

A new species of genus *Owenia* Delle-Chiaje, 1844 (Annelida: Oweniidae) from the coast of Venezuela

Oscar Felipe DÍAZ-DÍAZ^{1,2}, Julio PARAPAR^{3*} and Juan MOREIRA⁴

(1) *Postgrado en Ciencias Marinas, Instituto Oceanográfico de Venezuela, Laboratorio de Biología de Poliquetos, Av. Universidad Cerro Colorado - Edif. IOV., Cumaná (Sucre), Venezuela*

(2) *FANAUMAR Ltda. Consultorías Medio Ambientales e Investigación Marina, Lira 2355, Santiago, Chile*

(3) *Departamento de Biología Animal, Biología Vegetal e Ecología, Facultad de Ciencias, Universidad de Coruña, Rúa da Fraga 10, 15008, A Coruña, España*

(4) *Departamento de Biología (Zoología), Universidad Autónoma de Madrid, Cantoblanco 28049, Madrid, España*

*Corresponding author: jparapar@udc.es

Abstract: The study of several specimens belonging to the genus *Owenia* Delle Chiaje, 1844 (Annelida; Oweniidae), collected from the north-western coast of the Gulf of Venezuela, Caribbean Sea, revealed the presence of a new species, *Owenia vieitezi* sp. nov. The new taxon differs from other closely related species in presenting a branchial crown provided with three pairs of tentacles, and brown coloration in the ventral region of the peristomium and dorsal and lateral tentacles of the branchial crown.

Résumé : Une nouvelle espèce du genre *Owenia* Delle-Chiaje, 1844 (Annelida : Oweniidae) de la côte du Venezuela. L'étude de plusieurs spécimens appartenant au genre *Owenia* Delle Chiaje, 1844 (Annelida, Oweniidae) recueillis sur la côte nord-ouest du golfe du Venezuela, Mer des Caraïbes, a révélé qu'il s'agit d'une nouvelle espèce dont la description est présentée ici. La nouvelle espèce appelée *Owenia vieitezi* sp. nov., se caractérise des autres espèces voisines par la présence d'une couronne branchiale munie de trois paires de tentacules, ainsi que par la coloration brune de la région ventrale du péristomium et dans les tentacules dorsaux et latéraux au niveau de la couronne branchiale.

Keywords: Annelida • Polychaeta • Oweniidae • *Owenia* • New species • Caribbean Sea

Introduction

Owenia Delle Chiaje, 1844 is a worldwide reported genus belonging to the family Oweniidae Delle Chiaje, 1844, which accounts for 19 valid species (Read & Bellan, 2012).

Since Hartman (1959), many species of this genus described worldwide were considered as synonyms of *O. fusiformis* Delle Chiaje, 1844 (Hutchings & Kupriyanova, 2018); the latter is the type species of the taxon and was originally described from the Mediterranean Sea. This point of view was followed by recent works such as Dauvin & Gillet (1991) or Dauvin & Thiébaud (1994). Nevertheless, further studies found additional external

diagnostic characters previously underestimated that served to better characterised different morphotypes across the world, and question its cosmopolitan status (Hutchings & Kupriyanova, 2018). Hence it is now considered that the distribution of *O. fusiformis* is probably restricted to the NE Atlantic (Koh & Bhaud, 2001 & 2003; Koh et al., 2003; Parapar, 2003; Ford & Hutchings, 2005; Martín et al., 2006). These new approaches have provided a better picture of the diversity of the genus (see Ford & Hutchings, 2005; Capa et al., 2012; Parapar & Moreira, 2015; Silva & Lana, 2017) although there are still important gaps (Capa et al., 2014). Indeed, further work is needed to characterise 1) the validity and relevance of taxonomic characters used across the literature (e.g. Koh & Bhaud, 2001; Capa et al., 2014; Parapar & Moreira, 2015; Silva & Lana, 2017), 2) the true range of distribution and bathymetry of described species, and 3) the actual diversity of the genus.

The oweniid taxonomy in the coast of Venezuela is completely unknown. The study of the oweniid material obtained during surveys in the Gulf of Venezuela, Caribbean Sea, revealed the presence of a new species belonging to genus *Owenia*, which is described herein as *O. vieitezi* sp. nov. and compared with congeneric species previously described or reported across the southern Atlantic Ocean.

Material and Methods

This study is based on the oweniid specimens collected between 2008 and 2012 in the Gulf of Venezuela, in muddy sand bottoms off the coast of the Falcón and Zulia state (Venezuela). Samples were taken using a Beam Trawl dragnet (1.6 x 0.94 m opening) and trawled for 10 minutes at a speed of two knots (1 knot = 1.852 m.h⁻¹) at depths between 6 and 18 m. Each sample was sieved with a 1.0-mm mesh sieve and the retained specimens were placed in labelled plastic containers and fixed in a 10% formalin solution.

Light microscopy observations and drawings were made using an OLYMPUS SZX9 stereomicroscope and an OLYMPUS BX40 compound microscope connected to a camera lucida. Line drawings correspond to the holotype. Specimens used for examination with Scanning Electron Microscopy (SEM) were dehydrated in a graded ethanol series, prepared by critical-point drying using CO₂, mounted on aluminium stubs, covered with gold in a BAL-TEC SCD 004 evaporator, and examined and photographed under a JEOL JSM-6400 scanning electron microscope at the Servicios de Apoyo á Investigación (SAI), University of A Coruña (UDC, Spain).

Type material was deposited in the Museo Nacional de Ciencias Naturales (MNCN, Madrid, Spain) with

registration numbers 16.01/18416 to 16.01/18421 and in the polychaete collection of the Laboratorio de Bentos Marino, Simón Bolívar University (LBM-USB, Caracas, Venezuela) with registration numbers 58/II/REF2-5 and 60/II/REF2-3.

Terminology for segments and branchial crown features follows Capa et al. (2012 & 2014) and Parapar & Moreira (2015).

Systematics

Family Oweniidae Rioja, 1917

Genus *Owenia* Delle Chiaje, 1844

Owenia vieitezi sp. nov.

(Figs 1-5)

Material examined

Type material. Museo Nacional de Ciencias Naturales, 45 specimens. Holotype: MNCN 16.01/18416: Gulf of Venezuela (11°01'69"N-71°26'15"W). Paratypes (from same sample): MNCN 16.01/18417 (11 complete specimens); MNCN 16.01/18418 (28 incomplete specimens); MNCN 16.01/18419 (two fragments exhibiting regeneration); MNCN 16.01/18420 (two specimens on SEM stub), MNCN 16.01/18421 (one specimen on SEM stub).

Non-type material. Laboratorio de Bentos Marino, Simón Bolívar University, 65 specimens. LBM-USB 58/II/REF2-5: 11°06'04"N-70°26'11" W (20 complete specimens); LBM-USB 60/II/REF2-3: 11°08'39"N-70°39'30"W (45 incomplete specimens) (identified initially as *Owenia* cf. *fusiformis*).

Description of holotype

Body elongated, 21 mm long, 1.5 mm maximum width at thoracic level, complete, with 20 chaetigers (three thoracic + 17 abdominal). Branchial crown provided with three pairs of tentacles (Figs 1A-D, 2A-B & 3A-E), each tentacle with three major ramifications, first very close to crown base, second located at mid-length and third very close to distal end (Fig. 3B & E). Total length of crown about 1/2 of thorax length (C/T ratio >> 0.5). A pair of minute eyespots located at the base of crown. Junction between thorax and tentacle crown marked by a distinct, straight collar, closely aligned with body wall, slightly overlapping base of crown (Fig. 3C & E). Crown and thorax of similar width (Figs 1A-B, 2A-B & 3A, C-D). Relative length of thoracic chaetigers: 1-2-1. Thorax with three pairs of notopodia provided with capillary chaetae (Fig. 4A-B), third one (tnot3) with fewer chaetae but longer than those of first two (tnot1 and tnot2) and located more dorsally (Figs 2A & 3A-

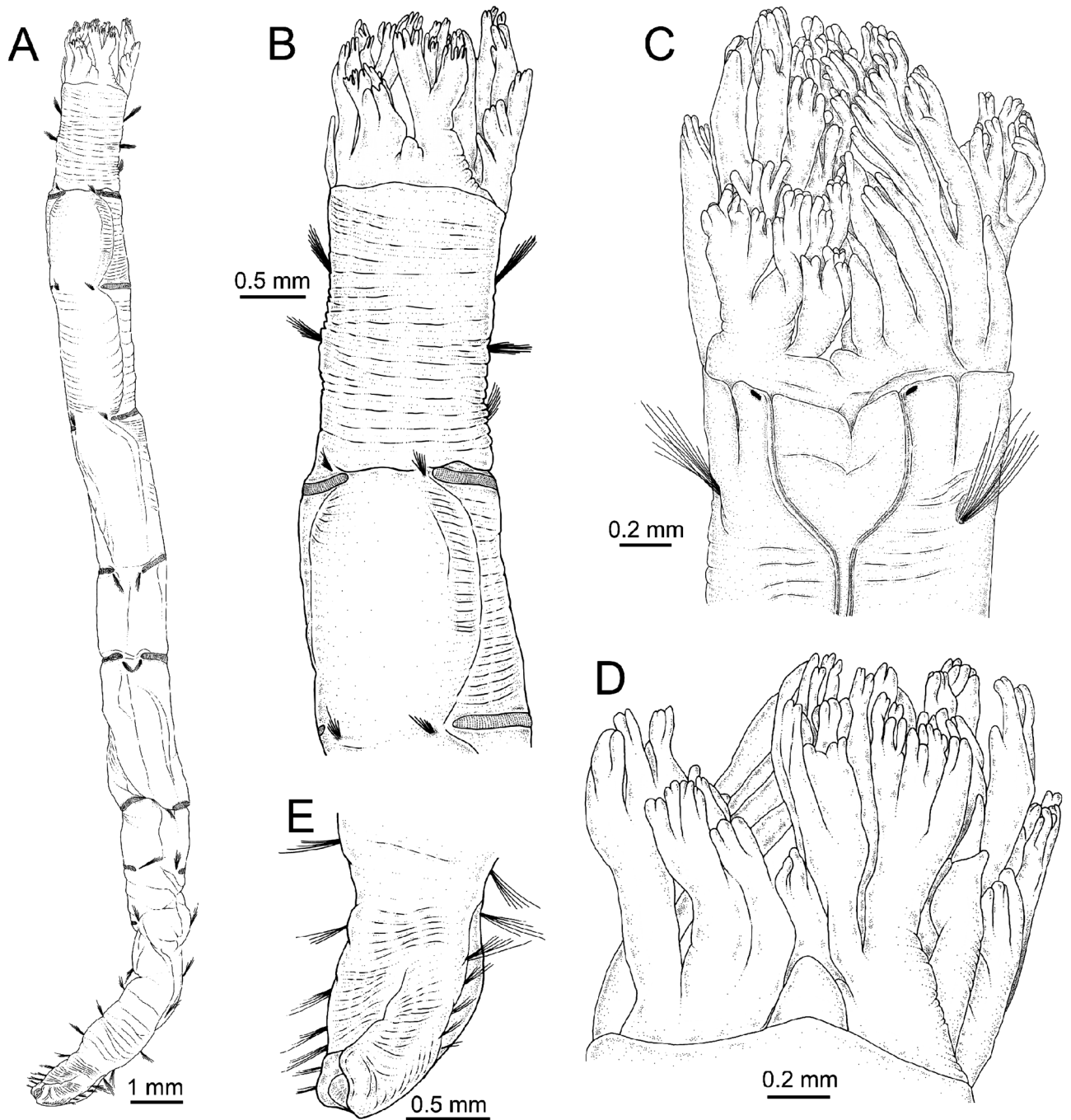


Figure 1. *Owenia vieitezi* sp. nov. MNCN 16.01/18416 (holotype). **A.** Complete specimen, dorsal view. **B.** Anterior end and first thoracic chaetigers, dorsal view. **C.** Branchial crown and uniramous chaetiger 1, ventral view. **D.** Branchial crown, detail, dorsal view. **E.** Posterior end, dorsal view.

B). Notochaetae with shafts composed of densely packed scales (Fig. 4C). Thoracic neuropodia absent. First abdominal segment about same length or slightly longer than total thoracic length (crown excluded). Second and third abdominal chaetigers the longest, similar in length

(1.3 times length of first one). Abdominal segments conspicuously decreasing in length and width from fifth chaetiger onwards, being posterior segments short and compact (Fig. 1E). Abdominal notopodia well developed; capillary chaetae similar to thoracic notochoetae but fewer

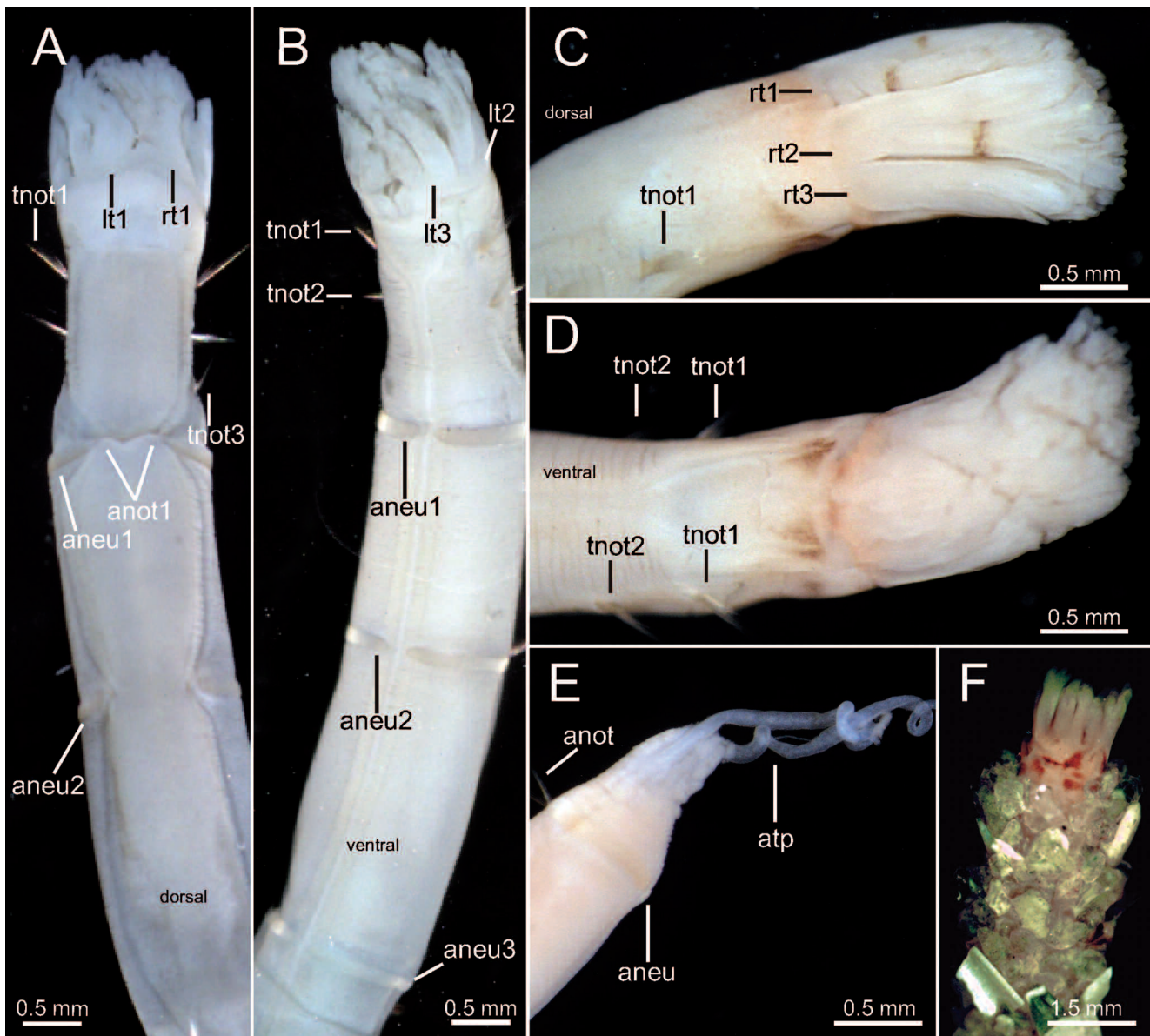


Figure 2. *Owenia vieitezi* sp. nov. Stereo-microscope micrographs. **A & B.** MNCN 16.01/18416 (holotype): anterior end in dorsal (A) and ventral (B) view. **C & D.** MNCN 16.01/18417 (paratype): right lateral view and ventral view. **E.** MNCN 16.01/18418 (paratype): anterior end of a specimen in regeneration process. **F.** LBM-USB 58/II/REF2-5 (non-type specimen): anterior end in ventral view in the tube. *Abbreviations:* aneu - abdominal neuropodia, anot - abdominal notopodia, atp - anterior tubular projections, bf - bifurcation, lt - left tentacle, rt - right tentacle, tnot - thoracic notopodia.

and arranged dorsally (Fig. 4D). Neuropodia consisting of wide, sessile podia with several rows of neurochaetal hooks (Fig. 5A); tori almost encircling body except on dorsal surface between notochaetal bundles. Neurochaetal uncini similar throughout, consisting of hooks with shaft ending in two teeth side by side (Fig. 5B-D). Pygidium simple (Fig. 1E). Body colour (preserved) creamy white. Tube coating depending on locality; sometimes covered with overlapping shell fragments of different sizes but mostly covered by quartz grains (Fig. 2F). Methyl green staining

pattern limited to both sides of the ventral Y shaped line, particularly in abdomen.

Variation

Paratypes show some variability in meristic characters. Complete specimens range from 13 to 19 mm in length and 0.8 to 1.0 mm in width at the widest thoracic level, with 16 to 17 abdominal chaetigers, although the last ones are difficult to count because of their minute size. Tentacles of

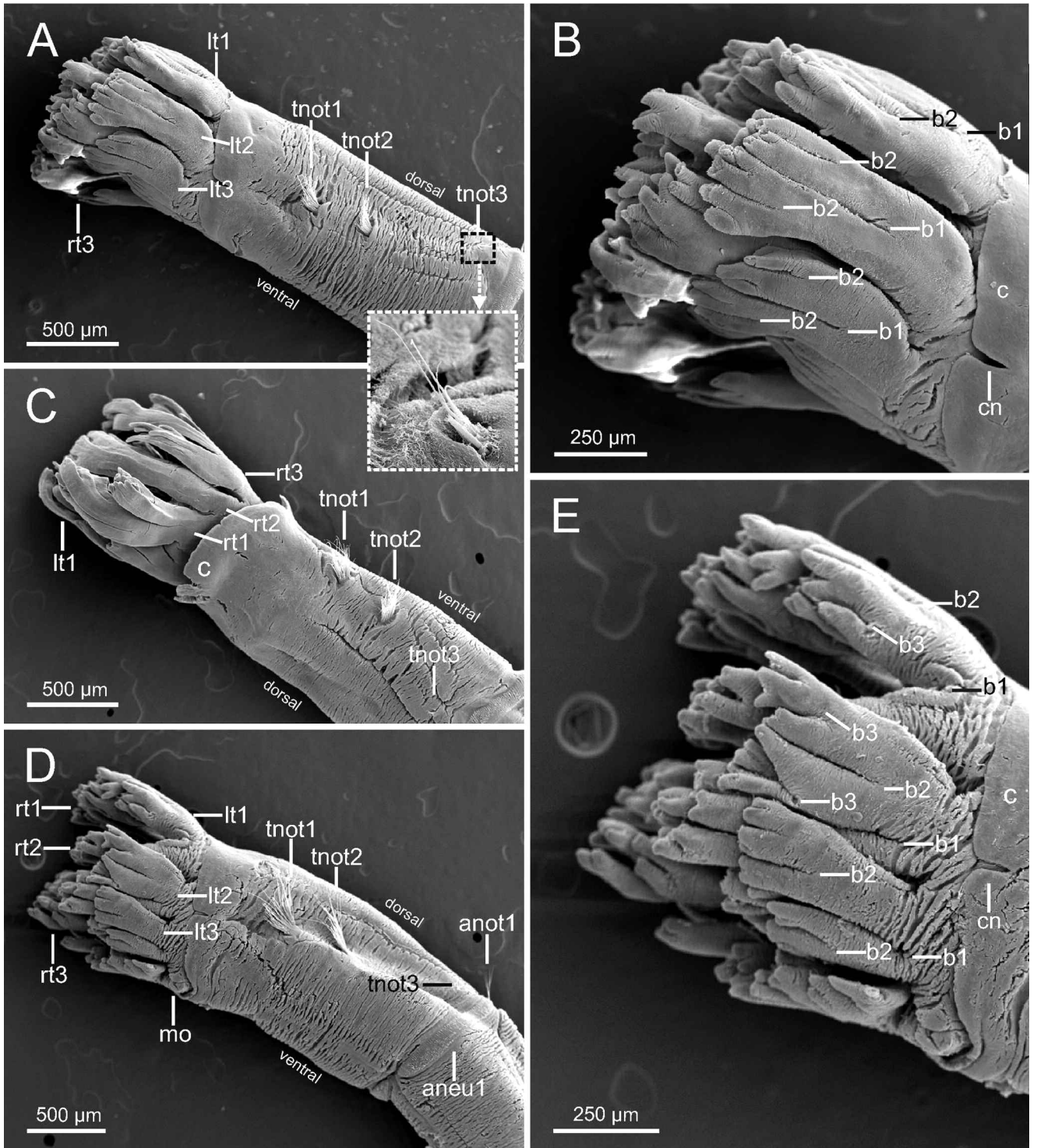


Figure 3. *Owenia vieitezi* sp. nov. MNCN 16.01/18420 and 16.01/18421 (paratypes). SEM micrographs. **A, C & D.** Anterior ends in left (A and D) and right (C) view. **B & E.** Detail of branchial crown of A and D respectively. *Abbreviations:* aneu - abdominal neuropodia, anot - abdominal notopodia, - anterior tubular projections, b - bifurcation, c - collar, cn - collar notch, lt - left tentacle, rt - right tentacle, tnot - thoracic notopodia.

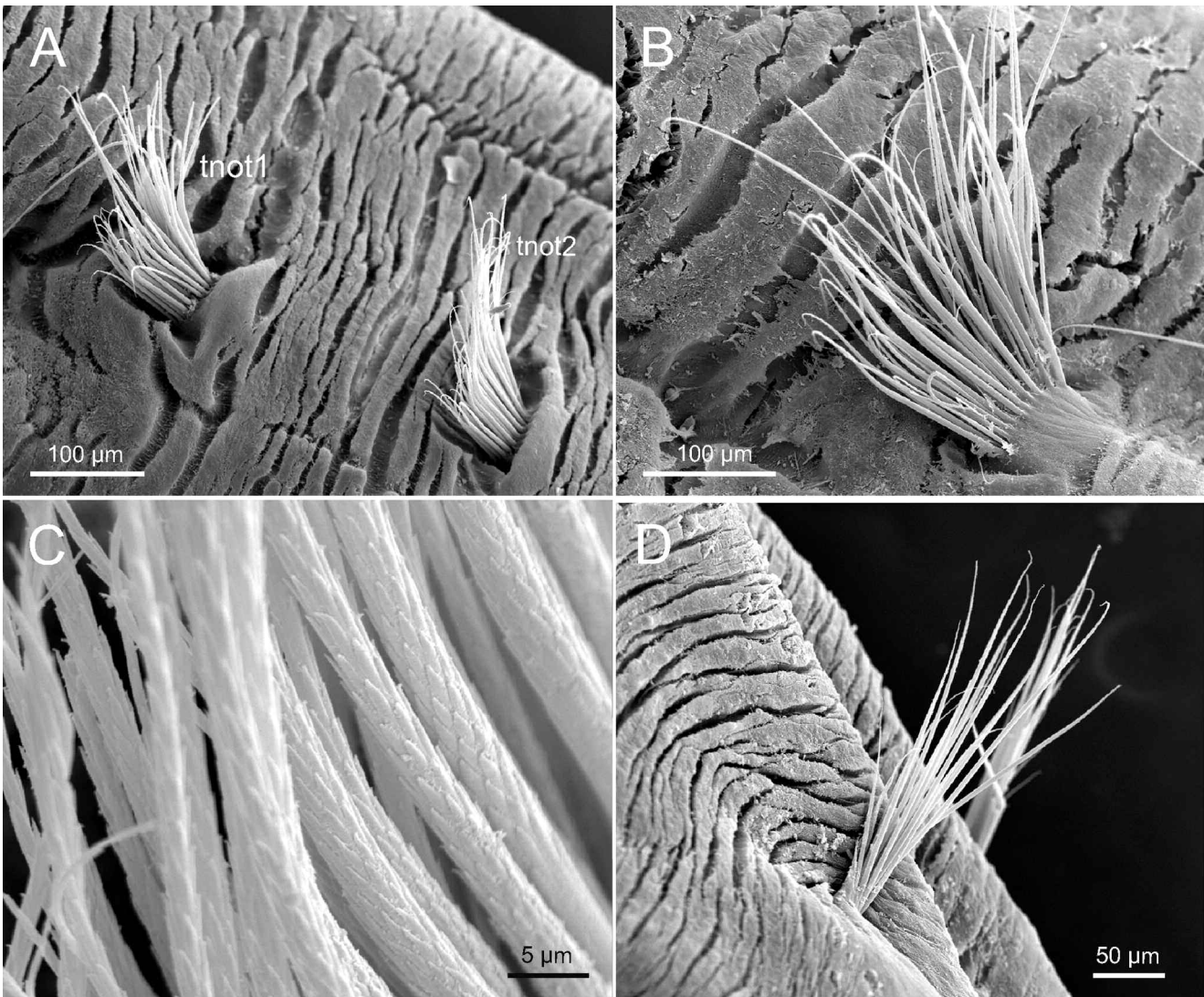


Figure 4. *Owenia vieitezi* sp. nov. MNCN 16.01/18420 and 16.01/18421 (paratypes). SEM micrographs. **A.** First two thoracic notopodia, left lateral view. **B.** First thoracic notopodium, detail. **C.** Thoracic notochaetae scale covering, detail. **D.** First abdominal notochaetae. *Abbreviation:* tnot - thoracic notopodia.

branchial crown are of similar length (Fig. 3A-C) but sometimes the dorsalmost is slightly longer (Fig. 3D-E). C/T ratio is near 1/1 in some specimens. Width of collar, position of thoracic notopodial bundles and chaetal composition is similar to that of the holotype. Collar and eyes were also seen in several specimens. The relative length of thoracic chaetigers ranges from 1-2-1 (as holotype) to 1-2.5-0.2, being the third thoracic notopodia located very close to the first abdominal notopodia (Fig. 3D). There is some variability in neurochaetal uncini regarding the presence in the same torus of uncini with teeth arranged at slightly different level (Fig. 5B). One specimen lacking anterior end seems in regeneration process showing tubular projections (Fig. 2E). Several paratypes show distinctive pigment marks, consisting of

brown horizontal lines in ventral and lateral anterior parts of peristomium and basal and median part of the two dorsalmost pairs of tentacles (t1 and t2) (Fig. 2C-D).

Etymology

The species epithet *vieitezi* is in honour of Dr. José Manuel Viéitez, Professor of Zoology in the Universidad de Alcalá de Henares (Madrid, Spain) for his constant support and friendship.

Type locality

Gulf of Venezuela, Caribbean Sea, on fine sediment with about 80% of fine fraction ($\leq 63 \mu\text{m}$).

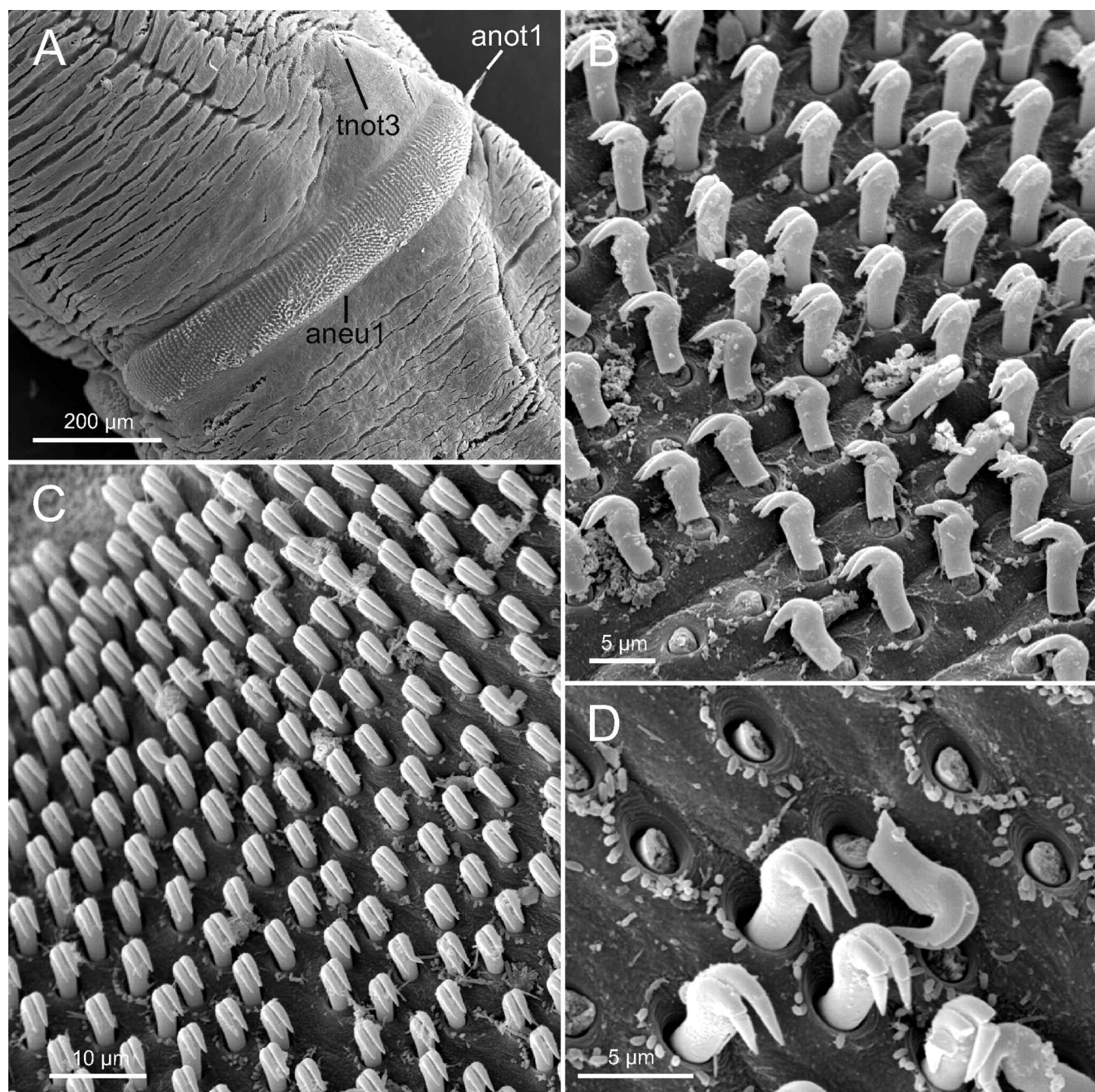


Figure 5. *Owenia vieitezi* sp. nov. MNCN 16.01/18420 y 16.01/18421 (paratypes). SEM micrographs. **A.** First abdominal chaetiger. **B.** Abdominal uncini, lateral view. **C.** Abdominal uncini, frontal view. **D.** Detail of bacteria associated with abdominal uncini. *Abbreviations:* aneu - abdominal neuropodia, anot - abdominal notopodia, tnot - thoracic notopodia.

Distribution

Only known from the type locality.

Remarks

To date, four species of *Owenia* have been described from South American waters: *O. tegula* (Kinberg, 1867) and *O.*

sundevalli (Kinberg, 1867) from Río de La Plata (Uruguay), *O. brasiliensis* (Hansen, 1882) and *O. caissara* Silva & Lana, 2017 from Brazil. The first three species are listed as synonyms of *O. fusiformis* in Read & Bellan (2012) following Augener (1934) and Hartman (1959). Nevertheless, Silva & Lana (2017) considered that these synonymies might be wrong; however, the incomplete

descriptions and illustrations of these three taxa and the poor conditions of the type material make difficult to assess their true taxonomic status. Anyway, the description and illustrations of *O. brasiliensis* by Hansen (1882) reveal an apparently three-branched branchial crown and a C/T ratio of about 0.5; this makes this species closer to *O. vieitezi* sp. nov. than to *O. caissara* (cfr. plate 44, figs. 33–34 in Hansen, 1882). Original descriptions of *O. sundevalli* and *O. tegula* are quite brief and do not provide illustrations, and type material is in poor condition; therefore, designation of neotypes would be desirable. On the other hand, *O. caissara* differs mainly from *O. vieitezi* sp. nov. because of the presence in the former of five branchial tentacles instead of three; both species share the presence of eyespots and patterns of colouration in the branchiae.

Other *Owenia* species also show branchial pigmentation such as *O. collaris* Hartman, 1955 (southern and central California) and *O. fusiformis sensu* Imajima & Morita (1987) (Japan), or diffuse brown speckles on the ventral side of the peristomium as *O. picta* Parapar & Moreira, 2015 (eastern Australia). However, *O. collaris* lacks eyes and the ramifications of the four pairs of branchial tentacles differ from those of *O. vieitezi* sp. nov. in having 3–4 dichotomies at the same level in each main branch (see Fig. 5.9A in Blake, 2000). Furthermore, *O. fusiformis sensu* Imajima & Morita (1987) shows a low C/T ratio, about 1/3 of thoracic length (Parapar & Moreira, 2015). Finally, the only species with three branchial tentacles is *Owenia bassensis* Ford & Hutchings, 2005, from Australia that also shares with *O. vieitezi* sp. nov. a C/T ratio of 0.5; however, *O. bassensis* mainly differs from the new species in lacking the peristomial collar.

It is remarkable the presence of tubular formations in one specimen of *O. vieitezi* sp. nov. showing regeneration of anterior end that are similar to those reported for other species of *Owenia* (e.g. Parapar, 2001, 2003 & 2006). In those papers, these observations are sometimes coupled with the presence inside the tube of the autotomized anterior end. Indeed, cases of regeneration of anterior and posterior ends have been reported in several species of other oweniid genera such as *Myriochele* Malmgren, 1867, *Galathowenia* Kirkegaard, 1959 and *Myriowenia* Hartman, 1960. This has been suggested as a type of asexual reproduction linked to anterior or posterior traumatic breakage followed by segment regeneration (see Capa et al., 2014) by cellular reactivation and stimulation of the proliferation process (Coulon & Marilley, 1978). However, this ability does not seem to result in tubular formations (Thouveny, 1967; Coulon & Thouveny, 1974; Marilley & Thouveny, 1978) as those found here for *O. vieitezi* sp. nov. Therefore, we suspect that the process after such structures might be a different one that deserves to be further investigated.

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