Pl. VIII, figs. 1–5; PRUVOT, 1930, pp. 76–78.
Ch. cautus; MARENZELLER, 1879, p. 143, Pl. VI, fig. 5.
Ch. takahashii; IZUKA, 1919, p. 4, Pl. VIII, figs. 9–12.
Ch. kagoshimensis; IZUKA, 1919, p. 5, Pl. VIII, figs. 13–17.

To this species I refer a number of specimens obtained from Tomioka and Misaki. The specimens collected at Tomioka may be classified into two types according to a pronounced difference in their habitats. Those belonging to type A are usually found in muddy bottoms, forming a large U-shaped tube characteristic to the species, while those of type B inhabit irregular U-shaped tubes embedded in coral masses. Their body length is remarkably small. At first glance the specimens of this type appear to be a separate species, but after examination it was revealed that they are not different in essential points from those of the first group but distinct only in their smaller body size and the irregular-shaped tube; these features may probably be derived from their environment.

The specimens belonging to type A are all of large size, measuring 18–20 cm in their body length. Tube length about 84 to 92 cm. The anterior body region consists of 9 segments, and only one among

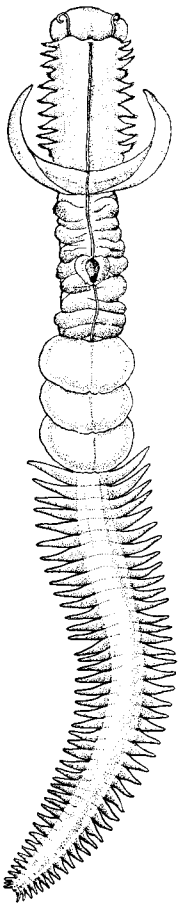

Fig. 1. *Chaetopterus variopedatus* RENIER collected from sandy flat, dorsal view. ×½.

6 specimens bears 10 segments. The posterior body region consists of 47–56 segments. The modified setae on the 4th segment are counted 23–25 in number, the similar setae are often met with on the 3rd or 5th segment, in which their number is less than in the 4th segment (10–15). The uncini of the last anterior segment bear 8 teeth. On the median region the uncini of the first 3 segments are of a subequal form and denticulated with 8–9 teeth, while the uncini of the last two segments, smaller in size, bear more teeth (12–13). The uncini of the posterior region are also small and slender, bearing 10–12 teeth on the ventral torus and 9 teeth on the lateral. A remarkable feature in the specimens of this type lies in the occurrence of paired cirri on the lateral neuropodial division of the posterior region. The species hitherto described is furnished with a single cirrus-like appendage just outside the lateral torus, while the Japanese specimens constantly bear on each torus a smaller, but distinct appendage located opposite to the normal one throughout the posterior region. As *Ch. variopedatus* exhibits a great deal of individual variation, it seems probable that the feature just mentioned may be regarded as a variation of the species. Although the previous authors who reported Japanese species did not pointed out the characteristic, '*Ch. cautus* MARENZELLER', '*Ch. variopedatus* IZUKA (non RENIER)' and '*Ch. takahashii* IZUKA' are probably provided with paired appendages.

The specimens belonging to type B are always found among corals in Tomioka. The tubes, parchment-like, rather thin but stout, and seemingly devoid of foreign materials on the outer surface, are not

of the regular U-shaped form, their main portion being embedded in the gap of the coral, with both extremities slightly extended upwards. Tube length about 70 mm and body length 20–30 mm. Prostomium hardly conspicuous. Peristomium expanded in a cup-like process

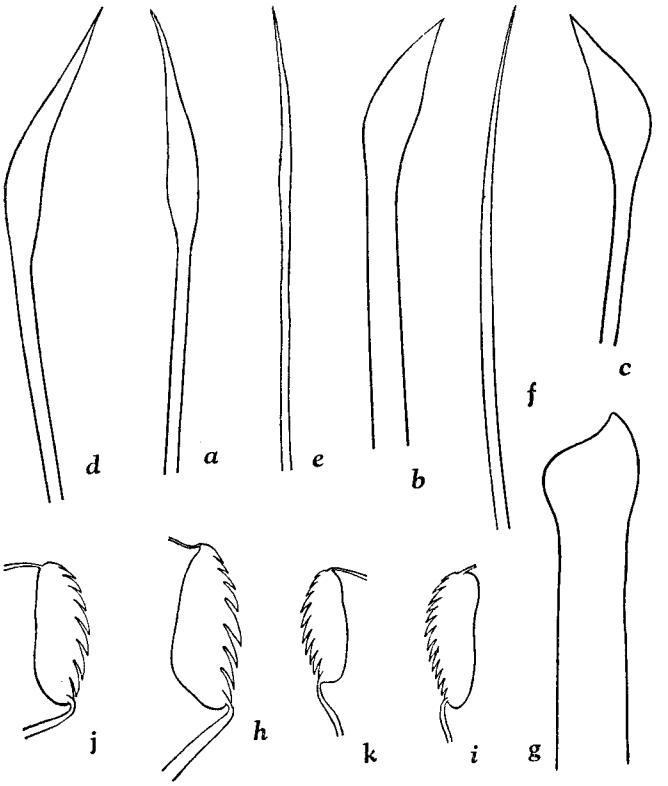

Fig. 2. *Chaetopterus variopedatus* RENIER from sandy flat (type A). *a–e*, notopodial setae of anterior body region. ×50 in '*b*' and ×65 in others; *f*, notopodial seta of middle region. ×120; *g*, modified seta. ×50; *h*, uncinus of last anterior segment; *i*, uncinus of 4th middle body segment; *j*, uncinus of lateral torus of 1st posterior segment; *k*, uncinus of ventral torus of 5th posterior segment. All ×220.

furnished with scattered madder brown pigments. A pair of short, slender tentacles. No eyes could be detected. Anterior body region always consists of 9 segments in the 11 specimens examined. The notopodia in the anterior region are similar in form, those of the 5th to 7th segments being larger than others. The 4th segment bears

4–11 stout, brown modified setae irregularly arranged in one row. The uncini of the last anterior segment bear 6–7 teeth. The middle region consists of 5 segments. The first segment bears a long aliform notopodium containing slender capillary setae. The uncini arranged in two rows on the first segment of the region have 7–8 teeth, rarely 9, and those of the last two segments are much smaller in size and

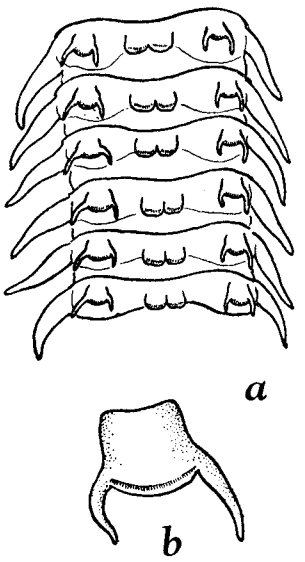

Fig. 3. *Chaetopetrus variopedatus* RENIER from sandy flat (type A). *a*, posterior segments. *b*, enlarged lateral torus in posterior region.

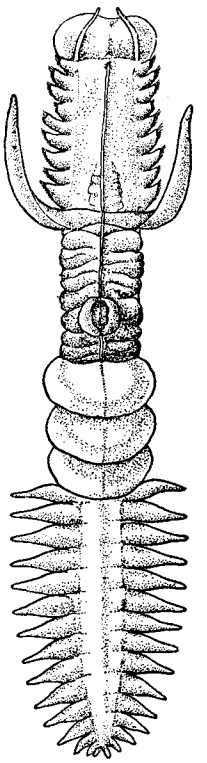

Fig. 4. *Chaetopterus variopedatus* RENIER among corals, dorsal view. ×5.

bear usually 11–12 teeth. Posterior region composed of 13–16 segments. The uncini on the lateral torus bear 8–9 and those of the ventral 9–11 teeth. The specimens of this group are characterized in their smaller size and peculiar habitat. *Ch. kagoshimensis* reported by IZUKA (1919) from Kagoshima belongs undoubtedly to

this group. On the other hand, these specimens agree with the AUGENER's description of *Ch. variopedatus* from West-Africa in the uncini and the smallness of the body. Additional ventral cirrus-like appendages are absent in the specimens under consideration, though the dorsal ones usually occur.

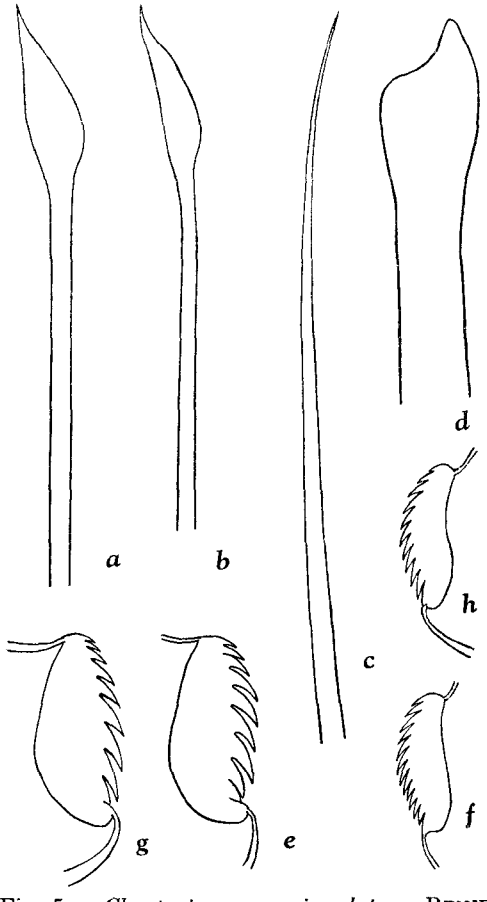

Fig. 5. *Chaetopterus variopedatus* RENIER occurring among corals (type B). *a*, *b*, notopodial setae of anterior body region. ×65; *c*, notopodial seta of middle body region. ×350; *d*, modified seta. ×65; *e*, uncinus of 2nd middle body segment; *f*, uncinus of last middle body segment; *g*, uncinus of lateral torus of posterior body region; *h*, uncinus of ventral torus of posterior region. All ×350.

Localities: Tomioka, Kumamoto Pref.; Misaki and ?Yokohama (MARENZELLER), Kanagawa Pref.; Kagoshima (IZUKA), Kagoshima Pref.; Tateyama (IZUKA), Chiba Pref.; Kagoshima (IZUKA), Ehimé Pref.

Distribution: Atlantic, Mediterranean, Indian and Pacific Oceans.

Remark: The species was first recorded by MARENZELLER (1879) from Japan for *Ch. cautus* which was afterwards referred to the present species by several authors (see FAUVEL, 1919, 1932 and PRUVOT, 1930). There is no room for doubt in identifying *Ch. cautus* with *Ch. variopedatus*. In 1919 IZUKA described two more species, *Ch. takahashii* and *Ch. kagoshimensis*. The former probably belongs to

the specimens of type A and the latter to those of type B. The characters enumerated by IZUKA to descriminate them are slight disparity of setae and difference in the proportional length to the body divisions, which are of no significance in the genus. Hence I have no hesitation in reducing them to the same single species. I will give the following list showing the characters of the Japanese species reported by the former authors together with my own observations.

	Ch. variopedatus belonging to type A	*Ch. variopedatus* belonging to type B	*Ch. Takahashii*	*Ch. kagoshimensis*	*Ch. cautus*	*Ch. variopedatus*	
						IZUKA	AUGENER
Body length	mm 180–200	mm 20–30	mm 315	mm 34	mm 78–80	mm 130–210	
Tube length	840–920	70–100	700	70	600–700		
Number of modified setae	23–25	4–11	15		20–30	20–35	4–11
Number of segments on region A	9–10	9	12	9	9	9	9
Number of segments on region B	5	5	5	5	5	5	5
Number of segments on region C	47–56	13–16	43	13	30–34	27–46	
Number of teeth of uncini on region A	8	6–7	7	8	6–7	8	7–8
Number of teeth of uncini of 1st middle segment	8–9	7–8			6–7		7–8
Number of teeth of uncini of last middle segment	12–13	11–12			8–10		12
Number of teeth of uncini of lateral torus on region C	9	8–9	8?	9?	6–7	8?	8–9
Number of teeth of uncini of ventral torus on region C	12	9–11			8–10		10–11

Region A, B and C denote the anterior, middle and posterior body regions respectively.

Telepsavus costarum CLAPARÈDE

(Pl. d, e and Text-figs. 6–8)

Telepsavus costarum; MONRO, 1933, p. 1052, Text-fig. 4, A & B.
Telepsavus sp.; POTTS, 1914, p. 969, Text-figs. 6–8.
Leptochaetopterus pottsi; BERKELEY, 1927, p. 441, Text-figs. 1–3.

The genus *Telepsavus* had been known as characterized by the body divided into two regions, the posterior one being provided with foliaceous notopodia. Together with the genus, *Ranzania* has been separated from 4 other genera among the Chaetopteridae on account of the absence of the third region of the body. Consulting this character BERKELEY (1927) founded the genus *Leptochaetopterus,* which differs from the diagnosis of *Telepsavus* in having the body divided into 3 regions and a large number of median segments. Recently MONRO (1933) describing a species *T. costarum* pointed out that the body of the species is "divided into 3 regions, and not two, as hitherto alleged: anterior region of 9 chaetigers, a middle of segments, consisting of a very variable number of segments, and a posterior region". He further mentioned CLAPARÈDE's specimens from Naples in the Museum collection "showing a hinder region with single pin-

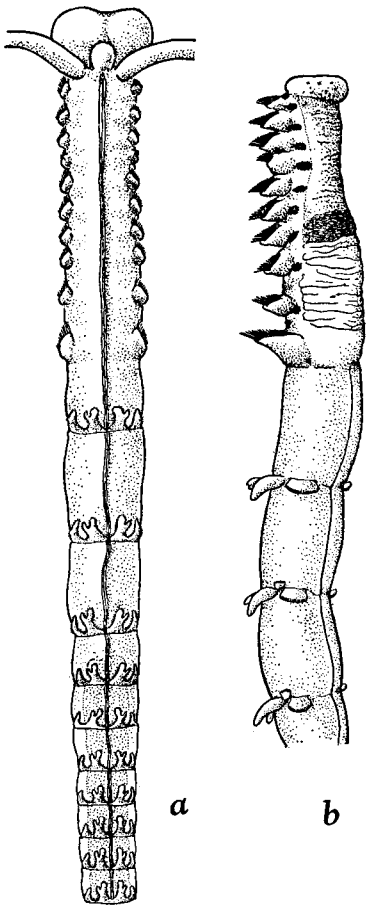

Fig. 6. *Telepsavus costarum* CLAPARÈDE. *a*, anterior body region, dorsal view; *b*, anterior end, lateral view.

shaped notopods exactly similar to that described by BERKELEY for her examples from Vancouver Islands". As to the insufficient descriptions of the previous authors about *T. costarum*, he is of opinion that "*T. costarum* is seldom obtained sufficiently intact to show the hinder region, and it has been overlooked". The Japanese specimens referred to the species agree exactly in several points with *T. costarum* as revised by MONRO and also with *Leptochaetopterus pottsi*. Therefore, the two species of different genera should probably be united into a single species *T. costarum*. A full description of the Japanese specimens will be given below.

Five incomplete specimens with fragmental tubes were obtained. Tubes, embedded in the sandy bottom, horny, translucent, long, slender, distinctly annulated at short intervals, solitary and more or less twisted. They project slightly above the surface (1–2 cm) and lie buried vertically in the ground beyond a depth of 50 cm. The longest one measures 64 cm by 2 cm. The largest specimen devoid of the posterior extremity is 18 cm long in alcohol. Ground colour of the anterior body region and the first several segments of the middle region cream-white in life and of the remaining posterior portion dark green. In general the pigmentation in the anterior portion recalls that of *Phyllochaetopterus claparedii* or *Ph. pictus*. As shown in Pl. V d, the squarish madder-brown blotches are regularly arranged on either side of the ventral groove of the tentacles from base to tip. Dots of the similar colour also arranged over the pro- and peristomium, especially on each lateral side of the prostomium. There are in the anterior region two brown bands along the both dorsal and ventral bases of notopodia. The anterior body

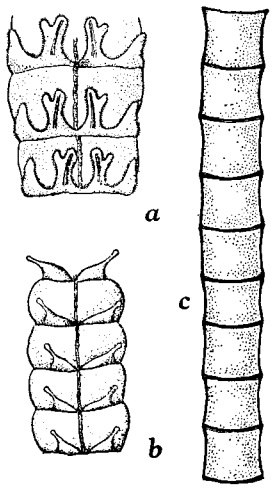

Fig. 7. *Telepsavus costarum* CLAPARÈDE. *a*, middle body segments; *b*, posterior body segments; *c*, a portion of tube. ×4.

region consists of 9–10 setigerous segments, its total length corresponding to that of 3 segments of the middle portion. The prostomium is flattened and oval in shape, the dorsal half of which sometimes

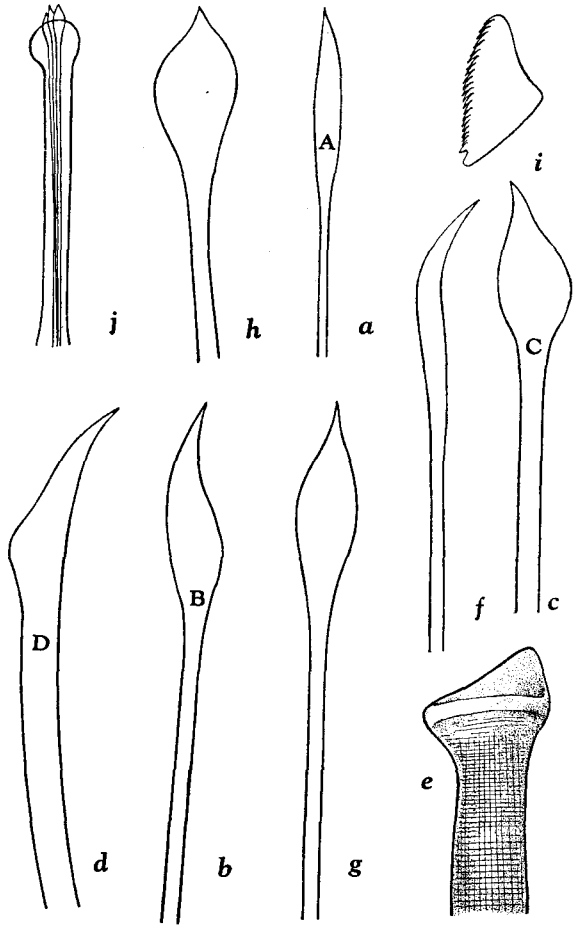

Fig. 8. *Telepsavus costarum* CLAPARÈDE. *a–d*, notopodial setae of anterior region. All ×120; *e*, modified seta. ×50; *f*, notopodial seta of middle region. ×550; *g*, *h*, notopodial setae of posterior region. ×550; *i*, uncinus of middle region. ×550; *j*, a clavate notopodium of posterior region. ×65.

barely covers the lateral lappets of the cup-shaped peristomium. From the base of the prostomium arise 2 long, slender peristomial tentacles, their tips reaching far back to the 20th to 25th body seg-

ment. Accessory small tentacles could not be detected. No eyes are visible. Ciliated groove continuous from the head to the tail. A large white glandular epithelial portion extending on the ventral side from the 7th to the 9th chaetiger is in front continuous to a broad pale brown belt. Notopodia short and stumpy. The setae are variable from the anterior end backwards. They are mostly lanceolate, but a few of the dorsal-most are longer and more slender. In the posterior 3–4 segments are found the setae shown in Fig. 8, d, which are replaced on the foregoing notopodia by the setae with symmetrical outline (Fig. 8, c). The arrangement of the setae is always in such order as A, B, C, or A, B, D from dorsal to ventral. The 4th notopodium has a single brown modified setae on the ventral-most portion. The middle body region consists of great number of segments; in the specimen bearing an uninjured middle portion the number of segments amounts to 67, and even the other incomplete ones bear 45–52 segments. The presence of a large number of segments in the middle region is remarkable character in the Chaetopteridae. BERKELEY laid stress on the character of *Leptochaetopterus* as worthy of a generic value. The segments comprising the middle portion is very variable in number (34–80 segments in BERKELEY's specimens). The notopodium is densely ciliated and consists of bifid lobes and a lateral accessory appendage. The inner lobes of the notopodium, though similar in size to the outer from the 17–18th segment backwards, are generally slightly broader. Slender capillary setae embedded only in the inner lobes are 5–8 in number on the anterior portion, but gradually decreasing to 2–3 on the posterior. The neuropodium is generally divided into two tori, but in the first middle segment the dorsal torus alone is present. The uncini are very minute, delicate, with many denticulations (20–21 teeth). No specimens being complete, I am uncertain as to the number of segments of the posterior region, but the largest specimen has 82 posterior segments. The notopodium is clavate, with a small lanceolate head bearing 2–3 slender setae slightly projecting outside.

Neuropodium biramous, uncini being quite similar to those of the middle portion.

Locality: Tomioka, Kumamoto Pref.

Distribution: Atlantic, Mediterranean, Indian and Pacific Oceans.

Mesochaetopterus minuta POTTS

(Pl. V., f, g and Text-figs. 9–11)

Mesochaetopterus minuta; POTTS, 1914, p. 962, Pl. II, fig. 4, Pl. III, figs. 7–8, Text-figs. 4–5; FAUVEL, 1930, p. 41; MONRO, 1928, p. 92; 1931, p. 25; 1933, p. 1052.

The specimens referred to the species were obtained from Tomioka and also from the Palau Islands. There is a considerable difference between the specimens of both localities in the size of the body length and the constitution of the tube, but both of them are closely allied to each other in the main parts and generally coincide with POTTS' description.

Numerous worms were obtained from Tomioka. They form a bundle of sandy tubes leaning one another in a sandy bottom at low water mark. The bundle of tubes, incrusted with sandy grains, projects slightly above the ground surface and is constricted near the level of the ground but gradually becomes loose towards the both ends. Tubes rarely communicated. The worms always inhabit the tube with head directed upwards. Body length 30–40 mm in life. Body colour milky white anteriorly, dark green posteriorly. As in POTTS' description, no pigmentation can be found, but the distal one-third of the tentacles is orange yellow in colour. The peristomium, deep cup formed, partly covers the dorsal portion of the prostomium. The slender, long, tapering tentacles arise from the base of the prostomium and attain to the posterior body region. A pair of eyes, madder-brown in colour, distinct, placed just outside the base of the tentacles. In the anterior region are 10–11 setigerous segments. The 4th notopodia bear 4–6 modified stout setae. The first 5–6 segments are devoid of the setae C shown in Fig. 11, and the setae A are not found on the last 3–4 segments. The median region consists

of 2 segments, the total length of which is much longer than that of the anterior portion. The dorsal epithelium on each side of the ciliated groove running from the anterior-most to the posterior extremity, is folded and glandular. The first segment is longer and

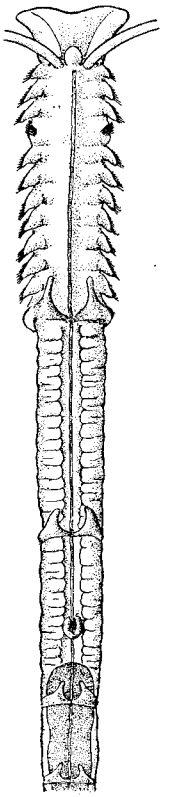

Fig. 9. *Mesochaetopterus minuta* POTTS. Anterior body region, dorsal view.

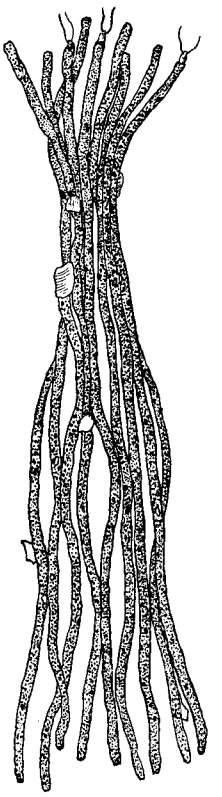

Fig. 10. *Mesochaetopterus minuta* POTTS. A portion of a tube bundle. ×1.2

has more slender conical notopodia than the others. Neuropodia of the first middle segment uniramous and those of the second biramous. The uncini bear 7–8 denticulations. The posterior body region consists of 18–21 setigerous segments in 3 specimens examined. Their neuropodia divided into 2 rami bearing small uncini with 10–11 teeth.

The specimens from the Palau Islands are all incomplete. The largest specimen bearing two posterior segments measures 26 mm in alcohol. Bundles of tubes found on a sandy beach much longer than those from Tomioka, the longest one being about 20 cm long and made of a horny substance incrusted with coarse sand-grains.

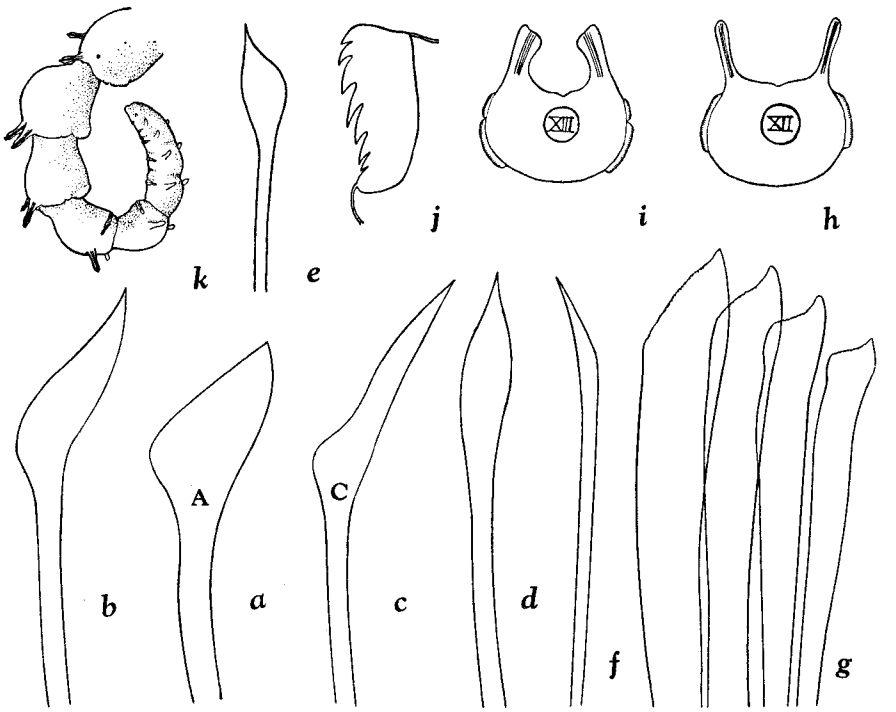

Fig. 11. *Mesochaetopterus minuta* POTTS. *a–f*, notopodial setae of anterior region. All ×350; *g*, modified setae bundle. ×220; *h*, *i*, 1st and 2nd middle segments (segment XII and XIII). *j*, uncinus of middle region. ×550; *k*, posterior end, lateral view.

The specimens rather resemble MONRO's specimens from the Low Isles. The body and tubes of both MONRO's specimens and mine are longer than the type specimens of POTTS, but in other characters quite accord with the latter.

Localities: Tomioka, Kumamoto Pref.; Marukyoku, Palau Islands.

Distribution: Atlantic and Pacific and Indian Oceans.

Mesochaetopterus japonicus FUJIWARA

(Text-fig. 12)

Mesochaetopterus japonicus; FUJIWARA, 1934, pp. 1–14, 3 Plates and 6 Text-figs.

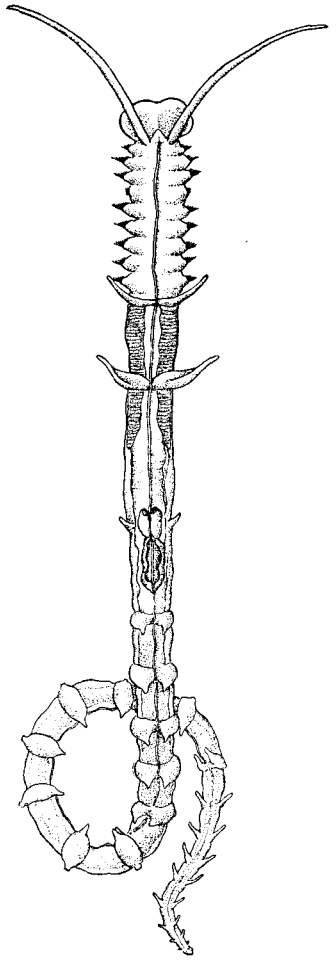

Fig. 12. *Mesochaetopterus japonicus* FUJIWARA. Entire worm, dorsal view. ×2.

A single specimen having no tube found at Tomioka measures 130 mm long in life. Anterior portion bearing 9 setigerous segments and 21 posterior ones. Modified setae 11 in number on the 4th segment. A specimen from Misaki bearing 9 anterior segments and 23 posterior ones measures about 100 mm long in alcohol. These specimens from different localities agree with FUJIWARA's descriptions and figures made of specimens from the Inland Sea. The species resembles *M. alipes* in the presence of large wings on the second segment of the middle region and in the absence of the frilled border on the same region and of the posterior feeding organ, but differs mainly from it in the presence of a 'canoe-like organ' situated just in front of the posterior portion and of the glandular character on the second middle segment.

Localities: Tomioka, Kumamoto Pref.; Misaki, Kanagawa Pref.

Distribution: Pacific coasts of Southern Japan.

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Plate V

Explanation of Plate V

a. *Chaetopterus variopedatus* RENIER from sandy flat, dorsal view.

b. *Chaetopterus variopedatus* RENIER among corals, lateral view.

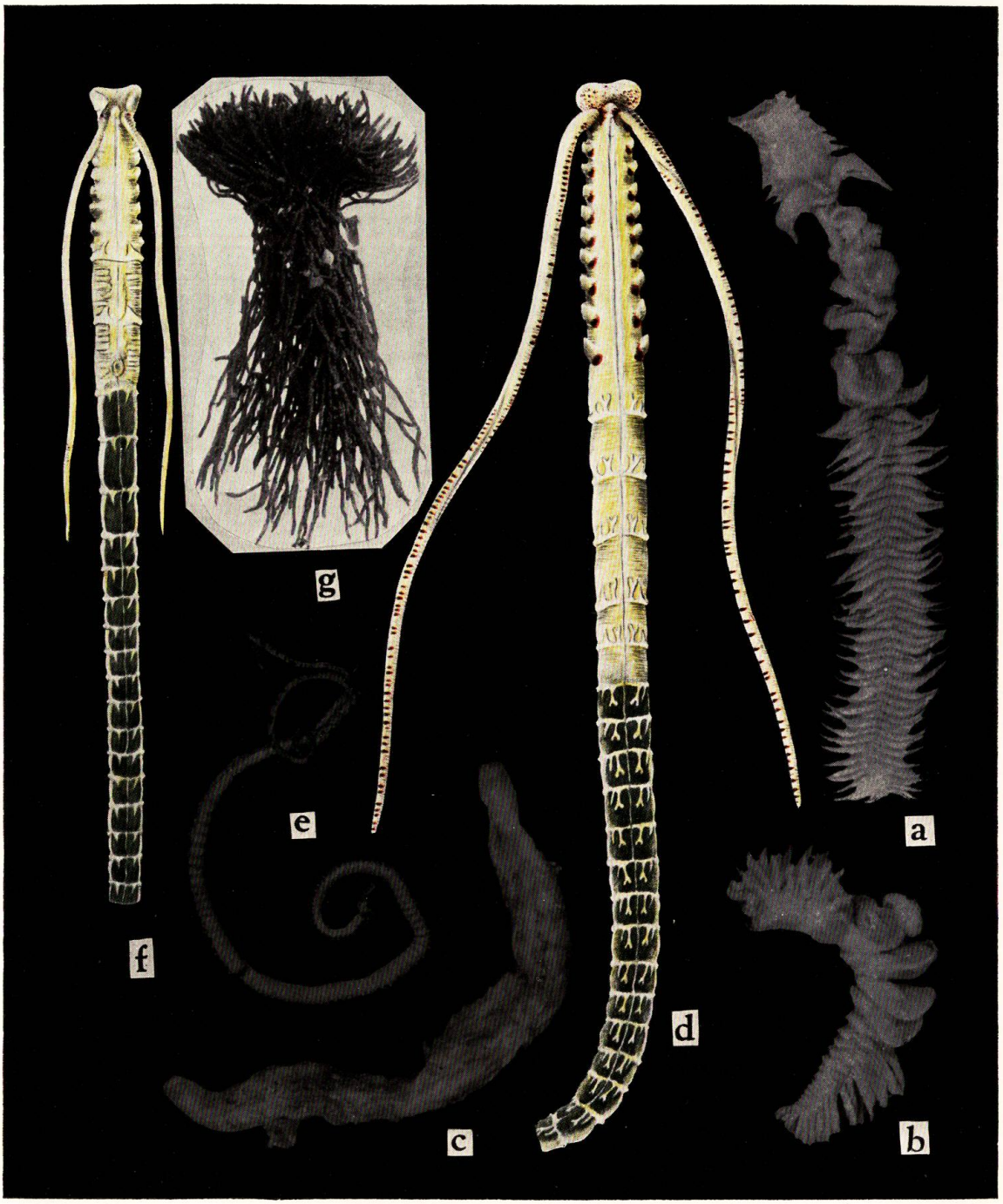
c. Tube of the same.

d. *Telepsavus costarum* CLAPARÈDE, dorsal view.

e. *Telepsavus costarum* CLAPARÈDE, lateral view.

f. *Mesochaetopterus minuta* POTTS, dorsal view.

g. Tube bundle of the same. (Mr. K. BABA photo.)



S. Okuda : Chaetopterids from Japanese waters