Pacific Science (1999), vol. 53, no. 1: 24–36

Redescription of *Mesochaetopterus selangolus* (Polychaeta: Chaetopteridae), Based on Type Specimens and Recently Collected Material from Morib Beach, Malaysia[1]

EIJIROH NISHI[2]

ABSTRACT: Rullier constructed the monotypic genus *Sasekumaria* within the family Chaetopteridae in 1976. I studied the type specimens and recently collected material and transferred *Sasekumaria selangola* to the genus *Mesochaetopterus* established by Potts in 1914. *Mesochaetopterus selangolus* is characterized by two middle segments with extended notopodia, associated feeding organ, a J-shaped tube, and the porous end of the tube. The species closely resembles *M. japonicus* Fujiwara, 1934. *Mesochaetopterus selangolus* can be differentiated from *M. japonicus* by the number of notochaetae in the middle and posterior region, the number of teeth on the uncinal plates of the middle and posterior region, the morphology of the anal region, and the structure of the tube. *Mesochaetopterus selangolus* is compared with other species of the genus and diagnostic keys are provided.

RULLIER (1976) ERECTED the new genus *Sasekumaria* for *S. selangola*, based on five incomplete specimens collected at Morib Beach, Malaysia. The characteristics with which Rullier distinguished the new genus from other chaetopterid genera are as follows: (1) Indistinct separation of the middle and posterior regions (other genera, *Chaetopterus*, *Mesochaetopterus*, *Phyllochaetopterus*, and *Spiochaetopterus*, have distinct middle and posterior regions), and (2) Some A4 stout chaetae. The genus *Telepsavus* has only two body parts and possesses only one stout chaeta. *Telepsavus* is now synonymous with *Spiochaetopterus* (Gitay 1969, Bhaud 1998), which has the characteristic body construction of this family, with distinct middle and posterior regions. Rullier (1976) studied five incomplete specimens lacking a "posterior region" (i.e., the end of the body or posterior part of the posterior region) and described "...la presence d'une 3em partie differente de la 2 semble exclue" (p. 199) (existence of a third part differing from the second part, seems out of the question). He precisely described the middle and posterior region as shown in his figure, and his description is nearly complete. Dr. A. Sasekumar, University of Malaya, Malaysia, who collected and sent chaetopterid specimens to the late Dr. Rullier, kindly sent me a sample of recently collected materials including complete specimens with tubes, associated crabs (*Polyonix vermicola* [Ng & Sasekumar, 1993]), and scale worms (*Grubeulepis* sp.).

I studied these chaetopterid materials from the type locality and supplemented Dr. Rullier's description with additional detailed observations and scanning electron microscope observations. After examination of paratype material and recent specimens of *Sasekumaria selangola*, I concluded that the species is a member of the genus *Mesochaetopterus*. Within the genus, *M. selangolus* closely resembles *M. japonicus* Fujiwara. I compared *M. selangola* with the related Pacific species *M. japonicus* collected in the

[1] This study was partly supported by a Grant-in-Aid for Encouragement of Young Scientists No. 09740645 from the Ministry of Education, Science, Sports and Culture, Japan. Manuscript accepted 20 April 1998.

[2] Natural History Museum and Institute, Chiba, Aoba 955-2, Chuo-ku, Chiba 260, Japan
(e-mail: cr2e-ns@asahi-net.or.jp).

Seto Inland Sea and Amakusa, West Kyushu, Japan. Because their differences are evident at the species level and not the genus level, I transferred *S. selangola* to *Mesochaetopterus* and consequently the genus *Sasekumaria* Rullier, 1976, is here synonymized with *Mesochaetopterus* Potts, 1914.

I followed Bhaud et al. (1994) for terminology of *Spiochaetopterus*, and the anterior, middle, and posterior body regions of chaetopterids are herein designated A, B, and C, respectively. A4 thus refers to chaetiger 4 in region A. For terminology of other body regions, I followed the reports of Fujiwara (1934) for *M. japonicus* and Petersen and Fanta (1969) for *Mesochaetopterus* from Brazil.

MATERIALS AND METHODS

Specimens of *Sasekumaria* (*Mesochaetopterus*) were collected at Morib Beach, Malaysia, at the type locality by Dr. A. Sasekumar (Ng and Sasekumar 1993). Comparative specimens of *Mesochaetopterus japonicus* Fujiwara were collected from a subtidal mud flat of Seto Inland Sea and the Inland Sea of Yatsushiro, Ariake Bay, Amakusa, West Kyushu. Recent specimens are deposited in the Natural History Museum and Institute, Chiba (CBM-ZW); paratypes are deposited in the Department of Zoology, University of Malaya, Malaysia.

To allow observations of uncini with a light microscope at high magnification, some lobes of noto- and neuropodia were dissected from the alcohol-preserved specimens. Bundles of chaetae and rows of uncini were mounted in a drop of alcohol on a glass slide, squashed by a cover glass, and permanently fixed by Canada balsam. Drawings and measurements of chaetae and uncini were made with a camera lucida (Olympus).

For observations with a scanning electron microscope (SEM), some parapodia were removed, and transferred to 80, 90, 95, 99, and 100% alcohol to dehydrate, then air dried, mounted on SEM stubs, coated with gold and paladium, and viewed with a scanning electron microscope (Hitachi S-800).

SYSTEMATICS

Family Chaetopteriidae Malmgren
Genus *Mesochaetopterus* Potts, 1914

Type species: *Mesochaetopterus taylori* Potts, 1914

Sasekumaria Rullier, 1976, new synonymy

DIAGNOSIS (based on Potts [1914], Berkeley and Berkeley [1941], Day [1967], and Gilbert [1984]): Small to medium-sized (1–60 cm in body length) chaetopterids with a well-developed peristomium, sometimes surrounding the prostomium, and a pair of long peristomial palps longer than anterior segments. Second small antennae or palps absent. Eyes present or absent. Dorsal ciliated fecal groove running from mouth along median line to posterior terminus (anus). Body divided into three regions.

Anterior region composed of 9–14 setigerous segments, parapodia uniramous, notopodial lobes short; ventral glandular shield long, dorsal notopodia with capillary and oarlike chaetae; 4th notopodia with several (4 to 20) stout chaetae, gradually changing in size and shape within the fascicle, usually dark brown.

Median region composed of 2 to 21 elongate segments, parapodia biramous, forming a flat platelike region, sometimes with a corrugated luminous organ or glandular lateral epithelium. The notopodia weakly or highly modified: slender, conical, nearly triangular, or aliform (winglike). Associated feeding organs or cupules usually present in posterior segments. Neuropodia unilobed in first segment and bilobed in following segments.

Posterior region with many (more than 20) segments, parapodia biramous, with unilobed notopodia and bilobed uncinigerous neuropodia. All the segments nearly homologous, except for some in the posterior pygidial region.

Tube parchmentlike or membranous, thin, with or without articulations on tube wall and partition in tube, partly covered by sand grains or encrusted segments; vertical or J-shaped in sand or mud flats. Rarely forming a colony.

Mesochaetopterus selangolus (Rullier, 1976)
Figures 1–5

Sasekumaria selangola Rullier, 1976:199–202, fig. 1.

MATERIAL EXAMINED: Type material: two paratypes, which Rullier studied in his report, deposited in the Department of Zoology, University of Malaya, Malaysia, sand flats, Morib, Selangor State, Peninsular Malaysia, ca 2° 44′ N, 101° 28′ E, 1975, leg. A. Sasekumar.

Other material: CBM-ZW-600 (1 worm, complete), -ZW-601 (1 worm, complete), -ZW-602 (1 worm, posterior C region lacking), -ZW-603 (1 worm, incomplete, 3B and C regions lacking), -ZW-604 (1 worm, incomplete, B2–3 and C regions lacking), -ZW-605 (3 worms, incomplete, only C region), subtidal sandy flat, Morib, Selangor State, Peninsular Malaysia, 15 December 1996, leg. A. Sasekumar.

Comparative material: *Mesochaetopterus japonicus* Fujiwara: CBM-ZW-630 (1 worm), Mie Prefecture, Matsusaka City, Kisetsuda River, 15 June 1996, coll. Osaka Marine organism association; -ZW-620, -ZW-621, -ZW-623, -ZW-624, Ariake Inland Sea, Amakusa, West Kyushu, May 1975, coll. T. Kikuchi.

DIAGNOSIS: Large species of *Mesochaetopterus*, surpassing 10 cm in body length for mature worms, with many modified, stout, brown chaetae on A4 segment. Region A with 9 or 10 segments, each segment with oarlike, slender, lanceolate chaetae; A4 with 8–10 obliquely truncated, tough, brown chaetae; region B with two segments, B1 with small, pointed, knoblike digitiform notopodia and uniramous neuropodia, B2 with finlike, pointed triangular notopodia crossing on the dorsal side, bilobed neuropodia, and a cupule or an associated feeding organ on the posterior part of B2, tube unbranched, J-shaped, tapered at one end, projecting vertically from the sand bottom, sometimes with distinct annulations, intervals equal to or greater than width of tube. Blind end of tube with many perforations embedded in sand.

REDESCRIPTION: Type material all lacks posterior part of C region. Holotype (with nearly complete whole body) 125 mm long

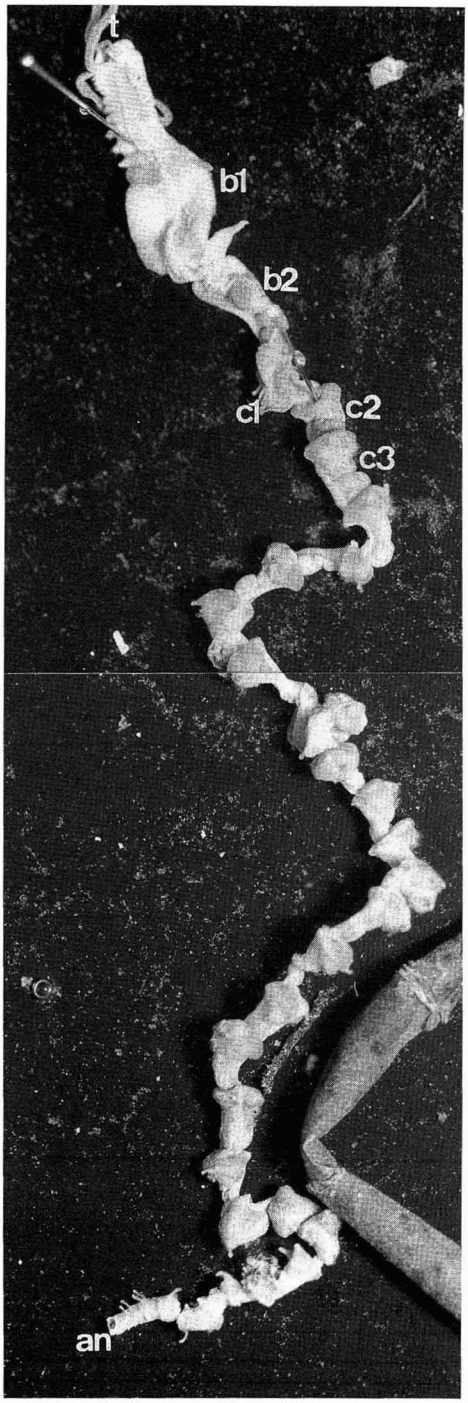

FIGURE 1. Whole view of *Mesochaetopterus selangolus* (CBM-ZW-600). Abbreviations: b1, b2, first and second B-region segments; c1–c3, first to third segments of C region; an, anus; t, palp.

and 5 mm wide; paratypes smaller than holotype, 70 to 90 mm long (Rullier 1976). Complete fixed worms (-ZW-600, 601) up to 15 mm in length with up to 40 chaetigers (9–10A + 2B + 25–32C; $n = 4$). Type material with 9A + 2B + 9–21C; all C regions are incomplete. Body size up to 100 mm in total length and up to 5 mm wide in B region.

Region A: long and narrow, usually with 9 segments (13 of 17 worms), rarely 10 (4 of 17 worms), including type specimens (Figure 1). Prostomium small, with anterior border rounded, entire, without eyespots. Peristomium extended, completely covers prostomium, much larger than prostomium, contracted in fixed worms. Two long, grooved palps arising dorsally just posterior to the junction of lateroposterior border of peristomium and prostomium (Figure 2*A*). No antennae posterior to palps. Middorsal ciliated groove beginning between base of palps and continuing posteriorly through regions A to C, deepest in region B especially in conspicuous dorsal cupule or an associated feeding organ on B2. Ventral surface of region A with long, slender, cream-colored plastron, without secretory crescents. Parapodia of region A uniramous, short, composed of notopodia only. Notopodia of A1 to A3 and A5 to A9 or A10 provided with a single row of about 10 to 20 straw-colored, slightly asymmetrical, lanceolate, oarlike chaetae; dorsalmost chaetae longest and most slender, ventralmost ones gradually becoming shorter and wider (Figure 4*B*). Segment A4 nearly triangular and stouter than those of A3 or A5. A4 with 8 to 10 asymmetrical, knoblike, stout modified chaetae (Figure 4*A*) plus 3 to 4 slender lanceolate chaetae on posterior side of modified chaetae (Figure 4*A*). Modified chaetae dark brown, partly embedded on A4 segments.

Region B with 2 segments, segments elongate, glandular dorsally (Figure 3*A*); B1 and B2 nearly the same length and longer than C segments; B1 wide, B2 slender (Figure 2*A*). Parapodia of region B biramous; neuropodia subdivided. Luminous gland on B1 and anterior B2 (Figure 2*A*,*B*). Notopodia unilobed; B1 with pointed digitiform, distally swollen; B2 with elongated, large winglike, nearly pointed triangular, with a groove on dorsal side (Figure 2*A–D*); associated feeding organ on posterior part of B2 and continued on anterior C1 (Figure 2*D*); C1 with digitiform notopodia as in C region (Figure 2*E*). Neuropodia of B1 with lower ventral lobe only, one of B2 with short, rounded, anteriorly oriented upper dorsal side lobe and elongate, posteriorly oriented ventral lower lobe. Uncini bluntly D-shaped, with single row of minute teeth visible under higher magnification (50×; Figure 4*C*); dorsal lobe with fewer uncini than ventral lobe, about 50 on dorsal uncini and over 100 on ventral one in B2 (-ZW-600). Uncini of dorsal and ventral lobes in three or more irregular rows, with adjacent uncini somewhat displaced relative to one another, those of dorsal lobes with teeth directed posteriorly, those of ventral lobes with teeth directed anteriorly. Uncini of ventral lobes smaller in size than dorsal ones, although the number of teeth in each are nearly the same (8 or 9 in these dorsal lobes) (Figure 4*C*,*D*).

Region C with 20 to 40 segments. Parapodia all biramous; notopodia unilobed, digitiform, distally swollen and containing 6 to 8 embedded acicula and without chaetae; neuropodia subdivided as in region B; only ventral lobe in most posterior part. Uncini similar to those of region B, becoming progressively fewer on a lobe, 10 or 11 teeth (from C10 to C15 segments of -ZW-601 and -ZW-602). Pygidium simple, open, with anal papillae (Figures 2*F*,*G*, 3*B*).

Tube: Within the substrate the tube has typically J- or L-shaped orientation and is completely buried, except for the tapering aperture, which protrudes 1–2 cm from the sediment surface and is white or cream-colored. From the surface opening, the tube follows a vertical path downward for about 15 to 20 cm and travels horizontally for about 10 cm before turning upward again close to the tube apex. Sediment-filled or collapsed branches of tube noted occasionally on some tubes. The tube is divided into three morphologically distinct sections (Figure 3*C*,*D*). For most of its length it is composed of a relatively thick-walled, parchmentlike material embedded with sand grains. The middle part sometimes with only a thinner wall and with sand grains on tube

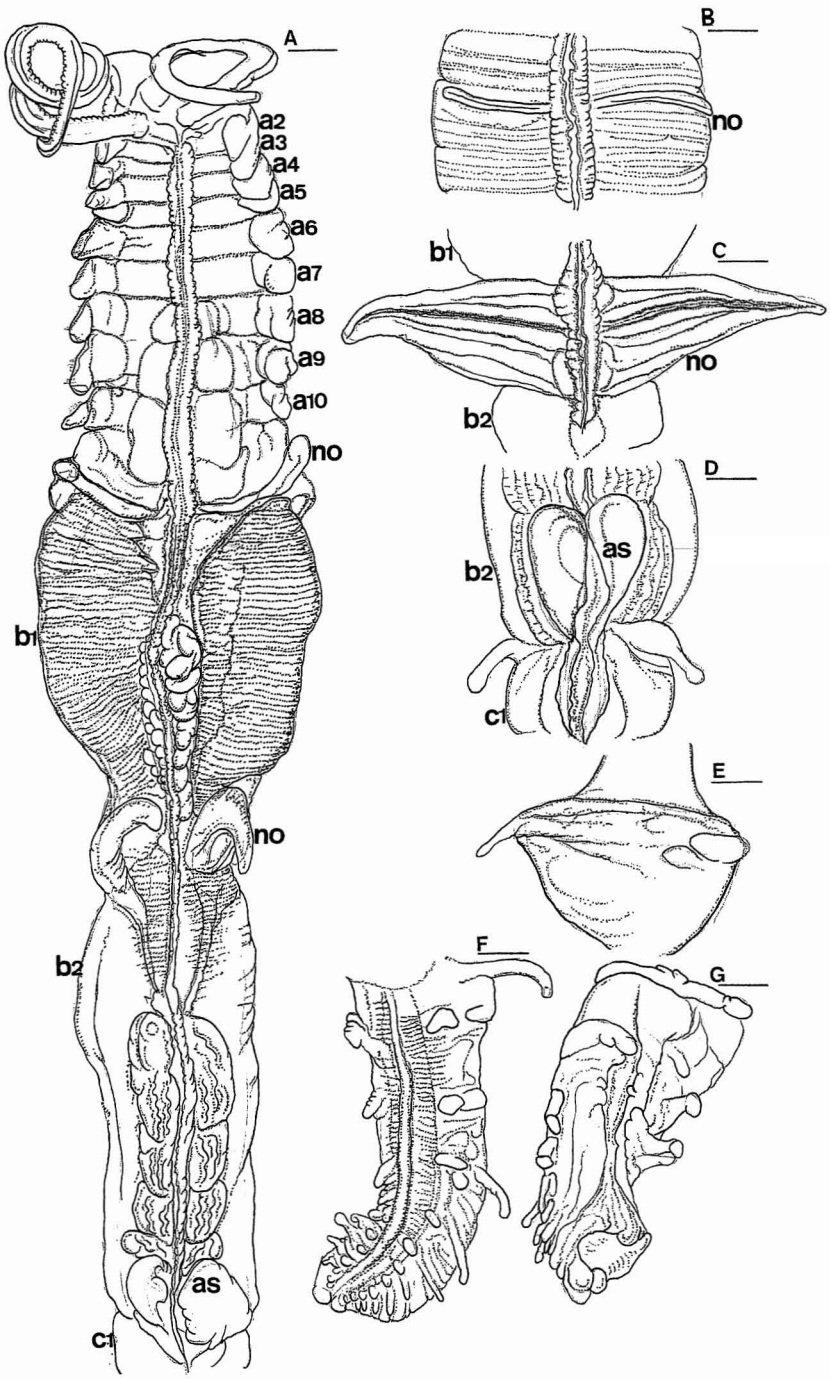

FIGURE 2. *Mesochaetopterus selangolus* (CBM-ZW-600). *A*, anterior and median region (A and B regions); *B*, B1 segment, dorsal view; *C*, B2 segment, dorsal view; *D*, posterior B2, dorsal view, showing a cupule; *E*, notopodia of C region, lateral view; *F* and *G*, posterior end, dorsal (*F*) and lateroventral (*G*) views. Abbreviations: a, A region segment; as, associated feeding organ; b, B region segment; c, C region segment; no, notopodium. Scales show 2 mm in *A* and 1 mm in *B–G*.

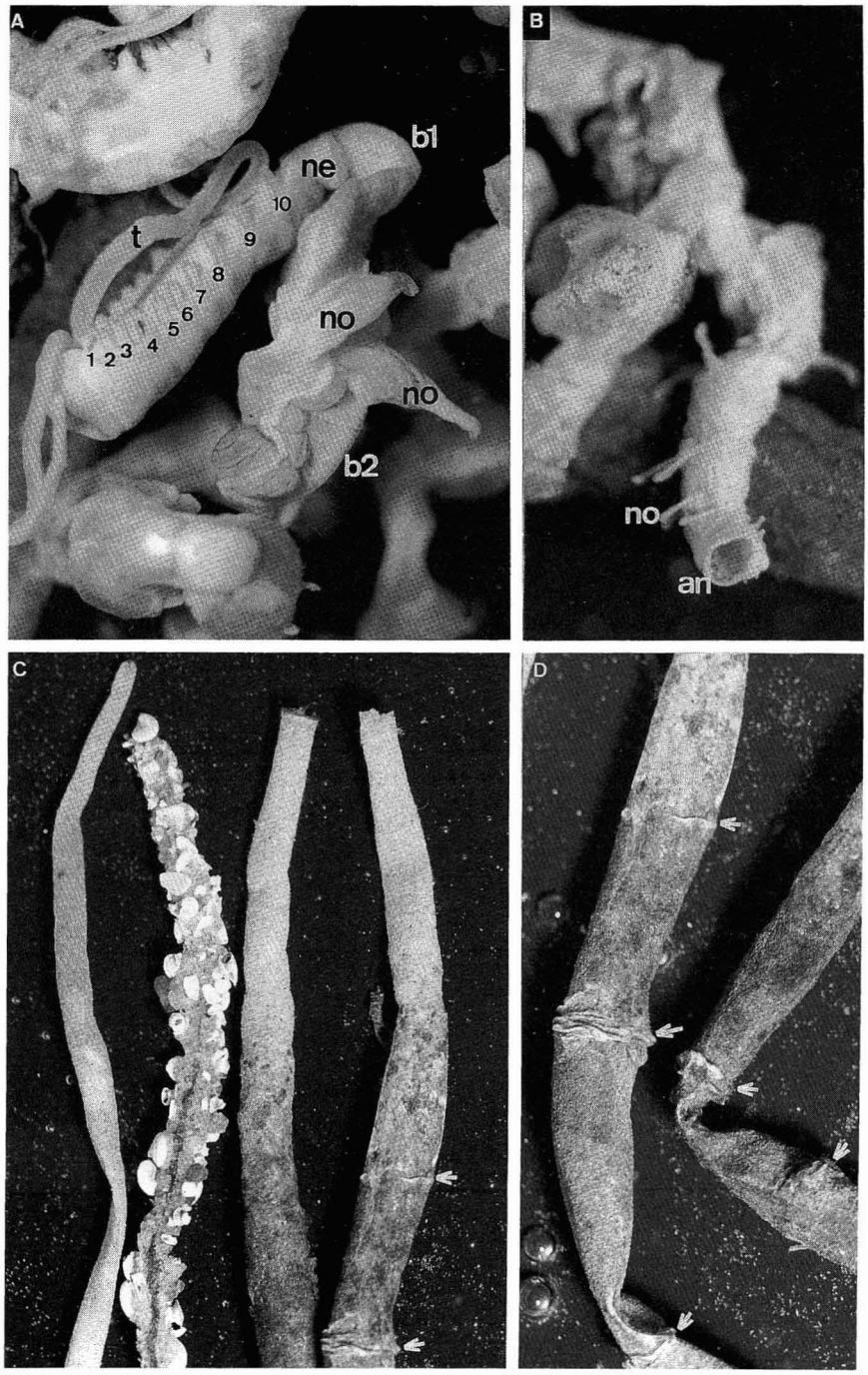

FIGURE 3. *Mesochaetopterus selangolus*. *A*, anterior and middle portion, lateral view; *B*, posterior part and annulated region; *C*, four states of tubes (*left to right*): slender, cream-colored; with fragments of shells and coarse sand; end of vertical portion without articulations; end of opening with some articulations (arrows); *D*, articulations (arrows) of tube. Abbreviations: 1 to 10, A region segment; b1, b2, first and second B region segments; an, anus; ne, neuropodium; no, notopodium; t, palp.

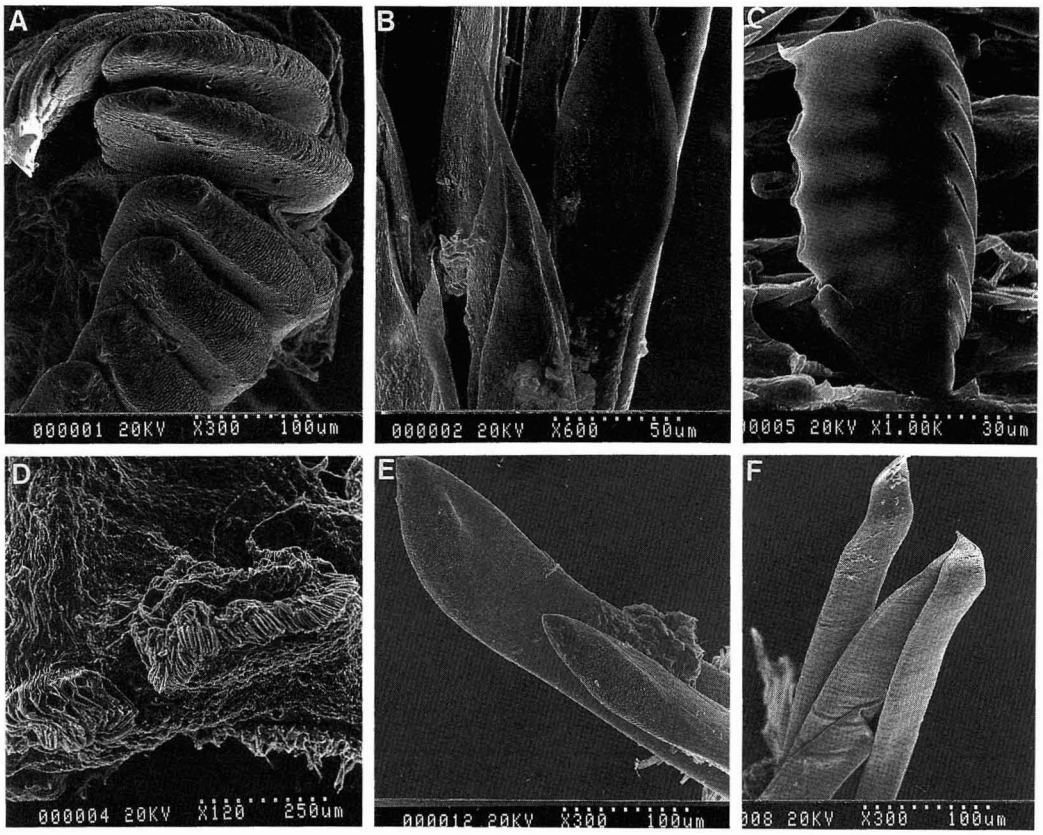

FIGURE 4. Chaetae of *Mesochaetopterus selangolus* (*A to D*) and *M. japonicus* (*E and F*). *A*, A4 chaetae; *B*, oarlike lanceolate chaetae of A5; *C*, uncini of ventral lobe of B2; *D*, uncinal lobe of C5; *E*, A4 stout chaetae; *F*, slender platelike chaetae of A4.

surface (Figure 3*C*, left and second from left). There are periodic rings or annulations in some tubes (Figure 3*C,D*). For approximately the last 5 to 8 cm, the tube is thinner, translucent, partly covered by sand grains, and perforated in a relatively uniform arrangement, terminating blindly in a nearly rounded apex (Figure 5). The perforations are usually elliptical, averaging 0.2 to 0.3 mm along their major axis (Figure 5). The entire external surface of the tube is covered with sand grains and the parchment consists of a number of layers of fibrils laid down on top of one another.

REMARKS: In his original description of *Sasekumaria selangola*, Rullier (1976) precisely noted and described pointed B1 notopodia, winglike B2 notopodia, and a cupule on B2 as abdominal segments, which are the same in the following C region. *Sasekumaria selangola* has distinct A, B, and C regions as in other chaetopterids, without fused notopodia in the B region (only *Chaetopterus* has fused B region notopodia forming cuplike structures), without second palps (only *Phyllochaetopterus* has first and second palps), and with some (not only one) stout chaetae on A4 (*Spiochaetopterus* has only one stout chaeta on A4; four other genera have some stout chaetae on A4); thus it is reasonable to transfer S. *selangola* to the genus *Mesochaetopterus*.

Within the genus *Mesochaetopterus*, which

FIGURE 5. End of tube of *Mesochaetopterus selangolus* showing perforations. Arrows show borders of thick and thin tube walls (the latter with perforations).

includes 12 described species, *M. minuta* Potts and *M. sagittarius* Claparede are now probably complexes. Some have synonymized *M. minuta* with *M. sagittarius* (Bailey-Brock 1987, Nishi and Arai 1996), here treated as *M. minuta*, but this needs revision. The first group comprises three species according to the structure of the B region notopodia: *M. capensis*, *M. ricketsii*, and *M. mexicanus* have slightly modified small and triangular B notopodia. The second group, of 5 species (*M. potti*, *M. minuta*, *M. xejubus*, *M. xerecus*, and *M. taylori*), has two to three modified conical notopodia. The third group, of three species (*M. alipes*, *M. japonicus*, and *M. selangolus*), has extended and pointed notopodia. The notopodia of the B region of *M. laevis* are characteristically long and fine, reaching A9, and the base of both are connected (Hartmann-Schroeder 1960). It is reasonable to form two groups based on the morphology of the A4 stout chaetae: (1) *M. selangolus*, *M. japonicus*, and *M. alipes* have A4 stout chaetae with knoblike tips; (2) the others have large denticles truncated evenly or obliquely (see *M. crypticus* Ben-Eliahu, 1976) or a knife-shaped or oblique edge with fimbriated edge or smooth edge in *M. laevis*, *M. xejubus*, and *M. xerecus*.

Eyes are present in four species (*M. xejubus*, *M. xerecus*, *M. capensis*, and *M. minuta*) and absent in the others (Table 1). *M. crypticus* has a cultriform chaeta in the posterior A region, but this does not appear in other species. In tube morphology and habitat, *M. selangolus* is similar to *M. taylori* Potts, reported by Sendall et al. (1995). *M. taylori* shows a typically L-shaped orientation of the tube, one end extending to the bottom and the other buried in the sediment; perforations appear at the buried end, and the entire surface of the tube is covered by sand grains (Sendall et al. 1995). The tube of *M. selangolus* can be differentiated from the tube of *M. taylori* by having a nearly J-shaped orientation (Rullier 1976) and periodic an-

TABLE 1

COMPARISON OF SPECIES OF *Mesochaetopterus*

CHARACTERS	*minuta* Potts	*taylori* Potts	*capensis* (McIntosh)	*laevis* Hartmann-Schroeder	*ricketsii* Berkeley & Berkeley	*alipes* Monro	*japonicus* Fujiwara	*selangolus* (Rullier)	*mexicanus* Kudenov	*crypticus* Ben-Eliahu	*xejubus* Petersen & Fanta	*xerecus* Petersen & Fanta
Length of worm (mm)	3.5	60	1.5–2.4	1.5 (?)	35	80	25	25	9.5	1.5 (?)	3.5	60
Width of worm (mm)	0.2	1.0	0.4	0.2	1.0	6.0	1.0	1.0	0.5	0.2	0.2	0.8
Peristomium	Partly surrounds prostomium	Surrounds prostomium	Surrounds prostomium middorsally	Surrounds prostomium, rounded	Surrounds prostomium	Surrounds prostomium	Completely surrounds prostomium	Completely surrounds prostomium	Surrounds prostomium, recurved	Surrounds prostomium	Surrounds prostomium	Surrounds prostomium
Eyes	Present	Absent	Present?	?	?	Absent	Absent	Absent	Present (?)	Absent	Present	Present
No. of parapodia of A region	9–13	9–11	9	9–14	10	9	9	9 or 10	13	9	9–12	7–17
No. of parapodia of B region	2	3	2	2	21	3	2	2	4	2+?	3	3
No. of chaetae of A4 segment	4–7	10	7–10	18	?	?	8–13	8–15	?	1 stout and normal chaetae	9–12	7–17
Shape of chaetae of A4 notopodium	Fimbriated with oblique edge	Short, strong, with truncated tip	Fimbriated, with serrated edge	Knife-shaped, with fimbriated edge	Fimbriated with oblique edge	Short, strong, with truncated edge	Truncated, spatulate with serrations	Truncated, spatulate with serrations	Oblique, distally dentate	Truncated, with few denticles	Oblique edge with serrations	Short with smooth margin
Shape of B2 notopodia	Conical, enlarged with groove	Short, conical, larger than C notopodium	Short, digitiform, knoblike tip	Long, fine bases connected	Triangular unilobed	Large, winglike	Aliform, winglike bases touching	Aliform, winglike bases touching	Hemisphere	?	Conical, enlarged at tips	Conical, flattened
No. and position of accessory feeding organs	B2	B2–B3	B2	B2	B21	B2	B2	B2	B1–B4	?	B2–B5	B2
No. of teeth on uncinal plate of B region	6–7	8–10	8–10	7	8–10	8	8	8	9	8–9	9	6–7
Position of glandular lateral epithelium	B1 and anterior B2	B1–B3	B region	?	B region	B1	B1 and anterior B2	B1 and anterior B2	?	?	B region	B region
Type locality	California	California	South Africa	Peru	California	Panama	Japan	Malaysia	Mexico	Red Sea	Brazil	Brazil

Note: Data supported mainly by Petersen and Fanta (1969) and partly by Kudenov (1975), Ben-Eliahu (1976), and Gilbert (1984).

FIGURE 6. (*A*) Whole view of *Mesochaetopterus japonicus*. (*B*) Close-up view of *M. japonicus* (*left*) and *M. selangolus* (*right*). Abbreviations: as, associated feeding organ; b, B region segments; c, C region segment; no, notopodium; t, palp.

TABLE 2

COMPARISON OF *Mesochaetopterus selangolus* WITH *M. japonicus*

CHARACTERS	*M. selangolus*	*M. japonicus*
No. of A region segments	9	9 (rarely 10)
No. of B region segments	2	2
No. of C region segments	15–30	30–40
No. of minute chaetae of B1 notopodia	25–30	30–35
No. of minute chaetae of B2 notopodia	70–80	130–150
No. of teeth on uncini of B2 neuropodia (range)	7–8/7–8	8–9/8–9
(ventral lobe/dorsal) (average ± SD)	7.5 ± 0.5/8.2 ± 0.4	8.7 ± 0.47/9.7 ± 0.5
Length of uncini of B2 neuropodia (range)	70–85/60–72	72–85/55–65
(ventral/dorsal lobe) (average ± SD)	78.5 ± 5.2/65.7 ± 4.6	79.5 ± 4.8/60.5 ± 3.9
Width of uncini of B2 neuropodia (range)	35–40/25–38	30–45/18–36
(ventral/dorsal lobe) (average ± SD)	38.1 ± 3.7/30.6 ± 4.7	36.7 ± 5.5/31.8 ± 3.1
No. of minute chaetae of C region (range)	5–7	7–9
No. of teeth on uncini of C region (range)	9–11/9–11	10–12/10–12
(ventral lobe/dorsal lobe) (average ± SD)	9.8 ± 0.6/9.9 ± 0.57	10.9 ± 4.9/11.5 ± 0.7
Length of uncini of C region (range)	45–60/35–42	50–65/40–46
(ventral/dorsal lobe) (average ± SD)	52.3 ± 4.9/39.1 ± 2.1	56.2 ± 4.9/42.1 ± 2.5
Width of uncini of C region (range)	20–28/18–28	18–30/18–30
(ventral/dorsal lobe) (average ± SD)	24 ± 2.7/21.3 ± 4.2	23.8 ± 4.5/24.3 ± 4.6
Anus	Opened	Tapered
Opening of tube	Tapered progressively	Straight
End of tube	With perforations	Blind end
Associated crabs in tube	*Polyonix vermicola*	*Tritodynamenia rathbuni*

nulated rings (joints) around the tube wall (Figure 3*C,D*). *M. capensis* (McIntosh, 1885) has been recorded in Pakistan waters, near Malaysia (Habib and Mustaquim 1988). *M. capensis* differs from *M. selangolus* by having eyes, digitiform notopodia in B1 and B2, and a long, slender B region segment (Gilbert 1984).

The main distinguishing characteristics of the 12 species of *Mesochaetopterus* are summarized in Table 1, which is taken partly from Petersen and Fanta (1969).

I made a detailed comparison of *M. selangolus* and *M. japonicus*. The two species are very similar in size and general appearance, and only five characters distinguish them.

Similar characters: The two species are nearly the same size (see Figures 1 and 6), with nine segments in the A region (*M. selangolus* rarely has 10 A region segments). There are two B region segments in both species. Fujiwara (1934) reported three segments in the B region, but this region is composed of a few segments with slightly or highly modified notopodia or with characteristic organs, such as the glandular epithelium and associated feeding organs; the first C segment in Fujiwara's description lacks a characteristic organ and is homologous with the following C region segment. Petersen and Fanta (1969) also noted a 3B segment in *M. japonicus*, probably following the original description by Fujiwara, but the number of B region segments of *M. japonicus* is exactly two, as in *M. selangolus*. [As in *M. japonicus*, *M. xerecus* also has five segments in the B region. Although Petersen and Fanta (1969) described the associated feeding organ in C1 and C2, if the B region designated here has an associated feeding organ or glandular epithelium, then *M. xerecus* has five B segments, not three.] Morphologically the notopodia of the B and C regions are similar in both species. A luminous organ or glandular epithelium appears in the B1 segment and anterior part of the B2 segment in both species. The chaetae of the A region, including the A4 modified chaetae, are also morphologically similar in both species, although the

number of A4 chaetae vary among worms, and there are usually fewer in *M. japonicus* (*M. selangolus* has 10 to 12 chaetae, *M. japonicus* has 8 to 12).

Distinguishing characters (Table 2):

(1) Number of chaetae in the B and C regions: *M. selangolus* has 80–90 chaetae on B2, whereas *M. japonicus* has 120–130 (Table 2). The number of chaetae of C region notopodia is 6 or 7 in *M. selangolus* compared with 8 or 9 in *M. japonicus*.

(2) Number of teeth on uncini in the B and C regions: The number of teeth on D-shaped uncini in the B2 region is 7 or 8 in *M. selangolus* and 9 or 10 in *M. japonicus*. The number of teeth on the uncini is 10 or 11 on C5 to C10 in *M. selangolus* and 12 to 13 in C of *M. japonicus*.

(3) Morphology of the anal region: *M. selangolus* has a widely open anus with bilobed papillae on the ventral side (Figures 2*G*, 3*B*), *M. japonicus* has a blind-ended posterior region without distinct structures (Fujiwara 1934).

(4) Tube morphology: The tube of each species is fragile and buried in the sandy bottom in an L or J shape. The tube of *M. selangolus* has a tapered opening part and periodic annulated rings over the whole tube except for the blind end, and perforations on the blind end appear as a distinct part (Figure 5). The tube of *M. japonicus* is a simple structure with a blind end.

(5) Associated crabs: *Polyonix vermicola* is associated with *M. selangolus* (Ng and Sasekumar 1993), and *Tritodynamenia rathbuni* is associated with *M. japonicus* (Petersen and Britayev 1997).

ACKNOWLEDGMENTS

I am grateful to Dr. A Sasekumar, University of Malaya, for providing polychaete samples; to Dr. M. Bhaud, Laboratoire Arago, Universite P. & M. Curie (Paris VI), for useful suggestions about the manuscript; to Dr. Taiji Kikuchi, director of Amakusa Marine Biological Laboratory of Kyushu University, and Dr. R. Yamanishi, Osaka City Natural History Museum, for providing Japanese chaetopterid samples; and to Dr. Julie Brock, Department of Zoology, University of Hawai'i at Mānoa, for corrections of the text.

LITERATURE CITED

BAILEY-BROCK, J. H. 1987. Annelida. Pages 213–454 *in* D. M. Devaney and L. G. Eldredge, eds. Reef and shore fauna of Hawaii. Bernice P. Bishop Mus. Spec. Publ. 64.

BEN-ELIAHU, M. N. 1976. Polychaete cryptofauna from rims of similar intertidal vermetid reefs on the Mediterranean coast of Israel and in the Gulf of Elat: Sedentaria. Isr. J. Zool. 25:121–155.

BERKELEY, E., and C. BERKELEY. 1941. On a collection of Polychaeta from Southern California. Bull. South. Calif. Acad. Sci. 40:16–60.

BHAUD, M. 1998. The species of the genus *Spiochaetopterus* (Polychaeta, Chaetopteridae) in the Atlantic-Mediterranean biogeographic area. Sarsia (in press).

BHAUD, M., M. C. LASTRA, and M. E. PETERSEN. 1994. Redescription of *Spiochaetopterus solitarius* (Rioja, 1917), with notes on tube structure and comments on the generic status (Polychaeta: Chaetopteridae). Ophelia 40:115–133.

DAY, J. H. 1967. A monograph on the Polychaeta of southern Africa. Brit. Mus. Nat. Hist. Publ. 656.

FUJIWARA, T. 1934. On a new chaetopterid, *Mesochaetopterus japonicus*, sp. nov. J. Sci. Hiroshima Univ. Ser. B. 3:1–14, plates 1–3.

GILBERT, K. M. 1984. Family Chaetopteridae Malmgren, 1867. Chap. 11 *in* J. M. Uebelacker and P. G. Johnson, eds. Taxonomic guide to the Polychaetes of the northern Gulf of Mexico. Barry A. Vittor & Assoc., Metairie, Louisiana.

GITAY, A. 1969. A contribution to the revision of *Spiochaetopterus* (Chaetopteridae, Polychaeta). Sarsia 37: 9–29.

HABIB, F., and J. MUSTAQUIM. 1988. New records of polychaete annelids from coastal water of Pakistan. Pak. J. Zool. 20:304–406.

HARTMANN-SCHROEDER, G. 1960. Zur Polychaeten Fauna von Peru. Beitr. Neotrop. Fauna 2:1–44.

KUDENOV, J. D. 1975. Sedentary polychaetes from the Gulf of California, Mexico. J. Nat. Hist. 9:205–231.

MCINTOSH, W. C. 1885. Report on the Annelida polychaetes collected by H. M. S. Challenger during the years 1873–76. Rep. Challenger Soc. 12:1–554.

NG, P. K. L., and A. SASEKUMAR. 1993. A new species of *Polyonix* Stimson, 1858, of the *P. sinensis* group (Crustacea: Decapoda: Anomura: Porcellanidae) commensal with a chaetopterid worm from Peninsular Malaysia. Zool. Meded. (Leiden) 67:467–472.

NISHI, E., and Y. ARAI. 1996. Chaetopterid polychaetes from Okinawa Island, Japan, with notes on the feeding behaviour of *Spiochateopterus costarum costarum*. Publ. Seto Mar. Biol. Lab. 37:51–61.

PETERSEN, J. A., and E. S. FANTA. 1969. On two new species of *Mesochaetopterus* (Polychaeta) from the Brazilian coast. Beitr. Neotrop. Fauna 6:120–136.

PETERSEN, M. E., and T. A. BRITAYEV. 1997. A new genus and species of polynoid scaleworm commensal with *Chaetopterus appendiculatus* Grube from the Banda Sea (Annelida: Polychaeta), with a review of commensals of Chaetopteridae. Bull. Mar. Sci. 60(2): 261–276.

POTTS, F. A. 1914. Polychaetes from the N. E. Pacific: Chaetopteridae. With an acount of the phenomenon of asexual reproduction in *Phyllochaetopterus* and the description of two new species of Chaetopteridae from the Atlantic. Proc. Zool. Soc. Lond. 1914: 955–994.

RULLIER, F. 1976. Description d'un nouveau genre et d'une nouvelle espece de Chaetopteridae *Sasekumaria selangola* (Annelides polychetes) de Malaisie. Bull. Soc. Zool. Fr. 101:199–202.

SENDALL, K. A., A. R. FONTAINE, and D. O'FOIGHIL. 1995. Tube morphology and activity patterns related to feeding and tube building in the polychaete *Mesochaetopterus taylori* Potts. Can. J. Zool. 73:509–517.