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Ascidioxynus ibericus n. sp. (Copepoda: Poecilostomatoida: Lichomolgidae), associated with the ascidian *Clavelina dellavallei* from the Strait of Gibraltar

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Abstract

A new species, *Ascidioxynus ibericus*, is compared with the three previously known species in the genus. This is the first report of this genus in European temperate waters. The characteristic features of *A. ibericus* are: the genital double-somite broadest at the anterior region, the rostrum rounded, the maxilliped with an unarmed well developed third segment, and the free segment of leg 5 trapezoidal, narrow at its base and increasing in width distally. The diagnosis of the genus is slightly modified to include the variability in the structure of the maxilliped shown by the female in species of *Ascidioxynus*.

Introduction

The revision of the superfamily Lichomolgoidea by Humes & Stock (1972, 1973) established five families: Lichomolgidae, Sabelliphilidae, Pseudanthessiidae, Rhynchomolgidae, and Urocopiidae. Recently a revision of the Lichomolgoid complex was undertaken, taking account of the numerous new genera added since 1972 (Humes & Boxshall, 1996).

The previous criteria for the differentiation of the families in the Lichomolgoidea were mainly based on the structure and segmentation of the legs (Humes & Stock, 1973). However, Humes & Boxshall (1996) found that these characters, for example, those based on the segmentation of the endopod leg 4 are significant mainly to generic level, rather that at family level. In addition, more than 40 new genera have been described since the 1973 revision. This blurred the limits established between the lichomolgoid families. Thus, a new vision of the classification of the lichomolgoids genera and families, considering other more relevant characters such as the structure of the mandible, led to the proposal of six new families, and the diagnoses of four out of the five existing families were altered. The family Urocopiidae was not affected, and was considered as only distantly related to the other lichomolgoid families.

The revised concept of the Lichomolgidae proposed by Humes and Boxshall (1996) comprises now only 25 genera, *Ascidioxynus* Humes & Stock, 1972, being one of them, and one of the eight lichomolgid genera associated with ascidians. All previous known species of *Ascidioxynus* were found in Caribbean waters. During a search for symbiotic copepods associated with ascidians in the Strait of Gibraltar and nearby areas, specimens belonging to the genus *Ascidioxynus* were found associated to the compound ascidian *Clavelina dellavallei* (Zirpolo, 1925). The

comparison with its Western Atlantic congeners revealed it to be an unknown species, the first Eastern Atlantic species of this genus.

Material and methods

Colonies of the ascidian *Clavelina dellavallei* were collected from infralittoral zones at Tarifa Island, Cádiz (southern Iberian Peninsula). The copepods were removed from the branchial cavity by dissection, and later preserved in 70% ethanol. For microscopical study, whole specimens were stained with Chlorazole black E (Sigma® C-1144) and dissected under a stereomicroscope. Permanent mounts were made in lactophenol and sealed with Entellan (Merck® 1.07961.0100). All figures were drawn with the aid of a camera lucida. The letter after explanation of each figure refers to the scale at which it was drawn.

Family Lichomolgidae Kossmann, 1877
Genus *Ascidioxynus* Humes & Stock, 1972
Ascidioxynus ibericus n. sp.
(Figures 1 and 2)

Type material: 3 ovigerous females from the branchial cavity of *Clavelina dellavallei* at Tarifa Island, Cádiz, southern Iberian Peninsula, 15 m depth, 8.VIII.96; 2 females with the same collecting data, 22.IX.96.

The holotype has been deposited in the Museo Nacional de Ciencias Naturales of Madrid, Spain (MNCN 20.04/4452).

Description: Female: body cyclopiform (Figure 1a), with moderately broad prosome, 0.59–0.84 mm in length (not including caudal setae) and 0.27–0.33 mm in width (based on 3 specimens in lactophenol). Ratio of length to width of prosome about 1.6:1. Ratio of length of prosome to that of urosome 1.6:1. Segment of leg 1 separated from the cephalosome by dorsal transverse furrow. Epimera of pedigerous segments as illustrated.

Somite bearing leg 5 (Figure 1a), 68 × 50 μm. Genital double-somite (Figure 1b) 79 × 67 μm, broadest at anterior region. Areas of attachment of egg sacs located dorsolaterally, in widest part of segment. Each egg sac attachment area (Figure 1b, d) characterized by two setae, one plumose, 26 μm long**,** one naked and shorter, 16 μm in length. Three postgenital segments 30 × 42, 25 × 42 and 34 × 41 μm from anterior to posterior. Posteroventral borders of postgenital segments smooth.

Caudal ramus (Figure 1b) 1.6 times longer than wide, 31 × 19 μm in greatest dimensions. Outer anterolateral seta 102 μm, and dorsal seta 90 μm, both naked. Outermost terminal seta naked, 84 μm, and innermost terminal seta plumose, 140 μm. Two long median setae 228 μm (outer) and 324 μm (inner), latter bearing a few hairs.

Rostrum (Figure 1c) rounded.

Antennule (Figure 1e) 7-segmented, about 184 μm long, lengths of segments (measured along posterior non-setiferous margins): 25 (32 μm along anterior margin), 32, 14, 36, 30, 26 and 12 μm, respectively. Formula for armature 4, 13, 6, 3, 4+1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked.

Antenna (Figure 1f) 149 μm long and 4-segmented. First and second segments with 1 small inner seta. Third segment with 3 setae, one much shorter than other two, one of these ungiform. Fourth segment, 48 μm along outer edge, 34 μm along inner edge, 15 μm wide, bearing terminally 2 claws 26 μm, and 4 setae, 2longest claw-like 48 and 60 μm long. Few small spinules on outer side of segment. All setae naked.

Labrum (Figure 1g) with two divergent posteroventral lobes, deeply incised medially. Paragnaths present, as illustrated.

Mandible (Figure 2a) with both sides without pronounced indentation but bearing serrated fringe, inner margin spinule row fully incorporated into lash. Lash slender with row of spinules on both sides. Maxillule (Figure 2b) with 3 elements. Maxilla (Figure 2c) 2-segmented, first segment unarmed, second segment with small setule on its proximal outer surface, posterior seta, denticulate auxiliary lash, and terminal lash with row of long slender spines. Maxilliped (Figure 2d) 3-segmented, first segment unarmed, second segment with 2 setules, third segment well developed and spiniform, without minute basal setule observed in other species.

Ventral surface between maxillipeds and first pair of legs (Figure 1e) slightly protuberant.

Legs 1–4 (Figure 2f–i) with 3-segmented rami except for 2-segmented endopod of leg 4. Formula for armature as follows:

P1	coxa 0-1	basis 1-0	exp I-0;	I-1;	III,I,4
			end 0-1;	0-1;	I,5
P2	coxa 0-1	basis 1-0	exp I-0;	I-1;	III,I,5
			end 0-1;	0-2;	I,II,3

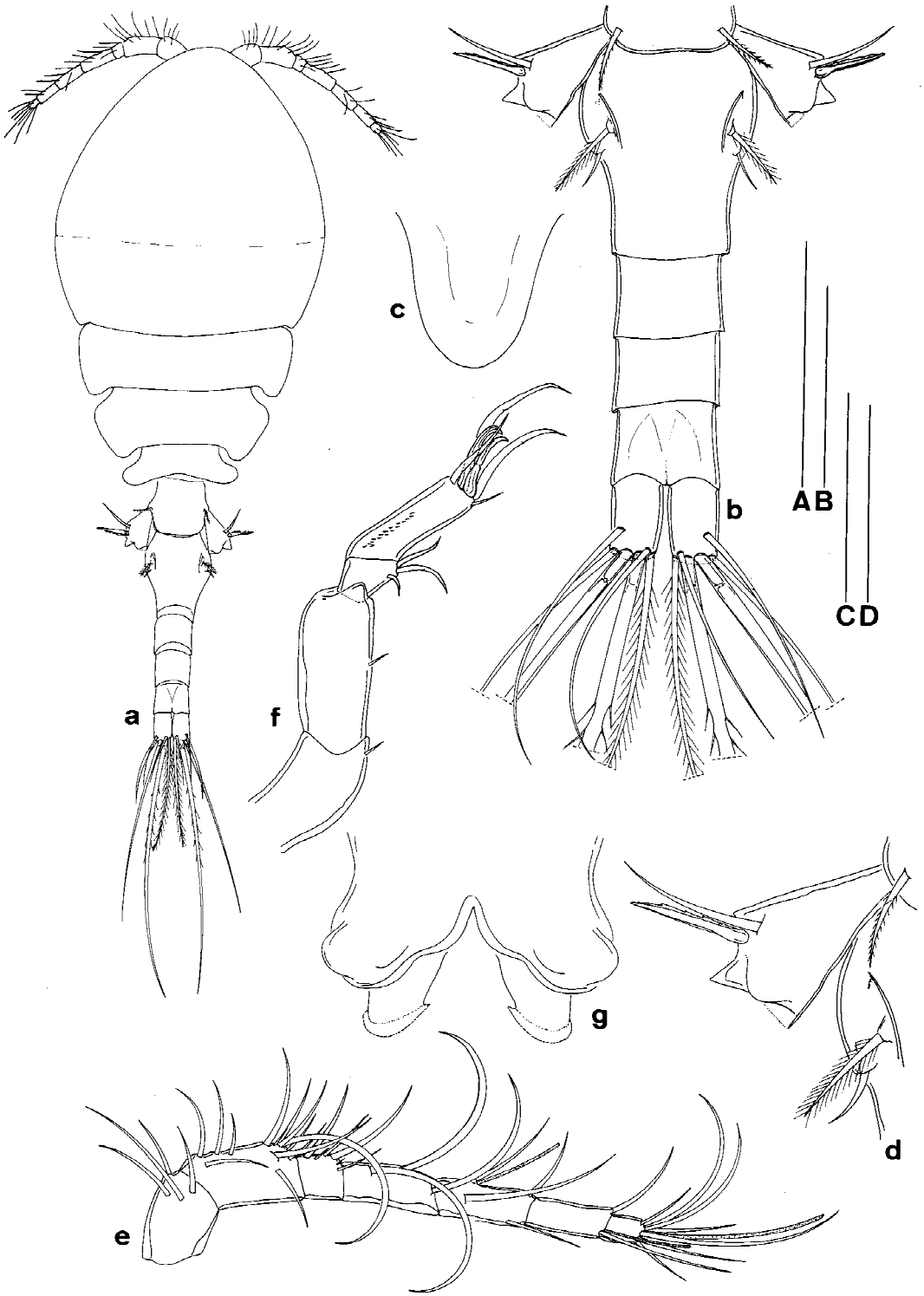

Figure 1. Ascidioxynus ibericus n. sp. Female: a, dorsal (A); b, urosome, dorsal (B); c, rostrum, (C); d, leg 5 and genital aperture, dorsal (C); e, antennula (B); f, antenna (B); g, labrum (D). Scale bars: A, 300 μm; B, 75 μm; C, 50 μm; D, 75 μm.

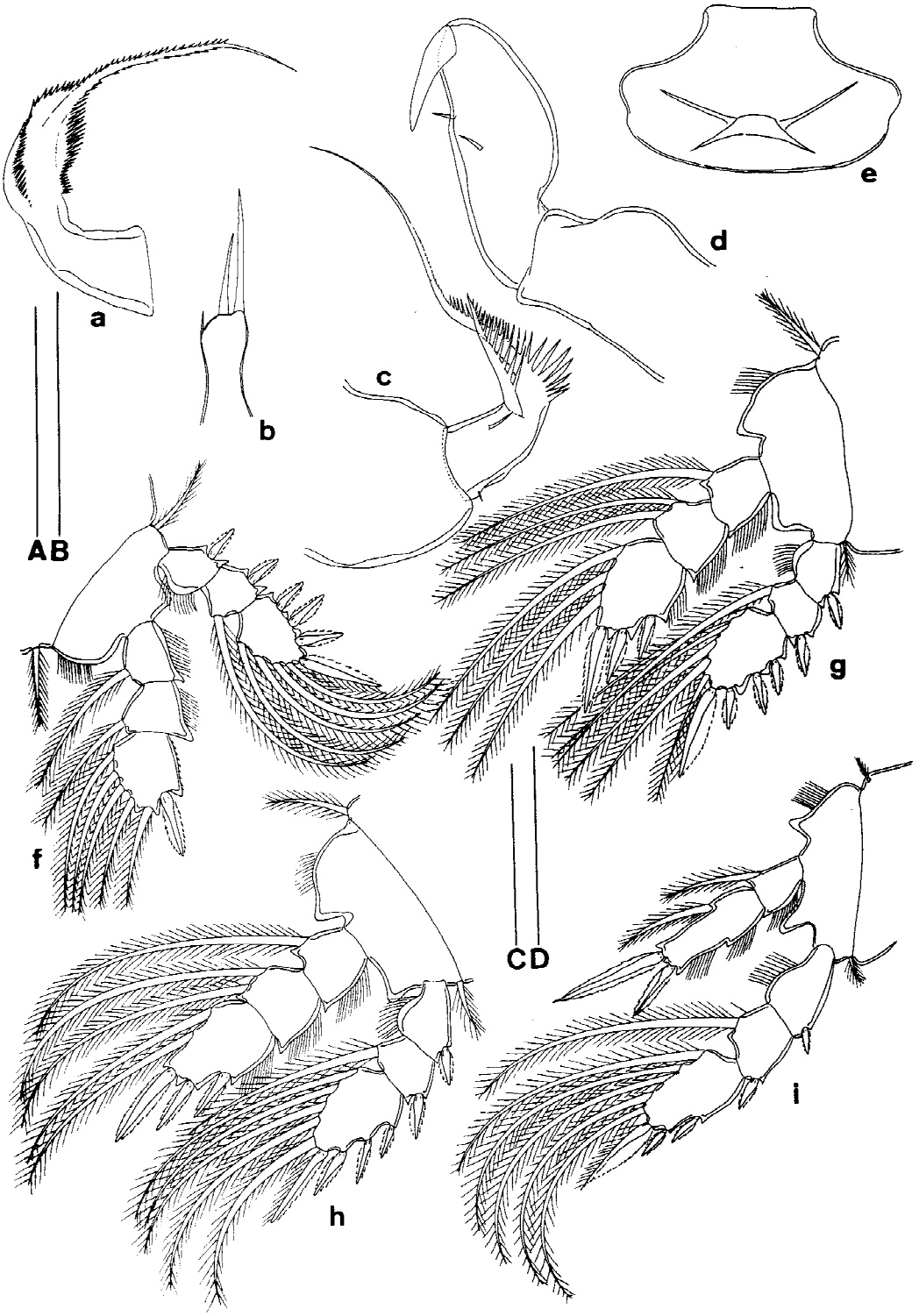

Figure 2. Ascidioxynus ibericus n. sp. Female: a, mandible (A); b, maxillule (A); c, maxilla (A); d, maxilliped (B); e, area between maxilliped and leg 1, ventral (C); f, leg 1, anterior (D); g, leg 2, anterior (D); h, leg 3, anterior (D); i, leg 4, anterior (D). A and B, 50 μm; C, 100 μm, and D, 75 μm.

P3	coxa 0-1	basis 1-0	exp I-0; I-1;	III,I,5
			end 0-1; 0-2;	I,II,2
P4	coxa 0-1	basis 1-0	exp I-0; I-1;	II,I,5
			end 0-1;	II,1

Inner coxal seta of legs 1-4 long, plumose, that of leg 4 much shorter than in preceding legs. Inner margin of basis with row of hairs in all 4 legs. Exopod of leg 4 96 μm long. First segment endopod 19 $\times$ 16 μm, with plumose inner seta 35 μm. Second segment 42 μm long, greatest width 17 μm, least width 11 μm; segment bearing 2 terminal fringed spines, 24 μm (outer) and 45 μm (inner), and inner plumose seta 37 μm. Outer margin of both segments with hairs.

Leg 5 (Figure 1c) with trapezoidal free segment, 47 μm long (excluding distal spiniform process). Segment narrow at base, 7 μm, and gradually increasing in width to reach 34 μm at distal end. Distal end bearing triangular process, rounded notch, and hyaline lamella at terminal inner corner. Leg 5 bearing naked seta 40 μm and spine 31 μm. Adjacent plumose seta on body 27 μm.

Leg 6 (Figure 1b, d) represented by 2 unequal setae on area of attachment of egg sac, one plumose and one naked.

Male unknown.

Etymology: The specific name, *ibericus*, refers to the Iberian Peninsula.

Relation to the host: Ascidioxynus ibericus is a symbiotic copepod that is associated with the compound ascidian *Clavelina dellavallei*. The copepod is found in the atrium (branchial cavity) of the ascidian zooid. Prevalence was 6.8% (N=73). Often this species shares its host with another symbiotic copepod that lives in the same habitat, *Fratia gaditana* Ho et al. (1998), which is much more abundant than the new species.

Key to species of *Ascidioxynus*

(Modified from Humes & Stock, 1973. Based on females. For a key to known males see Humes & Stock, 1973: 133)

1. Caudal ramus a little wider than long; maxilliped 2-segmented . . . . . ***A. jamaicensis*** (C.B. Wilson, 1921); Caudal ramus longer than wide; maxilliped 3-segmented, sometimes minute or weakly delimited.
2. Genital double-somite broadest anteriorly; free segment of leg 5 broadest at distal end; maxilliped with third segment well developed . . . . . ***A. ibericus*** n. sp.; Genital double-somite broadest at the middle or posterior region; free segment of leg 5 broadest near middle region; maxilliped with third segment minute or weakly developed . . . . . .
3. Genital double-somite elongated in dorsal view, 195 $\times$ 138 μm, broadest near middle; free segment of leg 5 with inner proximal expansion without lamella . . . ***A. bermudensis*** Humes & Stock, 1973 Genital double-somite less elongated in dorsal view, 160 x 140 μm, broadest behind midregion; free segment of leg 5 with inner proximal expansion bearing hyaline lamella with serrate margin . . . . . ***A. floridianus*** Humes & Stock, 1973.

Discussion

Ascidioxynus ibericus is the fourth species recognized in the genus. Differences between the new species and the remaining species of the genus are summarized in Table 1. *Ascidioxynus ibericus* may be easily distinguished by having the following combination of characters: genital double somite broadest at the anterior region, rostrum rounded, maxilliped with third segment well-developed and unarmed, and free segment of leg 5 narrow at its base and increasing width distally.

Humes & Boxshall (1996) pointed out that the family Lichomolgidae typically has a 3-segmented maxilliped, but a 2-segmented maxilliped, derived by fusion of the basis and endopod, is present in some genera. They also claim that *Ascidioxynus* presents an intermediate maxilliped structure, in which the endopod is minute and incompletely separated from the basis. The species of this genus have all possible range of the development of this appendage (see Table 1). Thus, the diagnosis of the genus *Ascidioxynus* must be slightly modified to include all this variation as follows: 'Maxilliped in the female 3-segmented, but a 2-segmented condition, by fusion of basis and endopod, may be also observed'. The presence of a well-developed third segment in the maxilliped is interpreted as relatively plesiomorphic stage.

To date, the three previously known species in the genus had been recorded in the Western Atlantic, therefore the new species constitutes the first record in European temperate water.

Table 1. Comparative features of the four described species of *Ascidioxynus*

	A. jamaicensis	*A. floridianus*	*A. bermudensis*	*A. ibericus*
Rostrum	Fleshy mass tapering into obtuse point	Triangular, bluntly pointed beak	Triangular, but not pointed	Rounded
Antenna terminal segment	2 claws+2 claw-like setae+1 dagger-like spine+2 setae	2 claws+5 slender setae	2 small claws+5 setae, longest	2 claws+2 claw-like setae+2 setae slightly unguiform
Maxilliped	2-segmented	3-segmented	3-segmented	3-segmented
Third segment of maxilliped	Finger-shaped, fused to the second segment	Minute, bearing 1 small setule	Weakly delimited, bearing 1 small setule	Well developed, claw-like, unarmed
Legs 1-4 outer basis seta	Plumose	Naked	Naked	Plumose
Genital double-somite	Broadest at middle	Broadest at middle	Broadest at middle	broadest at anterior half
Leg 5 free segment	With strong rounded triangular projection at the inner margin near the base	Inner margin expanded, forming hyaline lamella with serrated margin	Inner proximal margin expanded	Trapezoidal; increasing gradually in width from basal to distal end, with hyaline lamella
Caudal ramus	Little wider than long	Longer than wide	Longer than wide	Longer than wide
Caudal ramus setae	innermost terminal with inner hairs; dorsal plumose; median terminal setae with a keel-like projection	All naked; median terminal setae with inner lamella	Outer lateral and outermost with outer hairs; dorsolateral with few hairs; innermost setae with inner hairs	Innermost plumose; inner median with alternate series of hairs outer median with inner lamella; the remainder naked

Ascidioxynus has a high host-specificity since all species have been collected associated with ascidians; *A. floridianus* was found in an unidentified solitary ascidian; *A. bermudensis* was recorded from *Ecteinascidia turbinata* Herdman; *A. jamaicensis* was collected in *Ascidia atra* (Savigny), and *A. ibericus* was found in *Clavelina dellavallei* (see Humes & Stock, 1973; present account).

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References

Ho, J.-S., M. Conradi & P. J. López-González, 1998. A new family of cyclopoid copepods (Fratiidae) parasitic in the ascidian (*Clavelina dellavallei*) from Cádiz, Spain. J. Zool., Lond. 246: 39–48.

Humes, A. G. & J. H. Stock, 1972. Preliminary notes on a revision of the Lichomolgidae, cyclopoid copepods mainly associated with marine invertebrates. Bull. Zool. Mus., Univ. Amsterdam 2(12): 121–123.

Humes, A. G. & J. H. Stock, 1973. A revision of the family Lichomolgidae Kossmann, 1877, cyclopoid copepods mainly associated with marine invertebrates. Smith. Contr. Zool. 127, 308 pp.

Humes, A. G. & G. A. Boxshall, 1996. A revision of the lichomolgoid complex (Copepoda: Poecilostomatoida), with the recognition of six new families. J. nat. Hist., Lond. 30: 175–227.

Wilson, C. B., 1921. New species and a new genus of parasitic copepods. Proc. U.S. Nat. Mus. 59(2354): 1–17.