

A NEW SPECIES OF *EUCHONE* (POLYCHAETA: SABELLIDAE) FROM THE NORTHWEST ATLANTIC WITH COMMENTS ON ONTOGENETIC VARIABILITY

R. Eugene Ruff and Betsy Brown

Abstract. — *Euchone bansei*, a new species of the polychaete family Sabellidae, is described from the continental slope and rise between Cape Cod, Massachusetts, and Cape Lookout, North Carolina. Juvenile and adult specimens are examined and ontogenetic variability is discussed. It is demonstrated that the number of abdominal depression setigers, the shape of the collar, and the number of radioles are not valid diagnostic characters for the identification of juveniles.

In response to interest in offshore oil and gas development, the Minerals Management Service (MMS) of the U.S. Department of the Interior sponsored research on benthic communities on the continental slope and rise (500–3000 m) off the eastern United States in three regions: (1) the U.S. North Atlantic near Georges Bank off Massachusetts, (2) the U.S. Mid-Atlantic off New Jersey, and (3) the U.S. South Atlantic off the Carolinas. As is typical in marine soft-bottom environments (Knox 1977), the macrofaunal communities in these regions are dominated by polychaetous annelids (Maciolek et al. 1987a, b; Blake et al. 1987). Because of the numerous samples collected and the small sieve mesh (300 μ m) used throughout this sampling program, juvenile growth stages of many polychaete species were routinely collected. This paper describes a new species of *Euchone* (Polychaeta: Sabellidae) collected between 1345–2495 m depth along the U.S. Atlantic coast and examines some of the ontogenetic variability exhibited by this species.

Euchone bansei, new species
Figs. 1, 2

Euchone spp. Hartman & Fauchald, 1971:
179 [partim].

Euchone sp. 3. Maciolek et al., 1987a, b. —
Blake et al., 1987.

Material examined. — off Martha's Vineyard, 4 May 1966, *Chain* station Ch 103, 39°43.6'N, 70°37.4'W, 2022 m, 8 specimens; 7 Sep 1963, *Atlantis* station A 58, 38°34.3'N, 72°55.0'W, 2000 \pm 75 m, 3 specimens; near Baltimore Canyon, 19 May 1985, cruise MID-4 station 13-2, 37°53.29'N, 73°45.30'W, 1607 m, clayey mud, Holotype (USNM 115738); 19 May 1985, cruise MID-4 station 10-3, 37°51.73'N, 73°20.01'W, 2095 m, silty mud, 5 paratypes (USNM 115739); 16 Nov 1985, cruise MID-6 station 10-1, 37°51.77'N, 73°20.01'W, 2104 m, silty mud, 9 paratypes (BMNH ZB 1987.620–628); near Lindenkoehl Canyon, 16 May 1985, cruise MID-4 station 3-2, 38°36.75'N, 72°51.57'W, 2055 m, silty mud, 6 paratypes (BMNH ZB 1987.629–634); 17 May 1985, cruise MID-4 station 3-3, 38°36.75'N, 72°51.60'W, 2052 m, silty mud, 9 paratypes (USNM 115740); 17 May 1985, cruise MID-4 station 11-1, 38°40.10'N, 72°56.43'W, 1510 m, clayey mud, 22 paratypes (USNM 115741); 7 Aug 1985, cruise MID-5 station 12-2, 38°29.25'N, 72°42.22'W, 2495 m, sandy mud, 3 paratypes (USNM 115742); off Cape Cod, 25 Jul 1986, cruise NOR-6 station

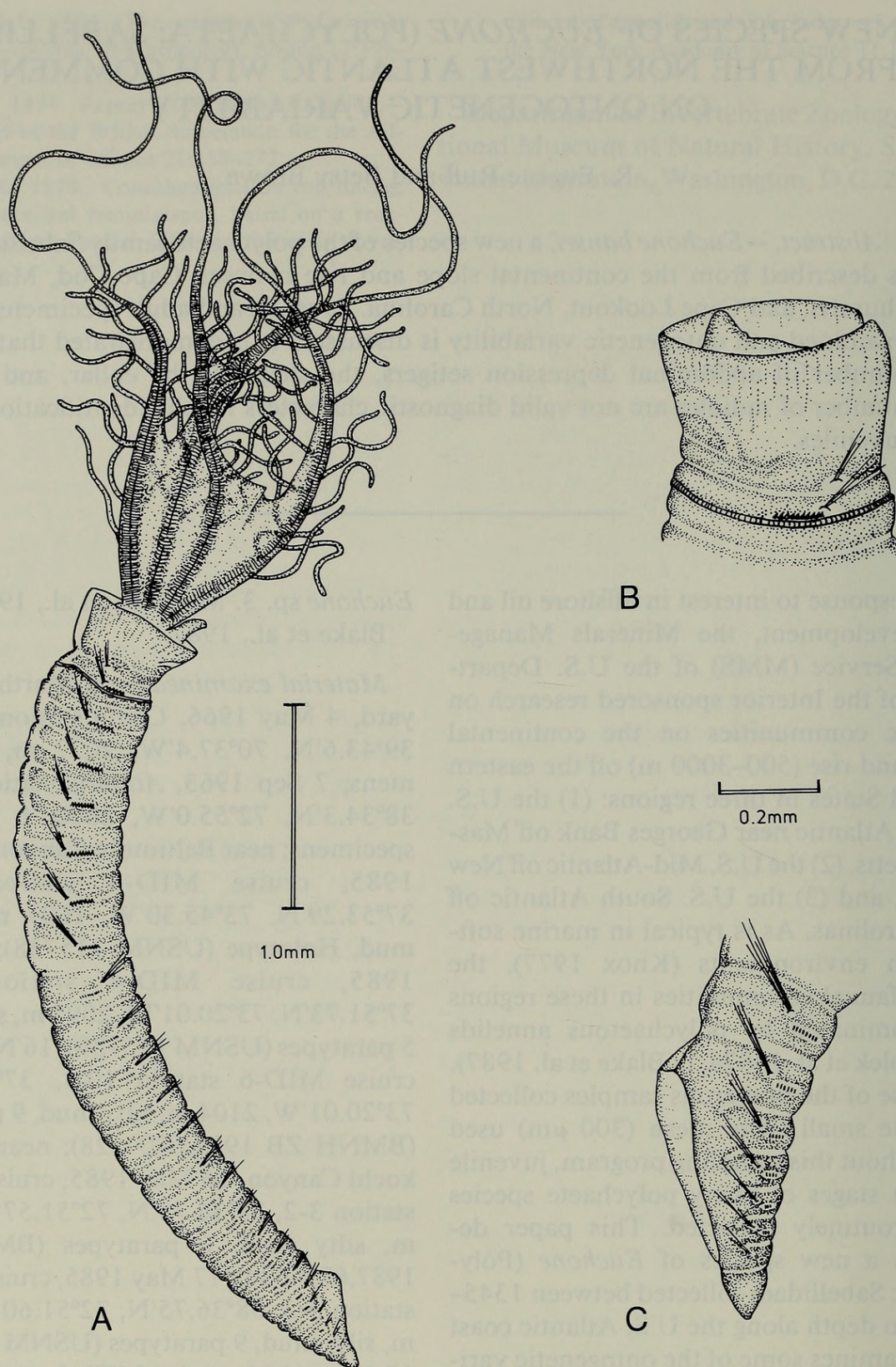


Fig. 1. *Euchone bansei* (holotype, USNM 115738): A, Entire animal in lateral view showing the right half of branchial crown; B, Collar and anterior region with branchiae not illustrated; C, Posterior region showing the anal furrow.

3-1, 41°01.55'N, 66°20.12'W, 1345 m, silty mud, 1 paratype (USNM 115743); near Lydonia Canyon, 29 Apr 1985, cruise NOR-2 station 6-2, 40°05.03'N, 67°29.13'W, 2108

m, sandy mud, 9 paratypes (USNM 115744); off Cape Lookout, 23 May 1985, cruise SA-4 station 4-3, 34°11.29'N, 75°38.67'W, 2015 m, silty mud, 2 paratypes (USNM 115745).

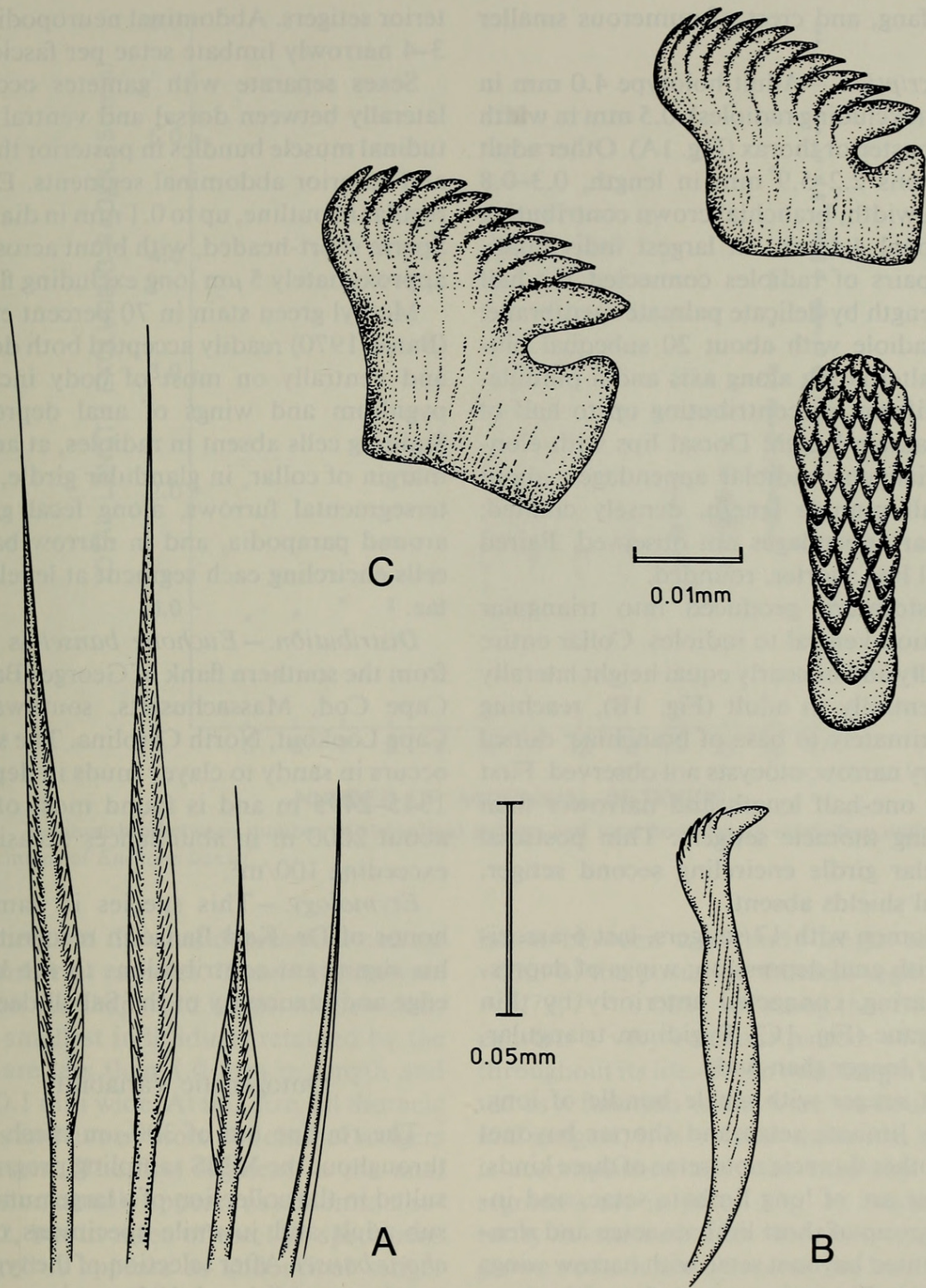


Fig. 2. *Euchone bansei* (paratype, BMNH ZB 1987.620): A, Thoracic notosetae from setiger three, including long and short limbate setae and a narrowly limbate bayonet seta; B, Thoracic neuroseta from setiger three; C, Uncini from abdominal setiger four in profile and in frontal view.

Diagnosis. — Small *Euchone* species with 17 abdominal setigers, last 6 associated with anal depression. Branchial crown with 4 pairs of radioles united with palmate membrane for half their length; radioles with long, filiform, pinnule-free ends. Collar entire lat-

erally and ventrally, separated by mid-dorsal gap, of even height all around, extending to branchial basis. Ventral shields absent. Thoracic notopodia with long and short limbate setae and pointed bayonet setae. Abdominal uncini with quadrate base, small

main fang, and crest of numerous smaller teeth.

Description.—Adult holotype 4.0 mm in length (excluding radioles), 0.5 mm in width along posterior thorax (Fig. 1A). Other adult specimens 2.2–5.9 mm in length, 0.3–0.8 mm in width; branchial crown contributing additional 4.4 mm in largest individuals. Four pairs of radioles connected for half their length by delicate palmate membrane; each radiole with about 20 subequal pinnules alternating along axis and a pinnule-free filiform tip contributing up to half of total radiole length. Dorsal lips with elongate-triangular radiolar appendages, about one-half pinnule length, densely ciliated; pinnular appendages not observed. Paired ventral lips shorter, rounded.

Peristomium produced into triangular projection ventral to radioles. Collar entire ventrally and of nearly equal height laterally and ventrally in adult (Fig. 1B), reaching approximately to base of branchiae; dorsal gap very narrow; otocysts not observed. First setiger one-half length and narrower than following thoracic setigers. Thin postsetal glandular girdle encircling second setiger. Ventral shields absent.

Abdomen with 17 setigers, last 6 associated with anal depression; wings of depression flaring, connected anteriorly by thin membrane (Fig. 1C). Pygidium triangular, slightly longer than wide.

First setiger with single bundle of long, narrow limbate setae and shorter bayonet setae; other thoracic notosetae of three kinds: superior arc of long limbate setae, and inferior group of short limbate setae and slender pointed bayonet setae with narrow wings (Fig. 2A). Thoracic neuropodia with about 12 long-handled acicular uncini in each fascicle (Fig. 2B). Abdominal notopodial tori with 10–17 uncini, each with quadrate base and small main fang surmounted by numerous rows of smaller teeth (Fig. 2C); shape of uncini nearly constant within each torus, but main fang progressively smaller in pos-

terior setigers. Abdominal neuropodia with 3–4 narrowly limbate setae per fascicle.

Sexes separate with gametes occurring laterally between dorsal and ventral longitudinal muscle bundles in posterior thoracic and anterior abdominal segments. Eggs irregular in outline, up to 0.1 mm in diameter. Sperm short-headed, with blunt acrosomes, approximately 5 μ m long excluding flagella.

Methyl green stain in 70 percent ethanol (Banse 1970) readily accepted both dorsally and ventrally on most of body including pygidium and wings of anal depression. Staining cells absent in radioles, at anterior margin of collar, in glandular girdle, in intersegmental furrows, along fecal groove, around parapodia, and in narrow band of cells encircling each segment at level of setae.

Distribution.—*Euchone bansei* is found from the southern flank of Georges Bank off Cape Cod, Massachusetts, southward to Cape Lookout, North Carolina. The species occurs in sandy to clayey muds in depths of 1345–2495 m and is found most often at about 2000 m in abundances occasionally exceeding 100/m².

Etymology.—This species is named in honor of Dr. Karl Banse in recognition of his significant contributions to the knowledge and taxonomy of the Sabellidae.

Ontogenetic Variability

The routine use of 300- μ m mesh sieves throughout the MMS sampling program resulted in the collection of a large number of sub-adult and juvenile specimens of *Euchone bansei*. After selection of the type material, an additional 185 specimens from across the sampling region were examined in detail. Ocular micrometer measurements were made on the total length from the top of the collar to the tip of the pygidium and on the width of the last thoracic setiger. Counts were made on the number of thoracic and abdominal setigers, on the number

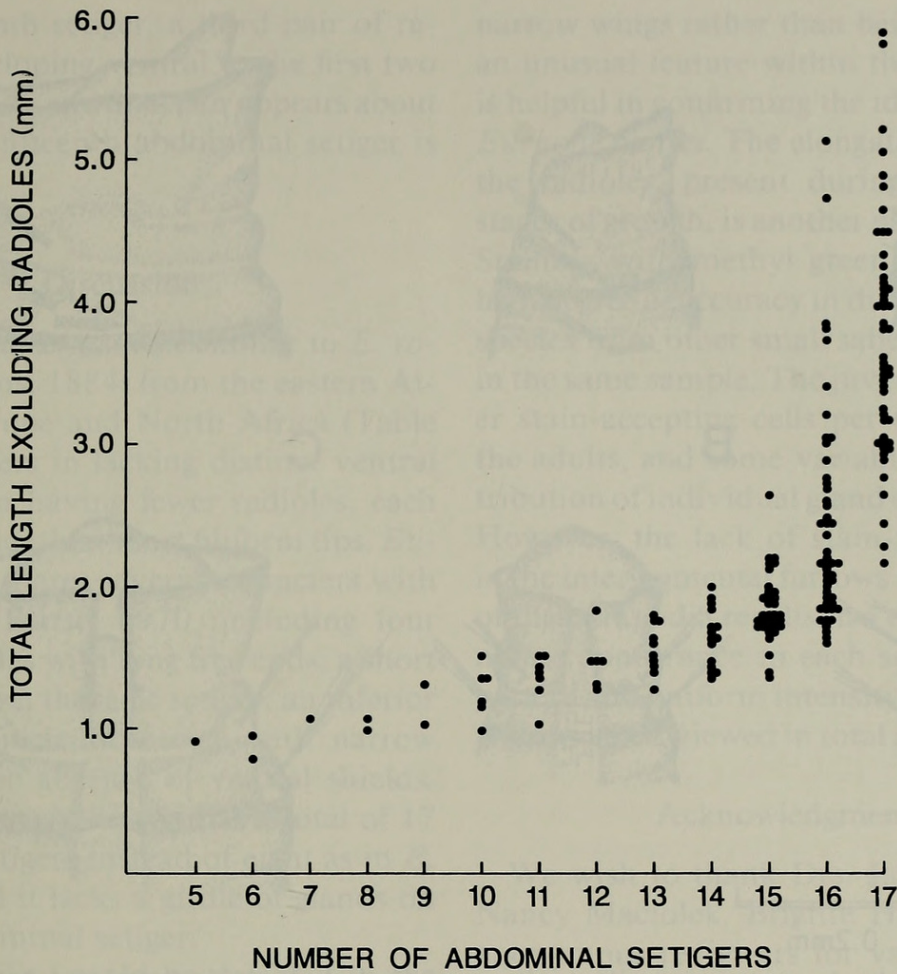


Fig. 3. Relationship between number of abdominal setigers and total body length (excluding radioles) for 185 specimens of *Euchone bansei*.

of segments in the anal depression, and on the number of radioles. Observations were made on the shape and height of the collar.

The smallest individuals retained by the sieves are less than 1.0 mm in length and about 0.1 mm wide. At this size, all thoracic setigers and five or more abdominal setigers are present. The first segment in the anal depression usually appears as abdominal setiger 12, but in three of the 185 specimens measured it appears as abdominal setiger 11. Depression segments are added through abdominal setiger 17. No specimens were found with more than six depression segments or 17 total abdominal setigers. In the three cases where the anal depression begins at setiger 11, the total abdominal setiger count is 16.

There is a statistically significant corre-

lation between total body length and the width of the posterior thoracic segment ($r^2 = 0.79$, $P < 0.005$), revealing that *E. bansei* exhibits a very constant pattern of growth throughout its life. When total length is plotted as a function of the number of abdominal setigers, it is evident that most growth is accomplished after the majority of the segments are in place (Fig. 3). Sexual maturity is attained after the individual has grown considerably in total size and added most or all of the setigers. Gametes are found only in a few of the largest specimens having 16 abdominal setigers, and in many of the larger individuals having 17 abdominal setigers.

The height and shape of the collar depends on the size of the specimen. In the smallest individuals it is short, oblique, and

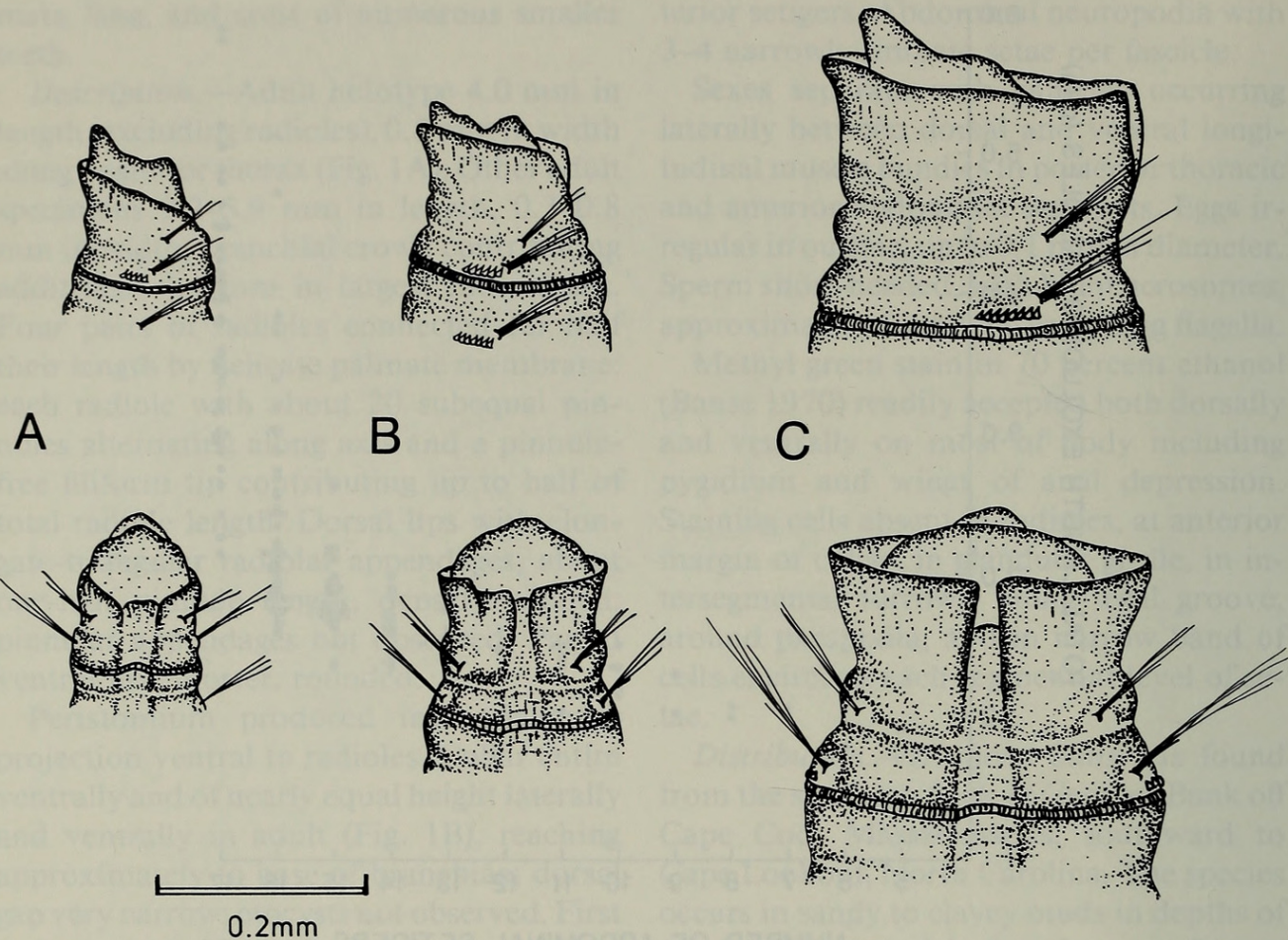


Fig. 4. Collar development in juvenile specimens of *Euchone bansei* in lateral and dorsal view: A, Six abdominal setiger stage; B, Twelve abdominal setiger stage; C, Sixteen abdominal setiger stage.

relatively undeveloped on the dorsal side, wrapping closely against the anterior body (Fig. 4A). The collar lengthens dorsally and laterally, becoming more foliaceous as the worm adds abdominal setigers (Fig. 4B, C). By the time the specimen has become sexually mature the collar extends to the base

of the branchiae and is of nearly equal height all around (Fig. 1B). Only two pairs of radioles are present on the smallest specimens examined. However, even at this stage the branchiae have the long filiform free ends characteristic of the adults. By the time the abdomen has

Table 1.—Comparison of small species of *Euchone*: (1) Pre-depression setigers in the abdomen; (2) Abdominal depression setigers in adult specimens; (3) Pairs of radioles; (4) Length:width ratio of the blades of the inferior series of limbate thoracic notosetae; (5) Occurrence of ventral shields; (6) Ratio of the length of the free tips of the radioles relative to the total length of the radioles. Information is derived from the original descriptions and from Banse (1970).

Species	1	2	3	4	5	6
<i>Euchone arenae</i> Hartman, 1966	6–9	6	5–7	4:1	Present	1:6
<i>Euchone elegans</i> Verrill, 1873	12–15	8–10	6–8	5:1	Present	1:6
<i>Euchone hancocki</i> Banse, 1970	5	3	4	10:1	Absent	1:3
<i>Euchone incolor</i> Hartman, 1965	6	3	3	5:1	Absent	1:4
<i>Euchone rosea</i> Langerhans, 1884	10–12	5–7	5–8	6:1	Present	1:10
<i>Euchone bansei</i> New species	11	6	4	9:1	Absent	1:2

added the tenth setiger, a third pair of radioles is developing ventral to the first two pairs. The fourth and final pair appears about the time the fifteenth abdominal setiger is developing.

Discussion

Euchone bansei is most similar to *E. rosea* Langerhans, 1884, from the eastern Atlantic off Europe and North Africa (Table 1), but it differs in lacking distinct ventral shields and in having fewer radioles, each with long rather than short filiform tips. *Euchone bansei* shares several characters with *E. hancocki* Banse, 1970, including four pairs of radioles with long free ends, a short and narrow first thoracic setiger, an inferior group of thoracic notosetae with narrow wings, and the absence of ventral shields. *Euchone bansei*, however, has a total of 17 abdominal setigers instead of eight as in *E. hancocki*, and it lacks a girdle of glands on the first abdominal setiger.

No seasonality could be detected in the growth stages of this species throughout the year. Sexually mature adults, juveniles with no depression setigers, and all intermediate stages were found in samples taken in the spring, summer, and winter months.

As noted by Banse (1970) for other small species of *Euchone*, all of the pre-depression setigers are in place before the first depression setiger is formed. Sub-adult specimens have fewer depression setigers, and the smallest individuals entirely lack the depression, negating the utility of this character for the specific determination of juvenile specimens. Ontogenetic differences between the juveniles and adults of *E. bansei* also occur in the shape of the collar and the number of branchial radioles. These traditional diagnostic characters, therefore, can be considered only when dealing with adults of the species of *Euchone*.

Several other characters, however, remain constant as the specimens grow. The inferior series of thoracic notosetae have

narrow wings rather than being broadened, an unusual feature within the genus which is helpful in confirming the identity of small *Euchone bansei*. The elongated free ends of the radioles, present during all observed stages of growth, is another useful character. Staining with methyl green also affords a high degree of accuracy in distinguishing this species from other small sabellids occurring in the same sample. The juveniles have fewer stain-accepting cells per unit area than the adults, and some variability in the distribution of individual gland cells is evident. However, the lack of stain-accepting cells in the intersegmental furrows and at the level of the parapodia results in a distinctly bianulate appearance to each setiger, and the pattern and uniform intensity of the staining regions when viewed in total are distinctive.

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