

## Dense Aggregation of *Chaetopterus longipes* Crossland, 1904 (Chaetopteridae, Polychaeta) in Coral Reefs at Okinawa, Japan

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**Abstract** *Chaetopterus longipes* Crossland, 1904, is first discovered from Japan, and the dense aggregation of the species is discussed. It inhabits irregularly U-shaped tube embedded in coral masses. In Okinawa, large colonies of *C. longipes* comprising up to 40 worms per colony were discovered on coral rubbles and among colonies of soft corals. The morphology and colony structure of *C. longipes* are described and compared with features of *C. cautus* Marenzeller, 1879, the local species being referred to *C. variopedatus*.

**Key words:** *Chaetopterus longipes*, *Chaetopterus cautus*, colonial polychaete, coral reefs, western pacific.

*Chaetopterus variopedatus* (Renier 1804) is often considered to be a common and cosmopolitan polychaete (Day, 1967; Hartman, 1969), but Petersen (1984a, b) pointed out that this is not the case and that variability in the species has been greatly overestimated. Many *Chaetopterus* species are large and inhabit U-shaped tubes in muddy bottoms (Marenzeller, 1879; Enders, 1901; Bailey-Brock, 1987), but smaller, epifaunal species attaching to hard substrates are also known (Petersen, 1984b).

At Zampa Cape, the Onna region of Okinawa Island, large colonies of a small *Chaetopterus* at first thought to be *C. kagosimensis* were found. The colonies comprised about 40 worms each and were found among coral rubble and colonies of coral colonies. Dr. Mary E. Petersen, Zoological Museum, University of Copenhagen, examined some of the material and informed me (in litt.) that the species is probably *C. longipes* Crossland, 1904, originally described from the Maldive Archipelago, Indian Ocean and later reported by Kohn and Lloyd (1973, as *C. variopedatus*) from Easter Island, southwestern Pacific Ocean: a detailed redescription of the species is in preparation by Dr. Petersen and will be published elsewhere. As *C. longipes* is incompletely known and additional material would be welcome, some features of the mor-

phology and colony structure of the Okinawa specimens are described here. Five chaetopterid polychaetes (*Chaetopterus variopedatus* (Renier, 1804), *Mesochaetopterus sagittarius* Claparède, 1868, *Phyllochaetopterus verrilli* Treadwell, 1943, *P. herdmani* Willy, 1905, *Spiochaetopterus costarum costarum* Claparède 1868) are known from Okinawa (Uchida, 1990; Nishi and Arai, in prep.); this appears to be the third record of *C. longipes* since its original description. Although I searched various locations in Okinawa intensively, I was not able to find the solitary U-shaped tubes of *C. variopedatus*. The specimens examined are deposited in the Natural History Museum and Institute, Chiba.

Dr. Petersen has also examined some of my specimens of the larger, solitary species treated herein and earlier referred to as *C. variopedatus* (Renier, 1804), and informed me (in litt.) that this is probably *C. cautus* Marenzeller, 1879, a distinct species and not a synonym of *C. variopedatus*. A redescription of *C. cautus* will be published elsewhere (Petersen, in prep.); to date *C. cautus* appears to be the only known species of *Chaetopterus* with a dorsal and ventral cirrus on the lateral lobes of the posterior neuropodia.

***Chaetopterus longipes* Crossland, 1904**

*Chaetopterus longipes* Crossland, 1904: 277–278, text-fig. 40, pl. 19, figs. 1–2.

*Chaetopterus variopedatus*: Kohn and Lloyd, 1973: 702, 707 (table 1).

*Chaetopterus variopedatus*: Uchida, 1990: 58 (not Renier, 1804).

**Material examined.** All specimens were collected by hand by E. Nishi, on 4 and 5 May 1995, at Zampa Cape, Okinawa Island (127° 43'E, 26°26'N), 0.5 m in depth, among coral rubble and soft corals. CBM-ZW-25 (a part of colony including many worms and tubes); -ZW-26 (1 specimen, 10 mm long); -ZW-27 (1 specimen with tube, 8 mm long); -ZW-28 (1 specimen with tube, 12 mm long); -ZW-29 (1 specimen with tube, 14 mm long); -ZW-30 (1 specimen with tube, 12 mm long); -ZW-31 (1 specimen with tube, 7 mm long); -ZW-34 (1 specimen, 10 mm long); -ZW-32 (many empty tubes, partly damaged); -ZW-33 (many empty tubes, partly damaged).

**Description.** Anterior, middle and posterior regions are here called A, B and C (see Bhaud *et al.*, 1994). Body up to 14 mm long, 1 mm wide at A5 without parapodia, 3 mm wide to tips of parapodia excluding setae (up to 9 mm long and 2 mm wide without parapodia according to Crossland, 1904). Up to 26 segments: 9A+5B+4–12C (up to 23 segments according to Crossland, 1904).

Anterior region (A) creamy white, with 1 pair of short, tapered palps, with reddish subdermal eyes just above tentacles and visible through ventral surface of peritomeum. Segments A1–A9 uniramous, segment A9 without neuropodia or uncini (Fig. 1A). Ventral shield (plastron) creamy, becoming whitish between the posterior part of anterior region and anterior part of middle region.

Middle region (B) whitish to pale yellowish, with digestive gland greenish to blackish in fresh material, fading in alcohol; with 5 segments with biramous parapodia; B1 notopodia winglike (alata); B2 notopodia fused middorsally, forming a dorsal cupule; B3–B5 notopodia fused dorsally as fan-shaped paddles (Fig. 1A). Neuropodia of middle segments flattened, bilobed, sucker-like; B1 neuropodia fused ventrally

forming transversely oval sucker with anterior and posterior rows of uncini; B2 neuropodia similar, but slightly smaller; B3–B5 neuropodia fused ventrally, flap-like, with single row of uncini on posterior edge of suckers.

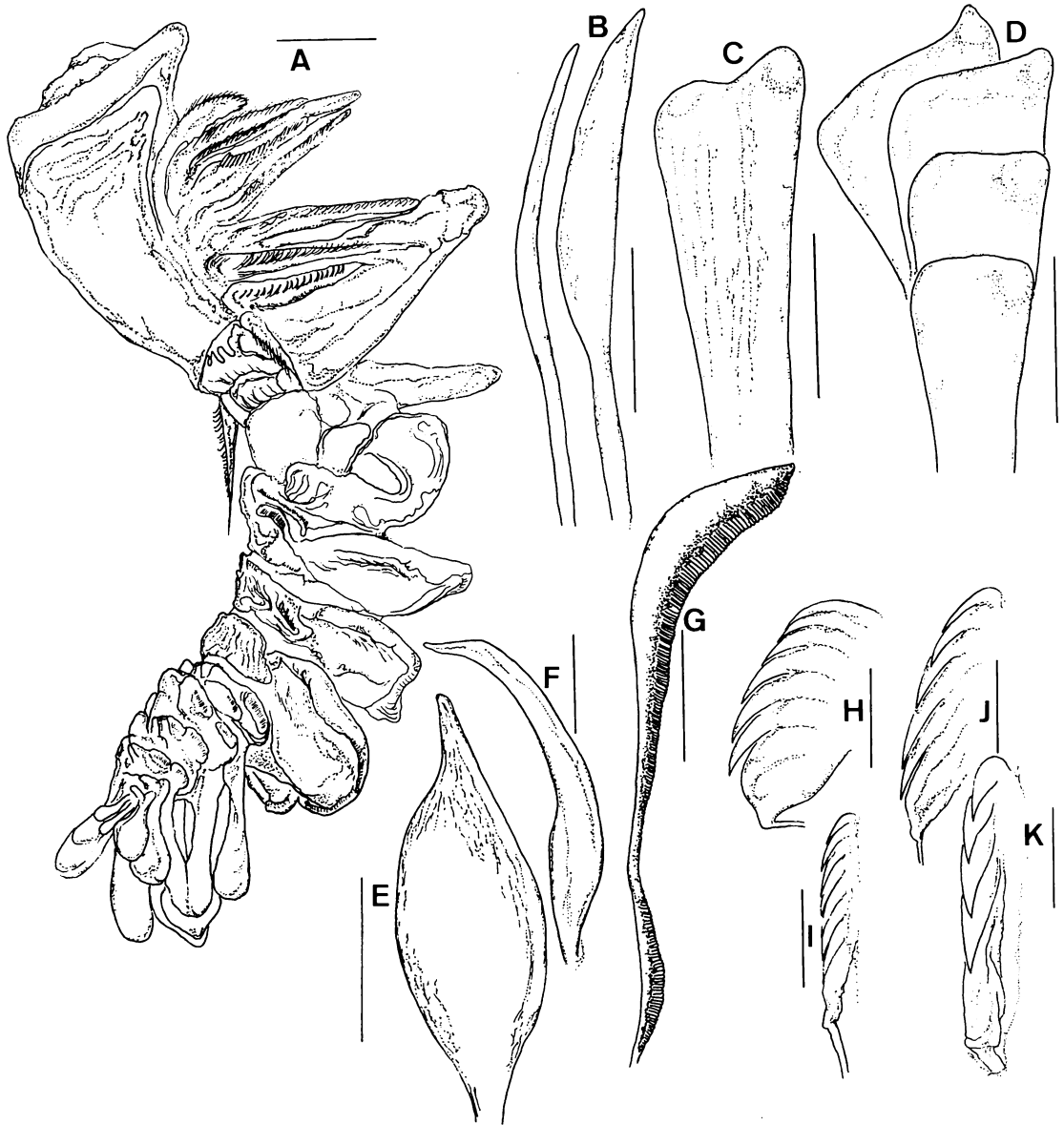
Posterior region (C) whitish to yellowish; notopodia club-shaped, narrow basally, swollen distally; neuropodia bilobed, those of C1 with small cirrus dorsal to lateral lobe, those of C2 to last without cirri (Fig. 1A).

No signs of asexual reproduction in structure of body.

Parapodia A1–A9 uniramous, with notopodia only. Notosetae of A4 comprised of modified cutting setae basally, pale yellowish to amber in colour, about 6–8 per notopodium (Fig. 1C, D); and paler lanceolate setae distally. Parapodia of A1–A3 (Fig. 1B) and A5–A6 (Fig. 1E) with simple, lanceolate or leaf-like setae; those of A7 and A8 similar but more slender (Fig. 1F); A9 parapodia with sickle-shaped notosetae (Fig. 1G). Neuropodial uncini of anterior rows of B1 and B2 with 5–6 teeth (Fig. 1H); uncini of posterior rows of B1 and B2 with 4–6 teeth (Fig. 1I, K); uncini in ventral lobes of region C with 6–8 teeth (Fig. 1J), those in lateral lobes with 5–6 teeth (according to Crossland, 1904, C uncini of ventral lobes with 7 teeth and those of lateral lobes with 4–5 teeth).

**Description of tube.** Tubes are irregularly curved, open at both ends, and approximately 5–15 cm long and 1–5 mm wide. The tubes are tough and covered with neumerous fragments of shells, foraminiferans, bryozoans, fine coral rubble and some coarse sand, the interstices clean or covered with mud (Fig. 2). The size of one colony was about 20×20 cm, and a smaller one 10×5 cm, with over 40 and 10 worms, respectively. The tubes were attached to each other, with the distances between tube openings ranging from 0.3 to 4 cm, average 2.5 cm (N=16).

**Remarks.** The present material was originally identified as *Chaetopterus kagosimensis* Izuka, 1911, but differs from this species in lacking neuropodia on A9. Izuka (1919), Okuda (1935), and Imajima and Hartman (1964) discriminate between solitary and colonial types on the basis of differences in setae and in the relative lengths of the body regions. Okuda



**Fig. 1.** *Chaetopterus longipes* Crossland. Entire specimen and setae, drawn from scanning electron micrographs; in figure text, A, B, and C=segments of anterior, middle and posterior regions. A, whole body, left lateral view; B, simple notosetae of A1-A3; C and D, cutting setae of A4; E, leaflike notosetae of A5-A6; F, slender simple notosetae of A7-A8; G, sickle-shaped notosetae of A9; H, neuropodial uncini of anterior row of B1; I and K, neuropodial uncini of segment of region B; J, neuropodial uncini of region C. Scale bars: A = 1 mm, B-E = 50  $\mu$ m, F = 20  $\mu$ m, G-K = 10  $\mu$ m.

(1935) noted additional differences between the two types, such as the presence of a pair of cirrus-like appendages on the lateral torus. I give 6 characters below differentiating the above two types based on comparisons between specimens of *C. cautus* collected at Kojiro Beach, near Misaki Marine Biological Sta-

tion, 6, May 1941 (deposited in Misaki Mar. Biol. St., 5 specimens measuring 15 to 30 cm in body length) and *C. longipes* from Okinawa (CBM-ZW-25, -ZW-26 and -ZW-27).

1) Both species have one pair of small tentacles, but in *C. longipes* the tentacles are wider and longer relative to the size of the head than

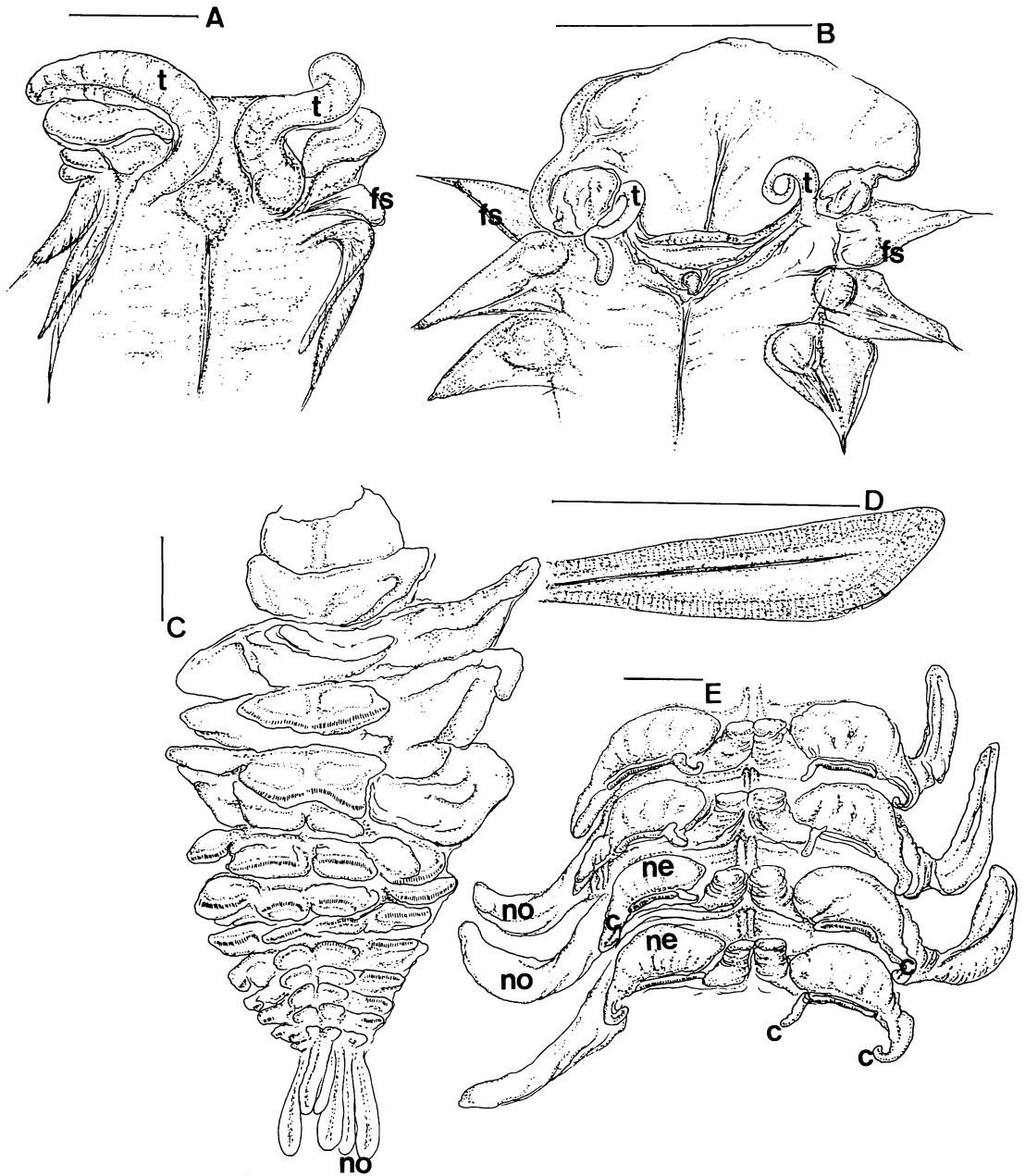


**Fig. 2.** Colony of *Chaetopterus longipes* Crossland, showing whole colony (lower) and close up (upper) views. Length of colony in lower photo is about 20 cm.

in *C. cautus* (compare Fig. 3A and B).

2) The number of segments in region A is constantly 9 in *C. longipes* (N=10), whereas it is

usually 9 or 10, rarely 11 (own observations; 9 segments, 2 specimens: 10 segments, 2 specimens: 11 segments, 1 specimen in *C. cautus*).



**Fig. 3.** Comparison of *Chaetopterus longipes* Crossland and *C. cautus* Marenzeller. A, anterior region of *C. longipes*, dorsal view (CBM-ZW-27); B, anterior region of *C. cautus*, dorsal view; C, posterior region of *C. longipes* (CBM-ZW-25), ventral view; D, club-shaped notopodium of *C. longipes* (CBM-ZW-25); E, posterior region of *C. cautus* showing segments C23–C26, ventral view; c, cirrus-like appendage of C-neuropodium; fs, first segment of anterior region; nt, notopodium; nu, neuropodium; t, tentacle. Scale bars: A, C–D=1 mm, B=10 mm, E=5 mm.

3) In *C. longipes* all parapodia of region A are uniramous, whereas in *C. cautus* the last pair of parapodia in region A (A9 or whatever is the last A segment) are bilamous, with neuropodia

with uncini.

4) The C notopodia are basally constricted and distally swollen in *C. longipes* (Fig. 3D), whereas in *C. cautus* they are conical and dis-

tally tapering (Fig. 3E).

5) The lateral C-neuropodia of *C. longipes* have a single cirrus-like appendage dorsally or lack cirri entirely (Fig. 3C), whereas in *C. cautus* they are provided with a pair of cirrus-like appendage (Fig. 3E).

6) The tube of *C. longipes* are basically U-shaped, but irregular, their main portion being embedded in the crevices of the dead coral, with both extremities slightly extended upwards, while tubes of *C. cautus* are more symmetrical and embedded in the bottom sediment.

**Biology.** Dense aggregations of individuals occur in shallow water attached to soft corals and coral rubble (Fig. 2). Near this chaetopterid colony, two solitary worms (probably detached from that colony) were found out under the calcareous algae.

**Distribution.** *Chaetopterus longipes* is presently known only from the Maldive Archipelago (type locality), Easter Island, and Okinawa Island, distributed not only in Okinawa, among corals and coral rubble, from the intertidal zone to about 27 m.

### Acknowledgments

I would like to express my thanks to Dr. Mary E. Petersen, Zoological Museum, University of Copenhagen, for her critical comments and linguistic corrections, and for providing unpublished information. I wish to thank Dr. Greg Rouse, University of Sydney, and Dr. T. Komai, Natural History Museum and Institute, Chiba, for their useful comments on this manuscript, Dr. S. Naomi, Natural History Museum and Institute, Chiba, for his critical review, Mr. K. Hasegawa, University of the Ryukyus, for assisting the sampling of polychaetes, and Dr. T. Sato, Tokyo University, for the loan of specimen of *Chaetopterus*.

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(Accepted on 17 October 1995)

Dense aggregation of *Chaetopterus longipes*

沖縄本島残波岬から採集された群居性の  
ツバサゴカイ科多毛類 *Chaetopterus*  
*longipes* Crossland について

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綱ツバサゴカイ科) は群居性で、30 から 40 個の棲管が約 20 cm 四方の中に見られる。今回沖縄本島残波岬の海岸で最初に発見し、その 2 つの群体の形状と個虫の形態について報告した。さらに従来 *C. variopedatus* (Renier) とされていた *C. cautus* Marenzeller との形態の比較を行った。

*Chaetopterus longipes* Crossland (環形動物門, 多毛