Eunice rubra Grube (Annelida, Polychaeta, Eunicidae), a redescription based on the holotype and Brazilian specimens

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ABSTRACT. Based on features of the holotype and seven Brazilian specimens examined under stereomicroscope, light microscope, and scanning electron microscope, *Eunice rubra* Grube, 1856 is redescribed, allowing for intraspecific variation and providing information on characters not included in a previous redescription. Characters important for the taxonomy of the genus varied widely, although in some cases because of fixation artefacts.
KEY WORDS. *Eunice rubra*, Eunicidae, Polychaeta, taxonomy, south-eastern Brazil

FAUCHALD (1992) based his revision of *Eunice* Cuvier, 1817 upon type material, some of which consisted of poorly preserved specimens, few or single individuals, or individuals with missing parts. Because of this, in several species certain characters were scored as unknown, and intraspecific variation was impossible or nearly impossible to evaluate. *Eunice rubra* Grube, 1856 is a good example. FAUCHALD (1992) examined only the holotype, which was incomplete, and therefore characters such as maxillary formulae, total length, and the morphology of the posterior end were impossible to describe precisely.

In Brazil, four specimens of a species which was previously considered as new and close to *E. rubra*, were collected in a sandy beach and in living colonies of the coral *Mussismilia hispida* (Verrill, 1868). In order to define the differences between our specimens and *Eunice rubra*, which has been reported several times from the Brazilian coast (NONATO & LUNA 1970; MORGADO & AMARAL 1981; DUARTE & NALESSO 1996), three specimens of the latter from the collection of Dr. Edmundo Ferraz Nonato were borrowed, and the holotype was also examined. The analysis indicated that the seven specimens from Brazil were actually *E. rubra*. Moreover, this species shows variation in characters considered important by FAUCHALD (1992) for the taxonomy of the genus, such as the shape of articulations in palps, antennae and peristomial cirri, the segment on which the branchiae first appear, and the number of branchial filaments per parapodium.

In the present paper, *E. rubra* is redescribed, based on a comprehensive morphological comparison of the holotype and the seven Brazilian specimens. The

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identity of the taxon *E. rubra* is reinforced by discussion of the differences between it and the species considered by FAUCHALD (1992) as closest to it, in view of the new information presented herein.

MATERIAL AND METHODS

The Brazilian material was collected on the northern coast of the State of São Paulo, south-eastern Brazil. Three specimens (numbers 1, 2, and 4) came from two independent projects. The first project analysed macrofaunal polychaetes from intertidal sandy beaches along São Sebastião Channel, and the second project examined the polychaetes living on tufts of algae and colonies of the coral *Mussismilia hispida* at Alcatrazes Island. For the first project, samples of sediment were collected between 1995 and 1997 at São Francisco Beach, and the polychaetes were fixed in 70% ethanol. The collections from Alcatrazes Island were made in 1995; the material was fixed in formalin, corals were de-calcified with formalin-formic acid solution, and the polychaetes were sorted and preserved in 70% ethanol.

Three additional specimens (fixed in formalin and preserved in 70% ethanol) from Ubatuba were borrowed from the collection of Dr. Edmundo F. Nonato. One specimen from the same beach as specimens 1 and 2 (fixation method unknown) was kindly provided by a colleague.

The specimens were inspected under a stereomicroscope. Slides permanently mounted in glycerin jelly were analysed under a light microscopy. Drawings were made with the aid of a drawing tube. For scanning electron microscope (SEM – Model JEOL JSM5800LV), several parapodia were detached, critical-point-dried, and covered with 40 nm of gold.

The holotype is deposited in the Zoological Museum, University of Copenhagen, Copenhagen, Denmark. The Brazilian material is deposited in the polychaete collection (MHN-BPO-ST) of the Museu de História Natural, State University of Campinas, state of São Paulo, Brazil.

RESULTS

Eunice Cuvier, 1817

Type Species. *Leodice gigantea* Lamarck, 1818, designated by VERRILL (1900).

According to ORRHAGE (1995), *Eunice* is characterised by having one central antenna, one pair of lateral antennae, one pair of slender dorsolateral palps (formerly considered as an additional pair of antennae), and one pair of peristomial cirri. Setae include limbate, pectinate, compound falcigers, subacicular hooks, and, in some species, compound spinigers and pseudocompound falcigers; subacicular hooks and falcigers are protected by paired guards (FAUCHALD 1992). Branchiae may be present; some species have been described based on specimens with or without branchiae and, although FAUCHALD (1992) contests both morphs belonging to the same species, NOGUEIRA *et al.* (2001) demonstrated that, at least for *E. insularis* Nogueira, Steiner & Amaral, 2001, branchiate and abranchiate forms do exist.

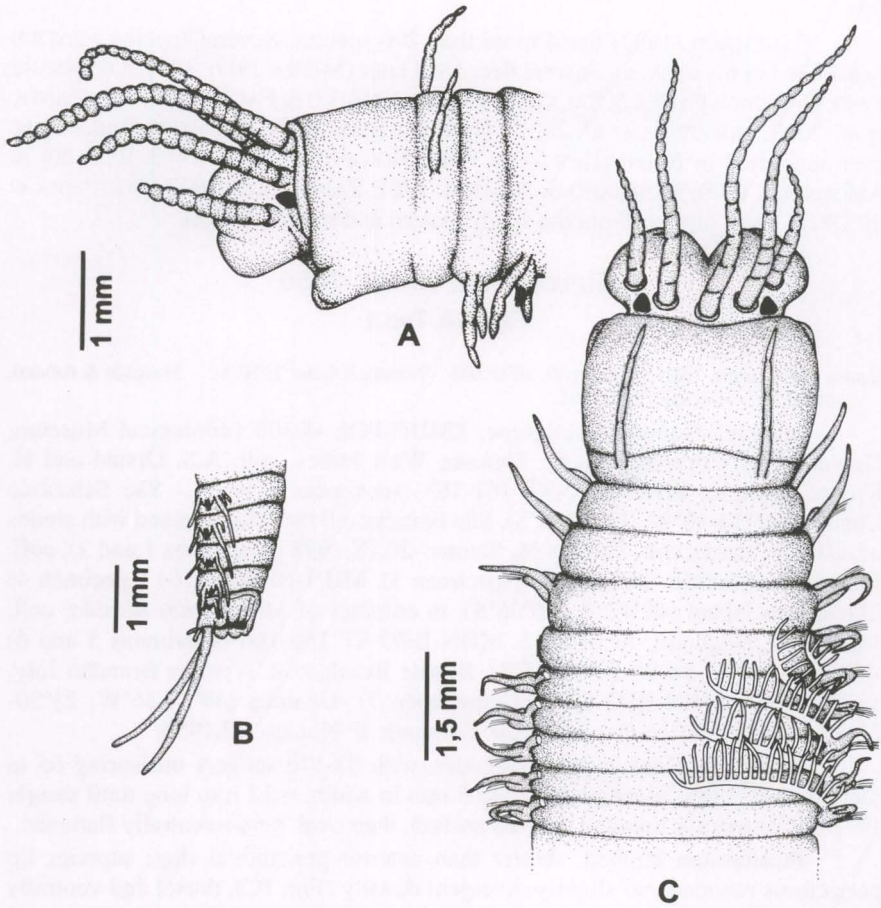

Fig. 1. *Eunice rubra*. (A) anterior body, lateral view; (B) pygidium; (C) anterior body, dorsal view. (A) specimen 6, (B-C) specimen 1.

= 6-8 + 7-10, MV = 1 + 1; left MIV with large teeth on the external side, and short teeth or even inconspicuous indentations, on internal side. From setiger 1, segments similar in length, progressively widening until setiger 10 (Fig. 1C). Peristomial cirri thin, slightly inflated basally, with 4-8 articles varying from weakly articulated cylinders to moniliform, distally tapering, reaching to or close to the anterior border of peristomium; basal article always longer than remaining articles.

Dorsal cirri with 4-8 true articles (Fig. 1A) or nearly smooth (3-4 constrictions) (Fig. 1C) along the entire body (degree of segmentation varying among specimens) (Figs 1A-C, 2A-D, 6A, 6C), about twice as long as ventral cirri; stout on abranchiate setigers (Fig. 2A-B), becoming progressively shorter and thinner from setiger 5 (Fig. 2C-D). Ventral cirri longer than acicular lobules on all setigers, stout and digitiform until setiger 4-5 (Fig. 2A-B), then basally inflated with

FAUCHALD (1992) listed more than 200 species. Several species were not considered in his revision, or were described later (MIURA 1986, 1987; ORENSANZ 1990; CARRERA-PARRA & SALAZAR-VALEJO 1998; LU & FAUCHALD 1998; ZANOL *et al.* 2000; NOGUEIRA *et al.* 2001). Up to the present, 37 species of *Eunice* have been identified in Brazil (HARTMAN 1948; NONATO & LUNA 1970; RULLIER & AMOUREUX 1979; MORGADO & AMARAL 1981; ZANOL *et al.* 2000; NOGUEIRA *et al.* 2001), most of them from the south-eastern and southern areas.

Eunice rubra Grube, 1856

Figs 1-8, Tab. I

Eunice rubra Grube, 1856: 59. – Verrill, 1900: 603. – Nonato & Luna, 1970: 81. – Morgado & Amaral, 1981: 36. – Fauchald, 1992: 291.

Material examined. Holotype: ZMUC-POL 00308 (Zoological Museum, University of Copenhagen), St. Thomas, West Indies, coll. A.S. Örsted and H. Kröyer. BRAZIL: MHN-BPO-ST 161-163 (specimens 1 to 3) - São Sebastião Channel (45°14-30'W; 23°41-53'S), São Francisco Beach (sand mixed with stones of different sizes), coll. Tatiana M. Steiner -20.IX.1998 (specimens 1 and 2), coll. Jolnnye R. Abrahão -20/05/2000 (specimen 3). MHN-BPO-ST 164 (specimen 4) -Alcatrazes Island (45°42'W, 26°06'S), in colonies of *Mussismilia hispida*, coll. João M.M. Nogueira, 17.III.1995. MHN-BPO-ST 165-166 (specimens 5 and 6) -Ubatuba (44°51-56'W; 23°20-25'S), Bonete Beach, coll. Aylthon Brandão Joly, 19.VIII.1963. MHN-BPO-ST 167 (specimen 7) -Ubatuba (44°51-56'W; 23°20-25'S), inside empty oyster shell, coll. Edmundo F. Nonato, III.1959.

Diagnosis. Body long and slender, with 83-176 setigers measuring 65 to more than 177 mm in length by 2.5-5.5 mm in width, 6-12 mm long until setiger 10. Body anteriorly rounded in cross section, then oval, dorso-ventrally flattened.

Prostomium bilobed, shorter than anterior peristomial ring; superior lip projections rounded and slightly divergent distally (Fig. 1C), dorsal and ventrally inflated, with deep median ventral sulcus; lower lip muscular (Fig. 1A). Palps and antennae in horseshoe arrangement; ceratophores ring-shaped, without articulations. Styles basally wrinkled (Fig. 5A) or with one short cylindrical article (Fig. 5B-D); moniliform articles along most of their length, drop-shaped in distal third or on the last one or two articles. Moniliform articles with quadrate or rounded-quadrate margins. Palps with 8-13 articles, extending to posterior part of anterior peristomial ring; lateral antennae with 14-24 articles, reaching posterior part of setiger 1 to setiger 3; central antenna with 15-24 articles, reaching setiger 2 to setiger 4; longer specimens always showing the higher values for these variables. One pair of triangular eyes, with rounded edges between bases of palps and lateral antennae, varying from dark red to black.

Anterior peristomial ring about three times the length of posterior ring, in dorsal view; separation between rings visible dorsal and ventrally, not laterally. Mandibles brown, shorter than maxillae (Fig. 4A), hard, cutting edges with darker concentric lines, strongly marked, covered by one pair of white, hard calcareous pieces (easily dettached) (Fig. 4B). Maxillary formula: I = 1 + 1, II = 5-6 + 5-8, MIII = 5-8 + 0, MIV

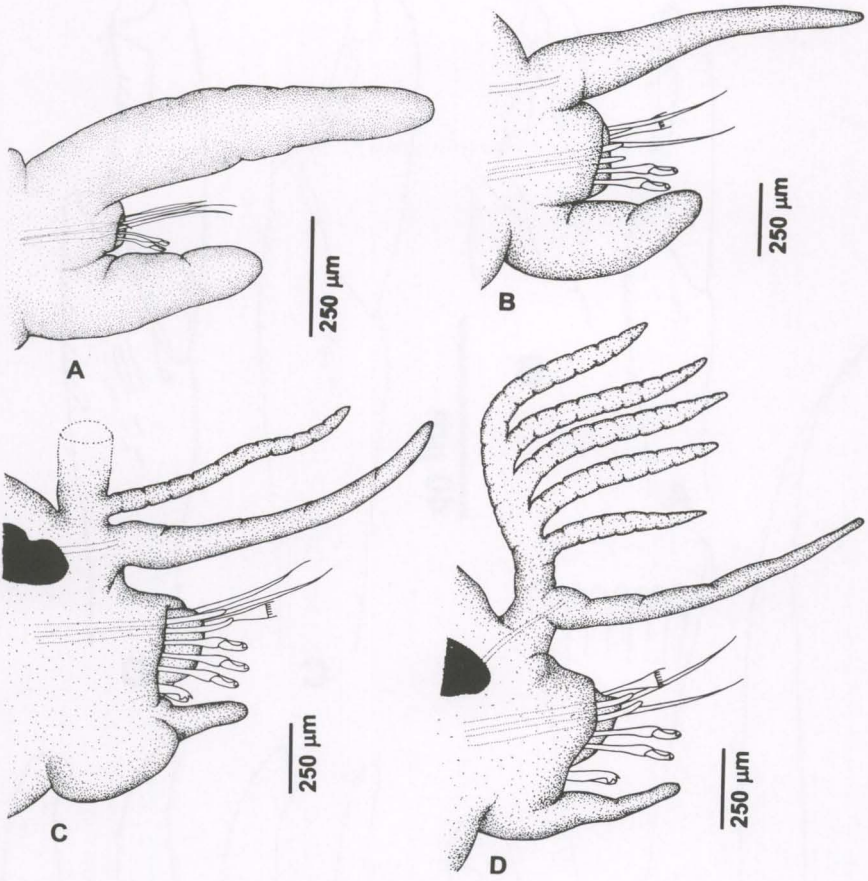

Fig. 2. *Eunice rubra*. (A) parapodium 1; (B) parapodium 4; (C) parapodium 25; (D) parapodium 74. (A) specimen 3, (B-D) specimen 1.

digitiform round tips for a short extension (Figs 2C, 6A). Inflated bases progressively decreasing and disappearing around setiger 40-55, while tips of cirri become longer and thinner towards end of body (Figs 2D, 6C).

Branchiae pectinate, beginning on setiger 4-6, with few filaments in the first one or two parapodia; number of filaments progressively increasing until about 14-21, for a short extension, then decreasing again to 1-3 filaments until near the end of body (Fig. 8). Most specimens showing slight increase in number of filaments on posterior body. Branchial stem up to three times longer than dorsal cirrus (Fig. 1C); branchial filaments shorter, laterally ciliated (Fig. 6B). Branchiate setigers with one internal light brown to black spot per parapodium (faint in specimens 5, 6 and 7), near origin of notoacicula (Fig. 2C-D). Posteriormost setigers abranchiate (Fig. 1B).

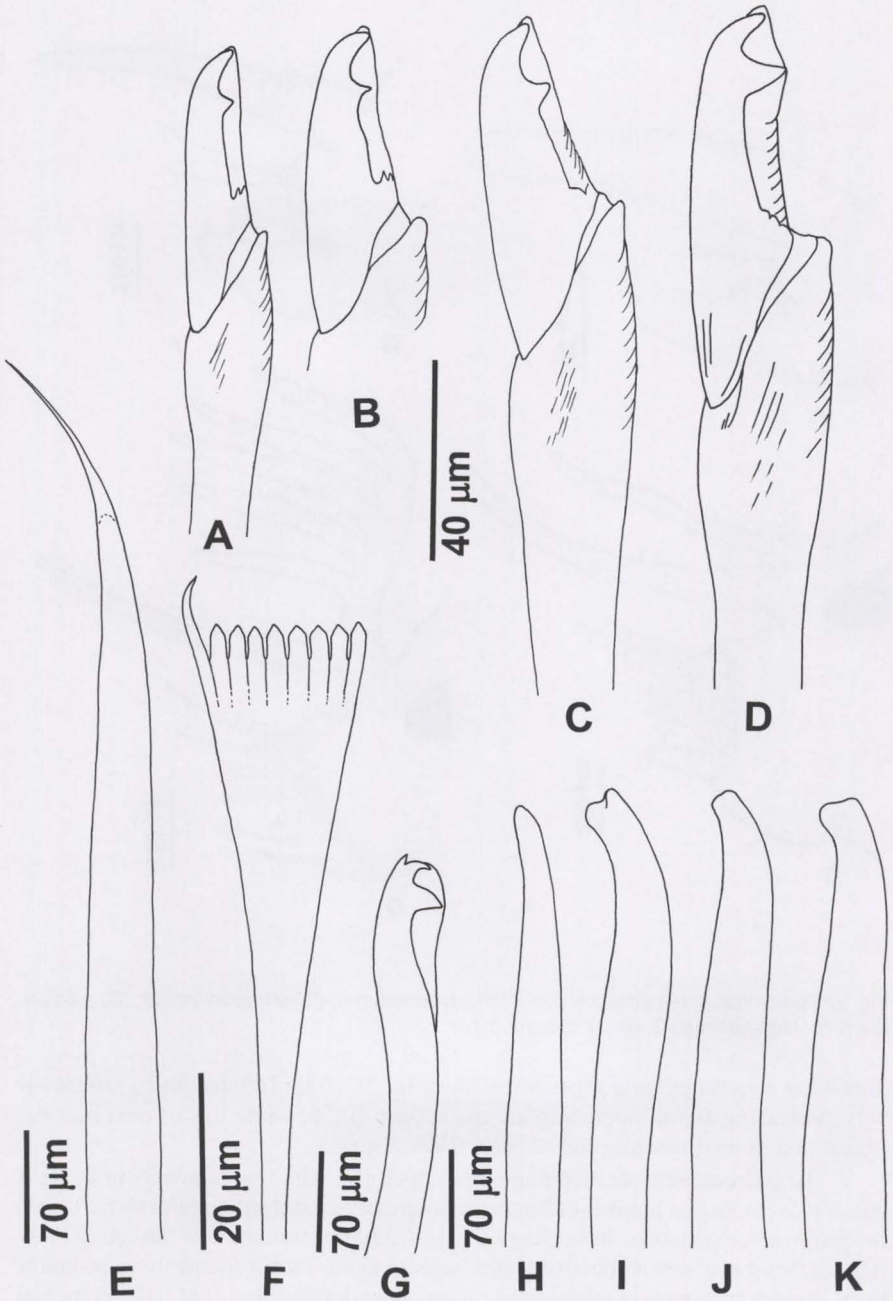

Fig. 3. *Eunice rubra*. (A-D) falcigers: (A) setiger 1; (B) setiger 2; (C) setiger 14; (D) setiger 118; (E, H-K) acicula; (F) pectinate setae; (G) subacicular hook. (A- E) specimen 3, (H-K) specimen 1.

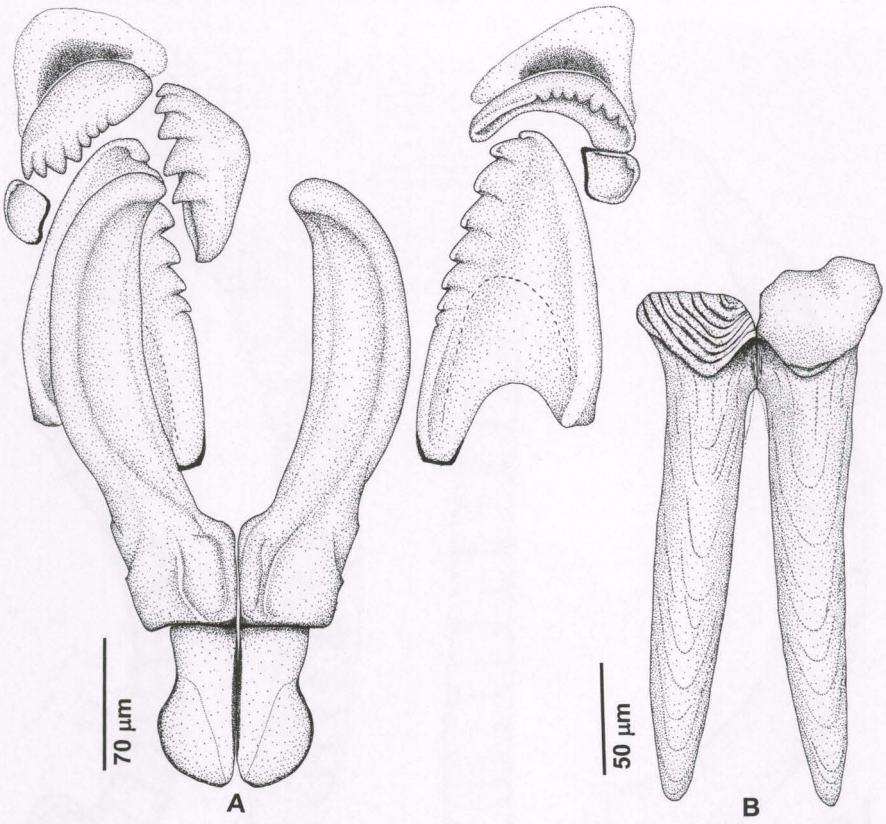

Fig. 4. *Eunice rubra*. Specimen 3. (A) maxillae, dorsal view; (B) mandibles, ventral view (left white calcareous pieces omitted).

Neuropodial acicular lobules rounded until midbody, conical on posterior setigers; pre- and post-setal lobules straight, shorter than the acicular lobules (Figs 2B-D, 6A, 6C). Supra-acicular bundle of setae from anterior setigers (Fig. 7B) including 6-12 limbate capillaries, thin, minutely denticulate laterally, central core smooth (Fig. 7A, 7D) and up to 10 pectinate setae, straight, with denticulate shaft, 8-11 sharp teeth, one lateral tooth longer than the remaining teeth (Figs 3F, 7D). Infra-acicular bundle of setae including bidentate compound falcigers (Fig. 7A) with paired guards, without mucros, denticulate basally and surrounding the blades like covers (Fig. 7C, 7E); blades bidentate, teeth distally blunt, proximal tooth triangular, laterally directed, shorter than distal tooth on anterior setigers (Fig. 3A-B), progressively increasing in length and becoming larger than distal tooth from midbody to pigydium (Fig. 3C-D); distal tooth directed laterally to obliquely upwards. Number of setae decreasing towards end of body. Subacicular hook light yellow, present from setiger 22-33, tridentate with teeth in a crest (Figs 3G, 6D), distal tooth reduced, directed obliquely upwards, remaining teeth directed laterally, inferior tooth larger; most specimens with one hook per

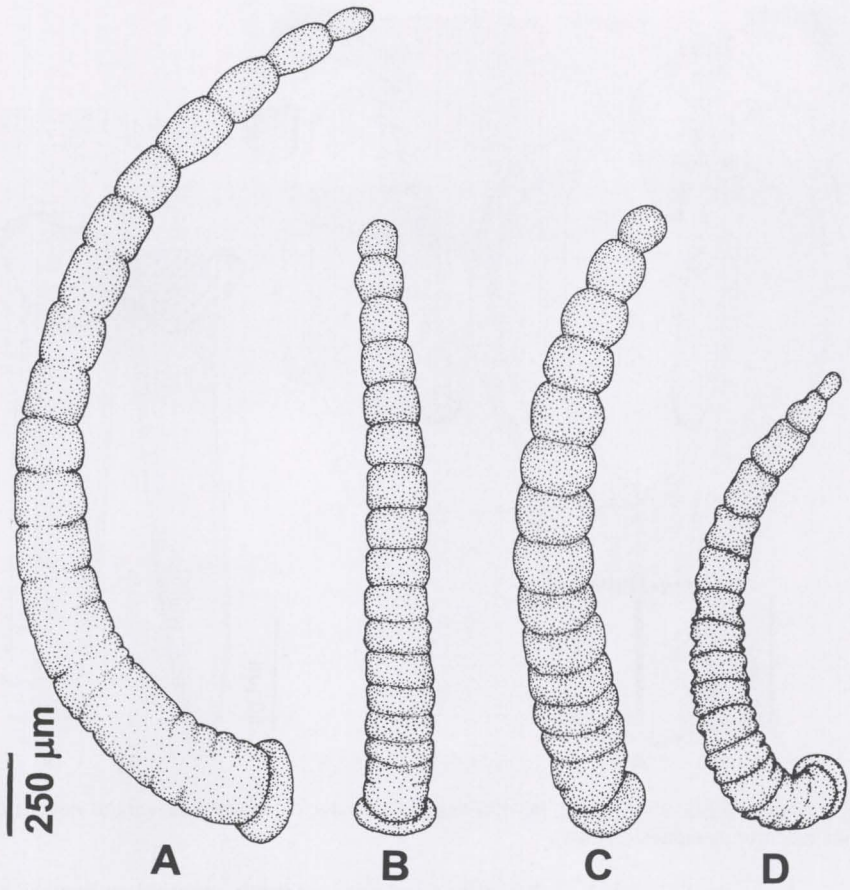

Fig. 5. *Eunice rubra*. Ceratophore and style of lateral antenna. (A) specimen 1, (B) specimen 4, (C) specimen 6, (D) specimen 3.

parapodium, except for replacements. Holotype and specimen 3 with two hooks on many setigers. Acicula prominent, light yellow, usually two per parapodium. On anterior setigers, acicula gently tapering to blunt tips, slightly bent distally (Fig. 3H and J); from midbody, acicula more conspicuosly bent, usually with two stout blunt teeth (Fig. 3I and K). Anteriormost setigers with additional aciculum gently tapering to long filiform tip (Fig. 3E).

Pygidium with two pairs of anal cirri, superior pair long, subulate, smooth to irregularly wrinkled, inferior pair thin and much shorter, about 1/15 length of superior cirri (Fig. 1G).

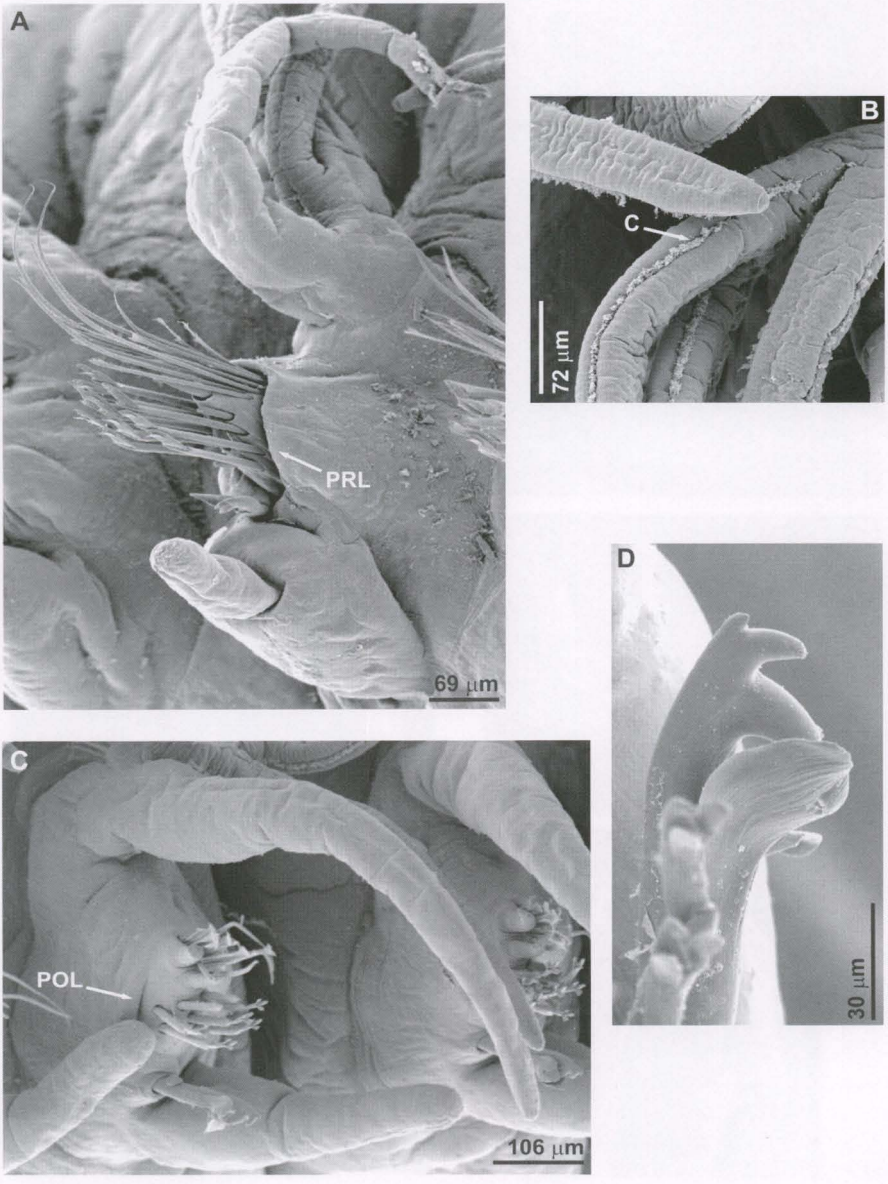

Fig. 6. *Eunice rubra*. Specimen 2. (A) parapodium 28; (B) detail of branchiae; (C) parapodium 107; (D) subacicular hook. C – cillia, POL – post-setal lobule, PRL - pre-setal lobule.

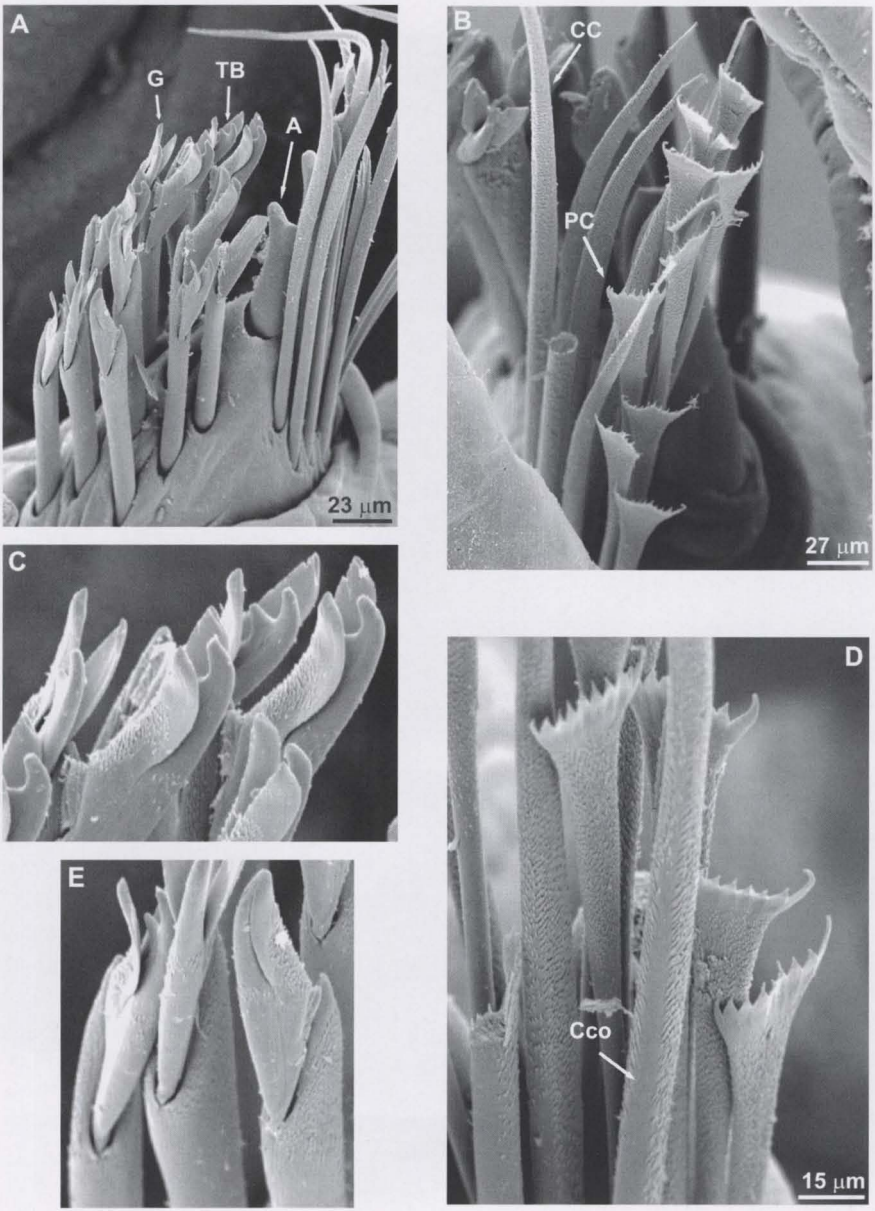

Fig. 7. *Eunice rubra*. specimen 2. (A) setae, parapodium 29; (B) supracicular setae; (C) and (E) details of the blades of falcigers; (D) detail of supracicular seta. CC – capillary setae, A – Aciculum, Cco – central core of capillary setae, G – guards, PC -pectinate setae, TB – teeth of the blade.

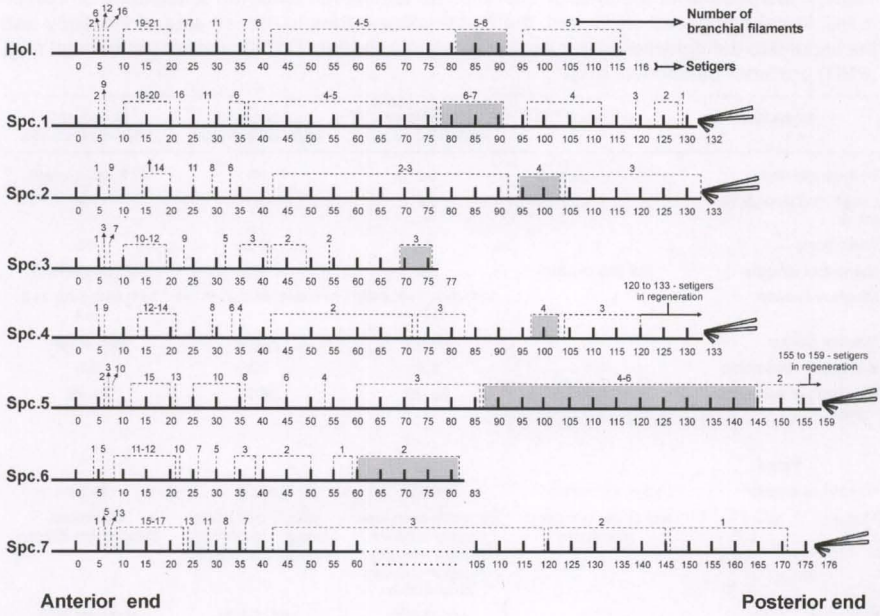

Fig. 8. *Eunice rubra*. Branchial formulae of all specimens examined, showing the increasing number of filaments in the posterior part of the body (darker area). Hol. – holotype, Spc. – specimen.

Holotype

Based on examination of the single type specimen, certain characters of the species must be reevaluated.

The holotype is well preserved, although it seems dehydrated, with the cuticule wrinkled and folded, altering the length and width of the body. Its original width may have been over 3 mm.

The distal end of the prostomium is damaged, somewhat altering its original morphology. The peristomial cirri are also damaged. The left cirrus reaches setiger 3 and has an inflated base and pointed tip. On the proximal half of the cirrus, 3 constrictions are well marked and the distal half is clearly smooth. The right cirrus is short and incomplete.

The dorsal cirri of anterior setigers are articulated, as described by FAUCHALD (1992). The posterior cirri are irregularly wrinkled, rather than divided into 3-4 articles. Several types of articles form the central antenna: the first is a short cylinder, the following articles are moniliform, next it has subquadrate cylinders, as in the specimen 3 (Fig. 5D), ending with drop-shaped articles, as in the specimen 1 (Fig. 5A). Other characters accord well with the description presented above.

Table I. Morphological features of the holotype and seven Brazilian specimens of *Eunice rubra*. In case of paired structures, the first number reffers to the left side of the body and the second to the right side; (–) means missing information; (APR) anterior peristomial ring, (PPR) posterior peristomial ring.

Character	Holotype	Specimen 1 MHN-BPO-ST161	Specimen 2 MHN-BPO-ST162	Specimen 3 MHN-BPO-ST163
Body length (mm)	177 (incomplete)	80	65	47.8 (incomplete)
Length to chaetiger 10 (mm)	7.5	8.2	6	7.2
Width (mm)	3	5	2.5	4.5
Number of setigers	116 (incomplete)	132	133	77 (incomplete)
Maxillary formula	–	1+1; 6+7; 7+0; 6+8; 1+1	1+1; 6+8; 8+0; 7+9;1+1	1+1; 6+8; 5+0; 7+7; 1+1
Maxillae Colour	–	brown	yellow	light brown
Branchiae - Beginning	4.4	5.5	5.5	5.5
Beginning of subacicular hooks	24, 24	25, 23	24, 24	24, 22
Palps				
Number of articles	3,5, incomplete	9, 11	10, 8	9, 10
Shape	first article cylindrical; moniliform	first article cylindrical; basally wrinkled; median = weakly moniliform; distaly drop-shaped	basally-cylindrical median – moniliform distally-drop-shaped	moniliform distally-drop-shaped
Extension		end of APR	end of APR	posterior APR
Lateral antennae				
Number of articles	14, 6	19, 21	15, 15	–, 16
Shape	same as palps	same as palps	same as palps	same as palps
Extension	setiger 1	setiger 2	setiger 2	setiger 2
Central Antenna				
Number of articles	21 (almost complete)	24	15	–
Shape	first article cylindrical; basally moniliform median = short cylinders distally - drop shaped	same as palps	same as palps	–
Extension	setiger 3	setiger 4	half of setiger 2	–
Peristomial cirri				
Number of articles	(?) 3, –	4, 4	4, 4	5, 5
Shape	segmentation faint	segmentation faint	segmentation faint (left), cylindrical (right)	segmentation faint
Extension	half APR	end of APR	beginning of APR	beginning of APR
Ventral cirri				
Digitiform between setigers	1-3	1-3	1-4	1-3
Inflated bases between setigers	4-34	4-34	5-26	4-35
Inflated bases decreasing between setigers	35-43	36-55	27-43	36-46
Filiform between setigers	44-116	56-132	44-133	47-end (fragment)

Continued

Table I. Continued.

Character	Specimen 4 MHN-BPO-ST164	Specimen 5 MHN-BPO-ST165	Specimen 6 MHN-BPO-ST166	Specimen 7 MHN-BPO-ST167
Body length (mm)	70	153	49.5 (incomplete)	133
Length to chaetiger 10 (mm)	7	12	7.5	10
Width (mm)	4.5	5.5	4	5
Number of setigers	133, regenerating from setiger 121	159, regenerating from setiger 155	83 (incomplete)	176
Maxillary formula	1+1; 5+8; 7+0; 8+10; 1+1	–	–	1+1; 6+5; 7+0; 7+8; 1+1
Maxillae Colour	light brown	–	–	light brown
Branchiae - Beginning	5.5	5.6	4.4	5.5
Beginning of subacicular hooks	24, 24	29, 33	22, 22	23, 24
Palps				
Number of articles	10,8	12,12, incomplete	8,9	12,13
Shape	moniliform distally-drop-shaped	moniliform	moniliform distally-drop-shaped	moniliform distally-drop-shaped
Extension	end of APR	–	posterior APR	end of APR
Lateral antennae				
Number of articles	14, 14	24, 17, incomplete	14, 18	21,–
Shape	moniliform distally-drop-shaped	moniliform	moniliform distally-drop-shaped	moniliform distally-drop-shaped
Extension	setiger 2	–	end of set iger 1	half setiger 3
Central Antenna				
Number of articles	16, incomplete	11, incomplete	20	10, incomplete
Shape	moniliform	moniliform	moniliform	moniliform
Extension	–	–	setiger 2	–
Peristomial cirri				
Number of articles	6, 6	5, 5	5, 5	6, 6
Shape	moniliform	segmentation faint	cylindrical; drop-shaped distally	segmentation faint
Extension	beginning of APR	anterior APR	beginning of APR	beginning of APR
Ventral cirri				
Digitiform between setigers	1-3	1-3	1-3	1-4
Inflated bases between setigers	4-31	4-34	4-30	5-34
Inflated bases decreasing between setigers	32-45	35-54	31-40	35-57
Filiform between setigers	46-133	55-159	41-end (fragment)	58-176

DISCUSSION

Table I lists the morphological features of holotype and all other specimens examined.

FAUCHALD (1992) placed great value on the articulations of the palps and antennae, whether they are moniliform or cylindrical, and used this character to separate groups of species. According to his concept, a moniliform articulation may vary from drop-shaped through rounded-quadrangular, to nearly triangular. According to the identification key provided by FAUCHALD (1992), *E. rubra* falls within a group of species having only moniliform articulations, rather than moniliform but drop-shaped distally.

Based on features of holotype and the seven specimens observed in the present study, this character shows some variation, since styles and peristomial cirri with very faint articulations (mainly specimen 1) and strongly moniliform (specimens 2, 4, and 7) were equally seen. The shape of the moniliform articles also varied from quadrangular (Fig. 5A, B), rounded-quadrangular (Fig. 5C), to drop-shaped (distally, in complete styles). Specimen 3 seems to be dehydrated like the holotype; therefore, although still moniliform, the articles of the antennae and palps appear deformed (Fig. 5D). Dorsal cirri also varied from nearly smooth, with very faint segmentation (such as in specimen 1), to truly articulated, with up to eight articles (as in specimen 5, 6, and 7, which has up to eight articles, even on posterior body).

The variation observed in the morphology of the articles of antennae, palps, and peristomial and dorsal cirri is probably related to the fixation and preservation of the specimens. The holotype and specimen 3 both appear dehydrated (specimen 3 more than the holotype), and have quadrate, centrally depressed articles (Fig. 5D). On the other hand, specimen 4 also has quadrate articles, but they are not depressed (Fig. 5B), and this specimen shows no evidence of dehydration. Specimens 5-7 have rounded quadrate articles up to the last third, after which they are drop-shaped (Fig. 5C). In specimen 1, the peristomial appendages are wrinkled at the base (Fig. 5A). We concluded that fixation and preservation seem to affect the morphology of soft structures, some of which were considered important by FAUCHALD (1992) for the taxonomy of the genus.

Other characters, such as the number of branchial filaments, the number of articles in the antennae and palps, the maxillary formula, and the number of hooks per parapodium also varied among the specimens. These variations appeared not to depend on the size of the specimens..

The total number of branchial filaments was highly variable among the specimens. This number increased slightly on the posterior segments of most specimens, but not in specimen 7 (Fig. 8). The length of filaments varied from about the same length as the dorsal cirri along the entire body, in some specimens, to distinctly longer than dorsal cirri, increasing posteriorly, in holotype and other specimens.

The eversible jaw apparatus is flexible, mainly in specimen 2. Specimen 1 differs in having this apparatus darker and harder, with a central subquadrate sclerotinised tissue on the roof of the mouth, near MIV. The variation in maxillary formula was remarkable, the specimens had different numbers of teeth on maxillae II, III and IV (Tab. I). Nevertheless, some patterns seem to be characteristic: maxilla

II has fewer teeth on the left side than on the right; maxilla III has large, sharply pointed teeth; the external half of the left maxilla IV has large teeth, while in the internal half teeth are shorter, or even with indistinct indentations; right maxilla IV has all teeth nearly the same size.

The numbers of anterior setigers with ventral cirri with inflated bases, and of posterior setigers with filiform-tipped cirri are size-dependent, because both areas are more developed in longer specimens.

The beginning of the branchiae and the subacicular hooks also seemed to be size-dependent, because specimen 5 (the longest animal) had both structures appearing more posteriorly. Additional smaller specimens, however, are needed to verify this patern.

The morphology of the mandibular apparatus, eyes, parapodial lobules, falcigerous and pectinate setae is constant in all specimens.

Intraspecific variation seems to be considerable in this genus, at least for some species. NOGUEIRA *et al.* (2001) recently described two new species of *Eunice* from the coast of the State of São Paulo, one of which has branchiate and abranchiate forms, and branchiate specimens have branchial filaments varying in position and length. Moreover, NOGUEIRA *et al.* (2001) demonstrated that juveniles of the same species frequently lack peristomial cirri, a situation which also occurs in *E. wui* Lu & Fauchald, 1998. This feature would have resulted in assignation of these specimens to the genus *Paramarphysa* Ehlers, 1887, if intraspecific variation and developmental characters had not been recognised.

In view of the new information provided by the present redescription, the differences between *E. rubra* and the closest species require re-evaluation. The species most similar to *E. rubra* are: *E. lucei* Grube, 1856, *E. aequabilis* Grube, 1878, *E. martensi* Grube, 1878, *E. stigmatura* (Verrill, 1900), *E. panamena* (Chamberlin, 1919), *E. aedificatrix* (Monro, 1933), and *E. hirschi* Fauchald, 1992. All the following comparisons were based on the redescription of these species by FAUCHALD (1992), and the original description, in the case of *E. hirschi*.

Eunice lucei has up to eight branchial filaments, and acicula more distinctly hammer-head or bifid, with more prominent teeth. The falcigerous setae have the proximal tooth shorter than distal tooth along the entire body. The guards of falcigers have short mucros on the anterior setigers, while in *E. rubra* all guards lack mucros and proximal tooth is larger from the midbody posteriorly.

The holotype of *E. martensi* is poorly preserved and, according to FAUCHALD (1992) several features are impossible to ascertain. The specimen, measuring 220 mm and having 168 setigers, has up to ten articles in lateral antennae (the only complete in holotype), the falcigerous setae are tridentate, and the acicula are more strongly bent and distally pointed, while *E. rubra* has more articles in the lateral antennae, and bidentate falcigers.

Eunice aequabilis has 12-17 branchial filaments on all setigers, while all specimens of *E. rubra* observed present anterior and posterior branchiate setigers with much fewer filaments. Besides, the blades of falcigers are tridentate in *E. aequabilis*, and bidentate in *E. rubra*.

Eunice stigmatura has much longer antennae and palps, since the palps reach setiger 1, the lateral antennae reach setiger 8, and the central antenna reaches setiger 10. Moreover, *E. stigmatura* has dorsal cirri longer than the branchial stem on all setigers, pectinate setae narrower, with 5-6 teeth and one lateral tooth about twice as long and stout as the other teeth. This species tapers abruptly distally, and has falcigers with the proximal tooth about the same length as the distal tooth. The subacicular hook is bidentate and tridentate.

The holotype of *Eunice panamena* is an incomplete fragment 30 mm long, with 71 setigers. Its general appearance is rather different from *E. rubra*, since it has dark patches scattered over its anterior dorsum. The palps and antennae are moniliform and shorter: the palps reach the middle of the anterior peristomial ring, and lateral and central antennae reach setiger 1. The branchiae have at most eight filaments. Moreover, *E. panamena* has falcigers with proximal tooth much shorter than distal tooth, which is nearly erect.

Eunice aedificatrix has shorter palps and antennae: the palps reach the middle of the anterior peristomial ring, the lateral antennae reach the posterior edge of the posterior peristomial ring, and the central antennae reach the middle of setiger 1. The peristomial cirri are longer, extending to the middle of the prostomium. Furthermore, in *E. aedificatrix* the branchiae have no more than 11 filaments, the falcigers have the distal tooth longer than the proximal tooth, the acicula are distinctly hammer-head, and the subacicular hooks begin from setiger 35.

Finally, *E. hirschi* has palps and antennae longer than *E. rubra*, since its palps extend to setiger 1, the lateral antennae to setiger 3, and central antenna to setiger 6. Moreover, *E. hirschi* has branchiae distinctly shorter than dorsal cirri, with 1-7 branchial filaments, and acicula bluntly pointed distally.

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