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THE POLYCHAETE GENUS, ACROCIRRUS, FROM JAPANESE WATERS¹⁾

BY

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(With nine Text-figures)

In 1872 GRUBE instituted the genus *Acrocirrus* for the reception of *Acrocirrus frontifilis* and placed it in the family Cirratulidae. Since that time, so far as the present writer is aware, only two species have been described, i.e. *A. varidus* by MARENZELLER (1879), from Enoshima, Japan, and *A. crassifilis* by MOORE (1923), off Santa Cruz Island. Recently the writer has had the opportunity to examine examples of Polychaeta collected from several localities in Japan, such as Misaki (Kanagawa Pref.), Muroran (Hokkaido) and Akkeshi (Hokkaido), and found among them three different species of *Acrocirrus*, including *A. varidus* and two new forms, *Acrocirrus uchidai* n. sp. and *A. muroranensis* n. sp. The former new species is named in honour of Professor TOHRU UCHIDA, from whom I have received valuable advice and by whose kind guidance the present study has been carried out. I am also indebted to Mr. M. ERI of the Misaki Marine Biological Station, through whose kindness the material from Misaki was placed at my disposal. Detailed anatomical and histological notes of these worms will be given in another paper.

Acrocirrus uchidai n. sp.

(Figs. 1-4)

A large specimen measures 40 mm long, 3.8 mm wide in its widest part, having 53 segments; a small one is 26 mm in length

1) Contribution No. 57 from the Zoological Institute, Faculty of Science, Hokkaido Imperial University.

with 67 segments. The dorsal surface of the body is arched above, while the ventral is somewhat concave. The body is widest in the middle portion and tapers at both ends. This species is characterized

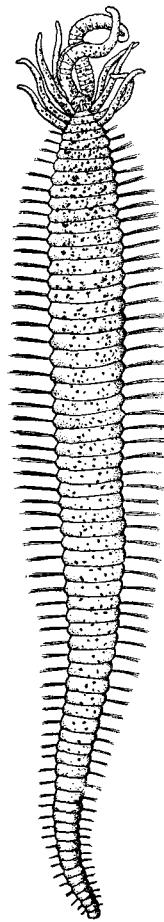


Fig. 1. *Acrocirrus uchidai* n. sp.
Dorsal view.
×9.4

by the presence of dorsal pigmented spots which are Sudan brown and scattered especially abundantly in the anterior region, including the tentacles and dorsal cirri, but are never found in the ventral part (Figs. 1 and 2, a). The colour is light pinkish cinnamon in the living state, but light brown in specimens preserved in spirit. The dorsal surface is uniformly provided with small conical papillæ which are especially abundant near the parapodium; the ventral is furnished with rather large papillæ which are arranged in one row between the neuropodial tuft and the mid-ventral line (Fig. 3). The head region, seen from above, is nearly chestnut-shaped, with crescentic ridges in the antero-lateral margin. The anterior free end of the head is dorso-ventrally bordered by a lamellæ-like ridge, terminating in a swollen end just above the mouth (Fig. 2, b and c). The tentacles, about 6 times the length of the head, are situated on each lateral side of this ridge. They are rather stout, gradually tapering to the tip, provided with irregular articulations and marked by a groove running on the middle line of their ventral surface (Fig. 1). Just below the tentacles there is a pair of thick-walled crescentic elevations transversely situated (Fig. 2, b).

These elevations are furnished with a ciliated groove which is composed of epithelial columnar cells with short cilia. This groove is surmised to be a sensory organ. The dorsal surface of the head is divided by a shallow transversal line into the small anterior and the large posterior portions. The anterior

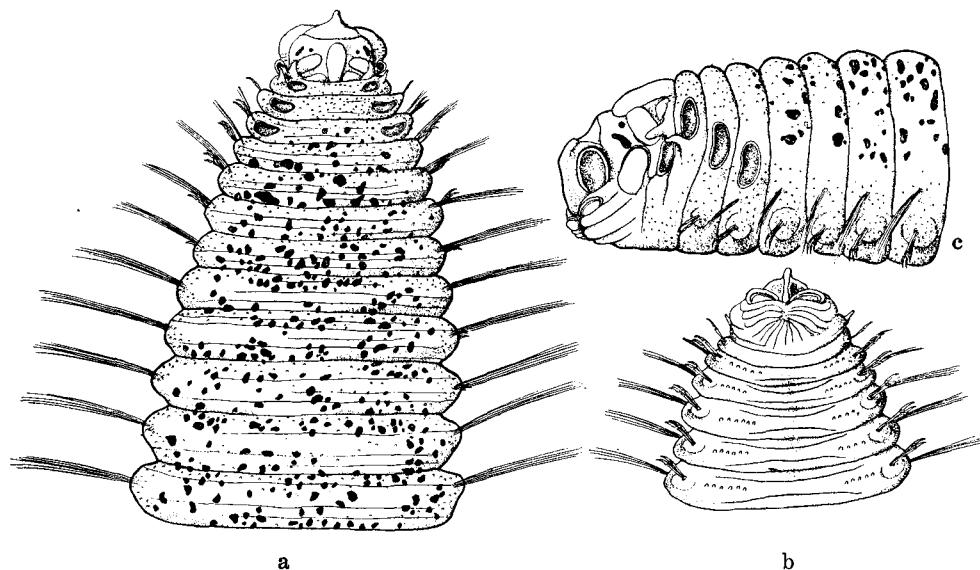


Fig. 2. *Acrocirrus uchidai* n. sp. a, Dorsal view of anterior segments, tentacles and tentacular cirri being taken off, dark dotted marks indicating pigment spots. $\times 14$; b, Ventral view of anterior portion. $\times 12$; c, Lateral view of anterior part. $\times 15$

portion is broadly triangular in shape, while the posterior one is nearly quadrate in shape and bears three pronounced elevations, one median and paired lateral ones, the latter obliquely disposed (Fig. 2, a). These elevations are not so prominent as those of *A. varidus*. Besides them, paired faint ones are found just behind the lateral ones. Of the two pairs of small black eyes, the outer are larger, and crescentic as seen in Fig. 2, a. The inner are spherical and smaller than the outer ones (Fig. 2, a). The mouth is relatively small and surrounded by about 10-13 radial foldings (Fig. 2, b). The body segments, from the first to the last throughout, are faintly divided into 2-4 annulations but no longitudinal fissures are visible in them. The first metastomial segment is very compressed dorsally and is scarcely distinguishable from the succeeding segment. Four pairs of club-shaped, slightly tapering tentacular

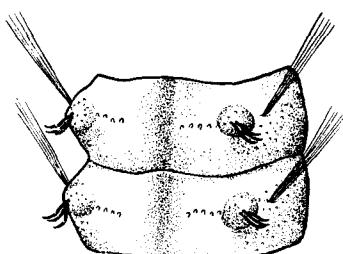


Fig. 3. *Acrocirrus uchidai* n. sp.
Ventral aspect of thirteenth
and fourteenth setigerous
segments. $\times 14$

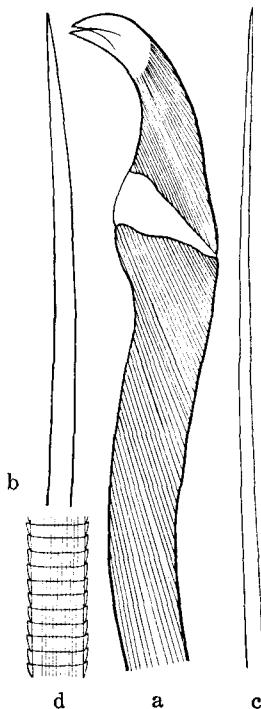


Fig. 4. *Acrocirrus uchidai* n. sp.
a, Neuropodial crochet. $\times 165$;
b, Acicula-like seta from neuro-
podium. $\times 165$;
c, Notopodial seta. $\times 90$;
d, A portion of notopodial seta.
 $\times 720$

cirri, one in each segment, arise from the definite positions of the first four segments as shown in Fig. 2, c. They are all liable to be detached. The species is different from other species belonging to the genus by the presence of paired triangular processes protruded anteriorly from the dorsal part of the first tentacular cirri. The anterior tips of these processes extend to the posterior part of the head plates which are obliquely elevated (Fig. 2, a and c). In all species examined by me the papillæ-like processes always project from just ventral in the second cirri, though MARENZELLER (1879) described its position in his generic diagnosis as, "zwischen beiden Fühlercirren ein kurzer papillenartiger Fortsatz". The neuropodial tufts, which begin to appear from segment IV, are small in the anterior portion but gradually become large in the posterior part. They are not so distinctly cylindrical in shape as those of *A. varidus* (Fig. 3). In the three species under investigation the neuropodial setæ have their head always directed anteriorly in the 1st-9th setigerous segment and then recurved posteriorly. The neuropodial setæ or crochet, always less than 4 in number in each torus, are

compound in structure; the head well developed, having distinct bifid tips and a slightly curved stem. The head and stem are connected with a thin chitinous membrane (Fig. 4, a). These setæ are present alternative in position with straight, acicula-like setæ which are embedded in the neuropodia (Fig. 4, b). The notopodial setæ, arranged in a single horizontal series in the form of a broad fan, are very long, measuring about $\frac{1}{2}$ the width of the body in the middle region, straight and indistinctly serrulated on both sides, and marked by longitudinal striations and faint regular but obscure transversal bands (Fig. 4, c and d). The notopodial setæ begin to appear at first on the second setigerous segment (V), the case being unique in this species. The first 3 somites and pygidium are devoid of setæ. The anus is terminal and opens somewhat on the dorsal side. The paired nephridia are represented by a fused U-shaped canal and each connected with the lateral side of the alimentary canal, occupying a position corresponding to segments II–XIII. Each nephridium can be divided into two parts: the upper, non-pigmented, thin-walled, rather spacious canal; and the lower, pigmented, slender cylindrical canal, the both being connected at segment XIII. The nephrostome, opening at the anterior end of the upper canal, is of a spatulate or triangular structure. The canal is lined with a single layer of columnar cells provided with long cilia, and communicated with the coelom in segment III. In transverse section the middle portion of this canal is somewhat oval and its wall consists of a single layer of flattened ciliated cells, underlined with the coelomic epithelium. The lower canal, more slender than the former, is ring-shaped in transverse section, and its epithelium is composed of columnar cells bearing cilia which gradually become shorter in the anterior portion. The canal leads to the ventral part of the 1st tentacular cirri, but the actual pore could not be found. The only specimen under examination was female. The paired masses of cream-coloured ova are bean-shaped, and are present in each segment on the sides of the alimentary canal. There are 25 pairs of gonads covering segments XIII–XXXVII. The alimentary canal consists of a buccal mass, a

pharynx, an oesophagus, and an intestine. So far as my observations go, it is impossible to indicate how many segments correspond to each portion of the alimentary canal. The buccal mass, feebly developed, is coated with a thick muscular layer and the alimentary epithelium consisting of small columnar cells very closely set. There are no gland cells in the buccal mass. The wall of the pharynx is rather thick and contains numerous spindle-shaped gland cells which are generally filled with mucous. The oesophagus is lined with ciliated columnar cells interspaced between gland cells. The epithelium of the oesophagus is, in cross section, extremely folded, especially in the posterior portion, taking the form of a rosette in the middle part of the intestine. The epithelium of the anterior portion of the intestine is universally composed of elongated cylindrical cells with short cilia. The gland cells gradually decrease in the posterior part. From near the posterior part of the intestine to the anus, there runs a distinct ventral groove, the epithelium of which consists of long ciliated cylindrical cells. The so-called heart body in the dorsal blood vessel is well developed as in other species. This species is characterized by the following points; 1) pigmented spots are distributed on the dorsal surface of the body, 2) presence of a pair of triangular processes at the base of the first tentacular cirri, 3) notopodial setæ begin to appear from the 2nd setigerous segment, 4) shape of the noto- and neuropodial setæ, 5) presence of the nephridium on segments II-XIII, 6) remarkable shortness of segment II. Two specimens were collected from gray mud at ca. 5 fathoms, in Akkeshi, Hokkaido, July 1933.

Acrocirrus muroranensis n. sp.

(Figs. 5-7)

Two specimens of this new worm were obtained. One specimen consists of 87 setigerous segments, having a length of 58 mm and a maximum width of 2.6 mm, and the other one with 82 setigerous segments measures 78 mm in length and 3 mm in breadth at the

widest portion. It is easily distinguishable from the other two species here described by its long slender form. In the living state the colour of the body is light brownish orange. Eyes black. The head, as seen from above, is roughly chestnut-shaped with a crescentic ridge on the antero-lateral corners (Fig. 5, a). The free end of the head, like *A. uchidai*, is bordered by a thin vertical ridge swollen at both ends. Tentacles, attached to lateral sides of the

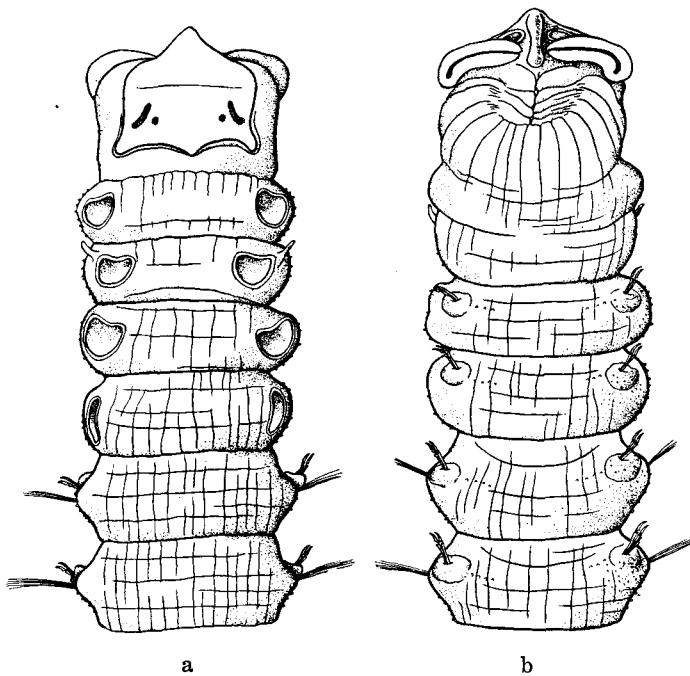


Fig. 5. *Acrocirrus muroranensis* n. sp. a, Dorsal view of anterior segments. $\times 23$; b, Ventral view of anterior portion. $\times 23$; tentacles and tentacular cirri being all detached.

anterior ridge, are detached in the specimens at hand. Paired ciliated grooves are recurved posteriorly in the outer portion, extending laterally from the basal part of the tentacles. On the dorsal surface there is a faint transversal line dividing the area into a small anterior and a large posterior part. The eyes are situated be-

hind the transversal line, in two pairs, the inner one small and spherical, the outer large, banana-shaped, slightly recurved inwards in the middle portion (Fig. 5, a). These eyes are black but often become obscure on account of the dark mottled pigments. The remarkable character of this species is the lack of the elevated ridges in the posterior region of the head, found in *A. uchidai* and *A. varidus*; the corresponding area is flattened and has no indication of the elevations. Encircling the eye area is an approximately quadrate invagination with two short postero-lateral wings and a

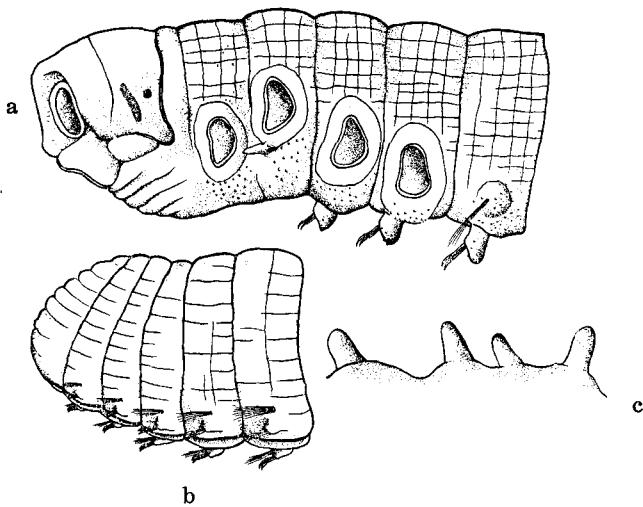


Fig. 6. *Acrocirrus muroranensis* n. sp. a, Lateral aspect of anterior portion. $\times 25$; b, Lateral view of caudal segments. $\times 19$; c, Papillæ of dorsal body wall. $\times 90$

slight median elongation. The body is slender and nearly round throughout, somewhat arched dorsally and concave ventrally. Segment II, about $\frac{1}{2}$ the length of the head, is separated from the latter by a distinct furrow, and segment III is, in length, approximately equal to segment II. The remainder of the body is nearly uniform in width but slightly tapering to the end. The surface of these segments is subdivided into 2-4 annulations and marked with longi-

tudinal striations. Irregular quadrate areas made by the annulations and striations are not so prominent as in *A. varidus*. Four pairs of stout tentacular cirri occur on the dorsum of segments II, III, IV and V. The first pair of cirri are about 4 mm in length, the second, third and fourth being 5 mm and 4.8 mm respectively. A toe-shaped

process arises from the ventral basis of each second tentacular cirrus (Fig. 6, a). The skin of the body is elevated, forming numerous small conical papillæ which are especially crowded near the lateral parts (Fig. 6, c). Neuropodia situated on the lateral angles of the body begin to appear from segment IV. They are small in the anterior segments but gradually become prominent in the middle region, and then again become smaller in the posterior part. Though the neuropodia are better developed than those of *A. uchidai*, they are not so evident as those of *A. varidus*. They contain 3-4 compound setæ, seldom more than 4 in number, which are rather more slender in shape than those of other species. The setæ always consist of a head with bifid tips and a curved stem with distinct oblique striations. As seen in *A. uchidai*, the arrangement of the setæ changes abruptly behind the 10th setigerous segment. Besides these setæ, acute and finely tapered acicula-like ones are embedded in the neuropodia intervening with the former setæ (Fig. 7, b). From segment VI posteriorly notopodial tubercles are present on the dorsal side of the neuropodium, bearing a tuft of very soft and slender capillary

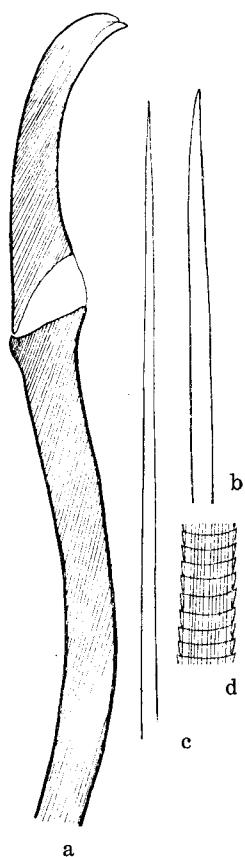


Fig. 7.
Acrocirrus muroranensis
n. sp.

a, Neuropodial crochet. $\times 260$; b, Acicula-like seta. $\times 165$; c, Noto-podial seta. $\times 260$; d, A portion of notopodial seta. $\times 720$

setæ furnished with faint serrations. Each seta is striated longitudinally and marked by a slight transverse band. The capillary setæ of this species are roughly $\frac{2}{3}$ the length of those of *A. uchidai* (Fig. 7, c and d). The first 2 metastomial segments and the pygidium are both achætous. The anus is situated terminally and somewhat dorsally. The nephridia are generally of a similar form and structure to those of *A. uchidai*, but, so far as has been observed in one specimen, they differ from the latter as to the position at which the upper and lower canals are joined. In the present species the right nephridium extends from segment II to X (7th setigerous segment) and the left one lies between the segment II to XI (8th setigerous segment). The gonads, so far observed in a male, are present from segment XIV (11th setigerous segment) to segment XXXIII (20 pairs in all) in the left side and to XXXII (19 pairs in all) in the right. They are somewhat irregularly peach-shaped, yellow orange in a preserved specimen, and situated beside the alimentary canal. The alimentary canal is very elongated and slender in the intestinal region, comparing with that of other species. The epithelium of the anterior portion of the intestine is characterized by the presence of paired prominent foldings, one dorsal and another ventral. These foldings are again subdivided in the posterior portion into several smaller foldings. The ventral groove is distinct. This form is characterized by the following points; 1) absence of elevated ridges in the head region, 2) remarkably slender and cylindrical body, 3) anterior body segments well differentiated by distinct furrows, 4) shape of the setæ, 5) position of nephridium (?). Two specimens were collected under stones between tide marks at Muroran, Hokkaido in May, 1933.

Acrocirrus varidus MARENZELLER

(Figs. 8 and 9)

A large specimen consisting of 108 segments is 74 mm long and 4 mm wide in the broadest portion; a small one made of 49 segments

is 18 mm in length. The entire body surface is rugose and rather distinctly subdivided into somewhat elevated squarish areas. Throughout its whole length the dorsal surface is exceedingly convex, while the ventral is concave. In the living state the body colour is dark brown, darker in the anterior region and dorsal part than in the posterior and ventral. Both eyes are black. Two tentacles and 4 tentacular cirri. The ciliated grooves are similar to other species in

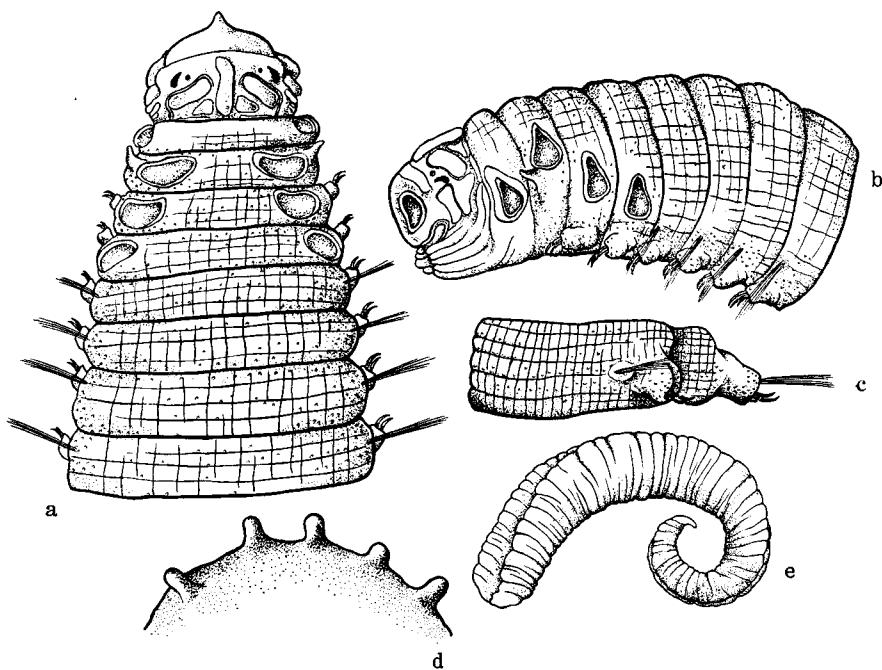


Fig. 8. *Acrocirrus varidus* MARENZELLER

a, Dorsal view of anterior portion. $\times 14$; b, Lateral view of anterior part. $\times 14$; c, Lateral aspect of twentieth setigerous segment. $\times 12$; d, Papillæ of dorsal body wall. $\times 120$; e, Tentacle, left side view. $\times 8$

position and form. The head region is divided into the anterior small and the posterior large part, of which the latter is surmounted by three remarkable and two indistinct elevations. The remarkable elevations are represented by a median spindle-shaped and two paired side ones. The indistinct elevations are broadly triangular and

situated on both sides of the base of the median elevation (Fig. 8, a). These elevations are more remarkable than those of *A. uchidai*. Papillæ-like processes arise on each lateral side of segment III (Fig. 8, b). Neuropodia, indicating a flat, swollen, cylindrical mass, and well developed and projecting antero-laterally. The neuropodial

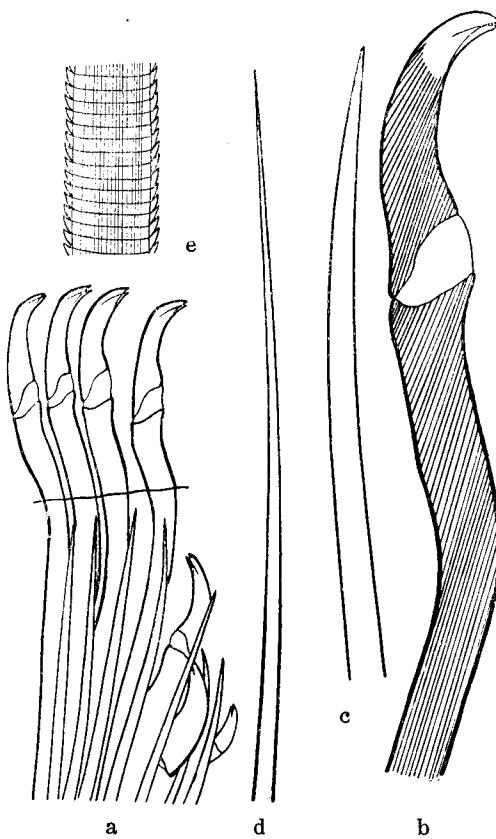


Fig. 9. *Acrocirrus varidus* MARENZELLER

a, 10th neuropodium. $\times 56$; b, Neuropodial crochet. $\times 120$;
c, Acicula-like seta. $\times 220$; d, Notopodial seta. $\times 120$;
e, A part of the same, enlarged. $\times 960$

setæ are stout and golden brown in colour. They are arranged in a row, the posterior ones being more strongly recurved in the head (Fig. 9, b). There are straight and tapered acicula-like setæ alter-

nating in position with neuropodial setæ (Fig. 9, a). The neuropodial setæ have each a head posteriorly directed in the 10th setigerous segment to the caudal segment. The notopodial setæ begin to appear from the 3rd setigerous segment, being thin and capillary hair-like as seen in *A. muroranensis*. The nephridia are found in segments II-XIII, zig-zag in form. The upper canal of the species is more spacious than that of the others. In one female the ovaries are 25 paired and situated in segments XV-XXXIX and in another specimen, 17 paired and found in segments XV-XXXI. The number of the gonads appears to be variable in this genus. The alimentary canal of this species presents similar features as in *A. muroranensis*, but the foldings of the epithelium of the intestinal region are more prominent and the ventral groove is more obscure than in the latter. Several specimens were collected under stones between tide marks at Misaki, Kanagawa Pref., April, 1933.

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