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***Clavellotis sebastidis* sp. nov. (Copepoda, Lernaeopodidae) parasitic on *Sebastes oculatus* Valenciennes, 1863 from Argentina**

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Abstract

A new species of *Clavellotis* Castro et Baeza, 1984 (Copepoda, Lernaeopodidae) parasitic on Patagonian redfish, *Sebastes oculatus* Valenciennes, 1833 from southern coast of Argentina is described and illustrated. The new species of *Clavellotis* differs from its congeners by the length of second maxilla, shape of the female trunk, length of genital process, and a combination of characters. The male also shows differences in the second maxilla, the maxilliped and in the shapes of the trunk and genital process. This is the first record of *Clavellotis* from the southern Atlantic Ocean and also the first record on a *Sebastes*

Key words

Copepoda, Lernaeopodidae, *Clavellotis*, new species, fish, *Sebastes*, Argentina

Introduction

Among the copepods that parasitize marine fishes, the family Lernaeopodidae, includes 45 genera (Benz et al. 2000), some on teleost and others on elasmobranch fishes. All of them are characterized by their mode of attachment by means of a bulla at the end of the second maxilla (with the exception of *Dendrapta* Kabata, 1964, *Schistiobranchia* Kabata, 1964 and *Brianella* Wilson, 1915). The bulla is inserted into the host tissue, facilitating a strong and permanent attachment allowing the copepod to have a range of action, depending upon the length of the second maxilla, in order to obtain their food.

There is no record in the literature for lernaeopodids that are parasitic on *Sebastes* in Argentinean marine waters. The only lernaeopodids reported from Argentinean waters are *Lernaeopoda bivia* Leigh-Sharpe, 1930 on *Halaaelurus bivius* [valid name *Schroederichthys bivius* (Müller et Henle, 1838)], from Puerto Deseado (Kabata 1986), and *Lernaeopoda mustelicola* Leigh-Sharpe, 1919 on *Mustelus schmitti* Springer, 1939 (cf. Brian 1944 after Etchegoin and Ivanov 1999).

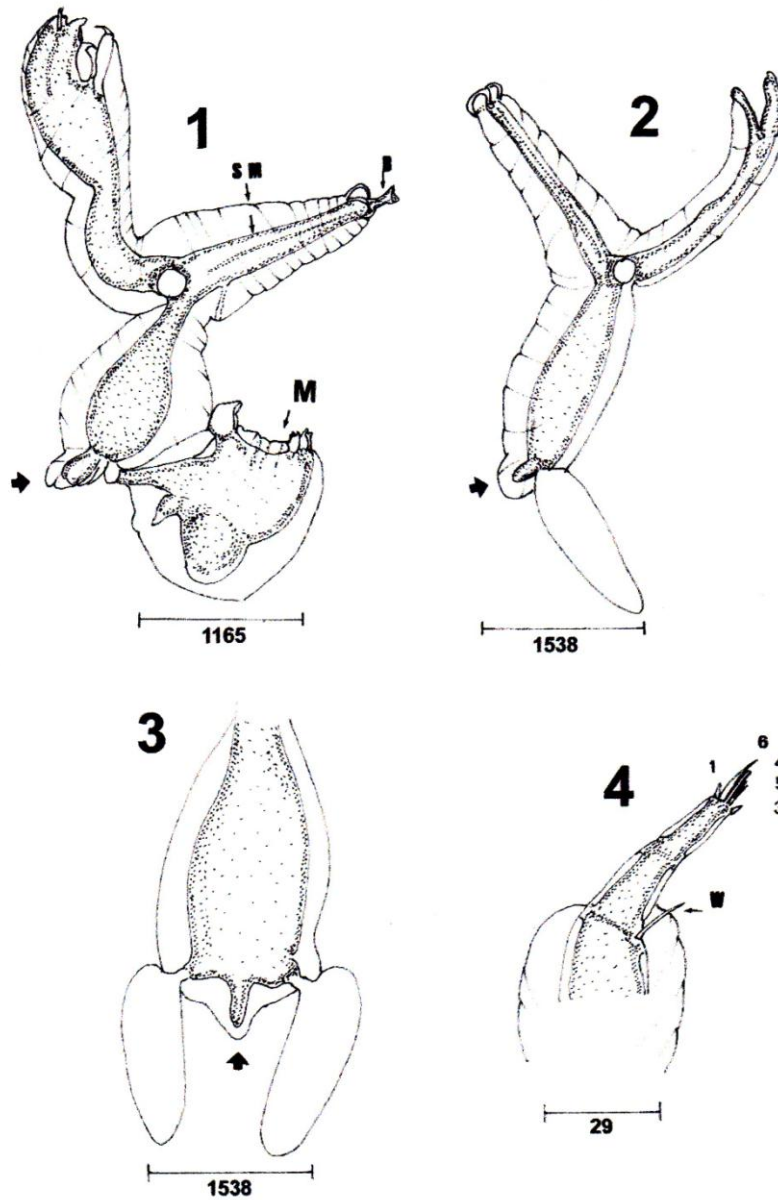
The *Sebastes* species are parasitized in other latitudes by some lernaeopodids, such as *Neobrachiella robusta* (Wilson,

1912) (cf. Dojiri 1981, Kabata 1987). The study of *Sebastes oculatus* collected in Argentine waters has permitted the detection of lernaeopodid specimens from the *Clavella* group (Kabata 1979) attached to their branchial arches (gill rakers). For the lernaeopodids, the male type gives an important clue that permits the definition of the taxonomic position of some specimens (Wilson 1915; Kabata 1979, 2004; Castro and Baeza 1984). In this case, the male characteristics permit us to identify the present specimens as belonging to the genus *Clavellotis* Castro et Baeza, 1984. This genus includes eight species (Kabata 1990) plus the most recent addition of *C. briani* (cf. Benmansour et al. 2001).

Characteristics of the female and male specimens are described, and their taxonomic identity is determined by comparison with all *Clavellotis* species, leading to the proposal of a new species, *C. sebastidis*.

Materials and methods

Drawings were made with the aid of a camera lucida attached to a stereomicroscope or compound microscope. Measure-



Figs 1-4. Female *Clavellotis sebastidis* sp. nov.: 1. Female non ovigerous, entire lateral view, with male attached; B L. bulla, (F L. female, M L. male, Sm L. second maxilla, arrow indicating the genital process. 2. Female ovigerous, entire lateral; arrow indicating the genital process. 3. Female trunk dorsal view; arrow indicating the genital process. 4. First antenna; w L. whip, 1, 3, 4, 5, 6 L. setae numbers

ments were made in micrometres, with a reticulated eyepiece attached to the microscope. The terminology adopted follows that of Kabata (1979).

Results

Clavellotis sebastidis sp. nov. (Figs 11, 14)

Female: Cephalothorax cylindrical, longer than trunk; latter suboval with developed genital process. Some specimens with short anal process protruding from to genital process. Second maxilla long, about as long as trunk or slightly shorter than cephalothorax, fused at apex, bearing distally short bulla, and with rounded swelling on each side.

Measurements in micrometres, based on 20 specimens: Cephalothorax length 1702.6 (1281.2205); cephalothorax width 337 (256.462); second maxilla length 1174.8 (974.1461), width 387 (231.641); trunk length 1255 (949.1590), width 811.8. Genital process length 212.6 (103.282), width 174 (103.256); egg sacs length ($n = 8$, 947.5 (641.1103), diameter 362 (259.462).

Appendages: First antenna (Fig. 4) apparently three-segmented, distal armature with 5 visible elements (setae: 1, 3, 4, 5 and 6). Seta 6 longer than others.

Second antenna (Fig. 5): Exopod long, axis in line with sympod, bulbous, armed with spinules on outer surface. Endopod apparently two-segmented, distal segment armed with three spines, two of them of equal size, third smaller.

Mandible (Fig. 6) with three secondary teeth, dental formula P1S1, P1S1, P1S1, B4.

First maxilla (Fig. 7) biramous; exopod with two digitiform papillae, each bearing apical long seta; short seta at base of dorsal papilla; exopod lateral, short, with two subequal apical setae. No other armature detected.

Second maxilla (Figs 1 and 2) as long as trunk and/or cephalothorax, slender, with rounded lateral swellings at base, fused at apex. Bulla short, typical for *Clavellotis*.

Maxilliped (Fig. 8): Robust corpus, myxa bearing single seta. Subchela cylindrical, with spiniform process on lateral surface, distally with basal seta and sparse denticulation on distal part of inner margin; distal claw slightly curved.

Male (Fig. 9) typical of *Clavellotis* Castro et Baeza, 1984. Body sack-like; trunk abbreviated, much smaller than cephalothorax, genital process prominent.

First antenna (Fig. 10A) three-segmented, basal segment with long whip. Distal segment armature of 5 elements, seta 6 longer than others.

Second antenna (Fig. 10B): Exopod bulbous and long, covered on distal outer surface with small spiniform processes and short spine; endopod much longer than exopod, with two segments, distal segment with outer distal margin armed with two spines, and a pad of short spinules ventrally, also pad of short spinules at base of first segment.

Mandible (Fig. 11) with three secondary teeth, dental formula P1S1, P1S1, P1S1, B4.

First maxilla (Fig. 12): Endopod with two papillae, each surmounted by long seta; short seta at base of dorsal papilla. Exopod ventrolateral; short papilla with two setae of about equal size.

Second maxilla (Fig. 13) globose, strong, slightly curved claw closing against prominent inner part of corpus.

Maxilliped (Fig. 14) subrectangular, with long, slender base, bearing two rows of spiniform processes, each row separated from other, but appearing fused in dorsal view.

Locality: Golfo San Jorge (43°S), Argentina.

Host: Patagonian redfish, *Sebastes oculatus*.

Habitat: Branchial arches (gill rakers).

Material deposited in the British Museum of Natural History: holotype number: 2004.556; paratypes number: 2004.557, 558, allotype number 20094.559.

Etymology: the specific name *sebastidis* refers to the generic name of the host.

Discussion

The males of the specimens recorded in this study show morphology typical of the *Clavella* group. Consequently, these specimens can be assigned to *Clavellotis* Castro et Baeza, 1984, based principally on the males, which permit clear discrimination among all those genera within the *Clavella* group, and fit well within the amended diagnosis of Kabata (1990).

To date, the genus *Clavellotis* included nine species: *C. dilatata* (Krøyer, 1863) type species, and 7 species that were transferred from the genus *Clavellopsis* Wilson, 1915 by Kabata (1990): *C. bilobata* (Pillai, 1962), *C. branchiostegi* (Yamaguti, 1939), *C. characis* (Richiardi, 1890), *C. fallax* (Heller, 1856), *C. pagri* (Krøyer, 1863), *C. sargi* (Kurz, 1877), *C. strumosa* (Brian, 1906), and a recently added *C. briani* Benmansour, Ben Hassine, Diebakate et Raibaut, 2001, plus a tentative, unnamed member of this genus (Roubal 1981), whose female was never fully described and more information is required for a definitive decision on the status of this species (Kabata 1990).

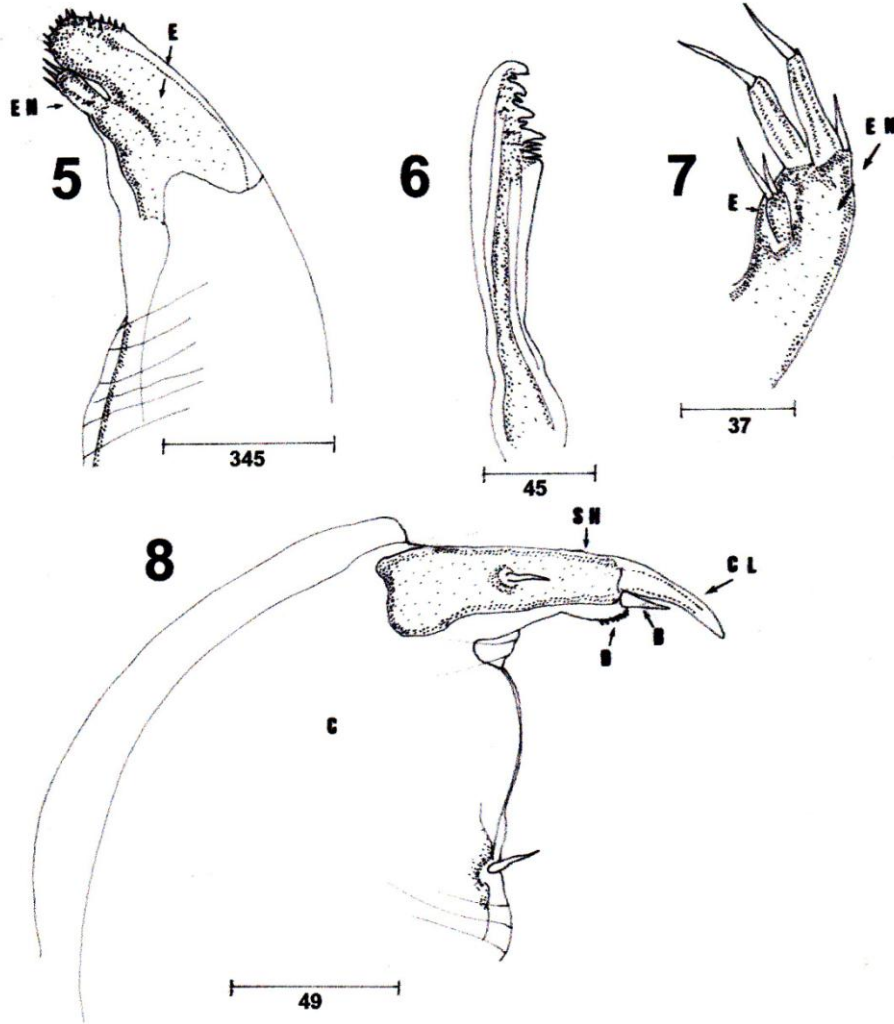
Among all species of *Clavellotis*, the new species differs from a group that shares a well-developed aliform lateral projection from the cephalothorax base (*C. bilobata*, *C. briani*, *C. branchiostegi*, *C. dilatata*, *C. fallax* and *C. strumosa*). The remaining species are more closely related to the new species, due to the presence of a subcircular lateral projection (*C. characis*, *C. pagri* and *C. sargi*).

The new species can be differentiated from *C. sargi* because, in the latter, the female bears a very long genital process, and the trunk is subcircular. The male shows differences in the trunk and genital process, in the second maxilla and in the maxilliped shape. *C. pagri* also differs in the female trunk shape and in the length of the second maxilla, which is longer in the new species. Other differences are found in the male second maxilla, maxilliped, and in the shapes of the trunk and genital process.

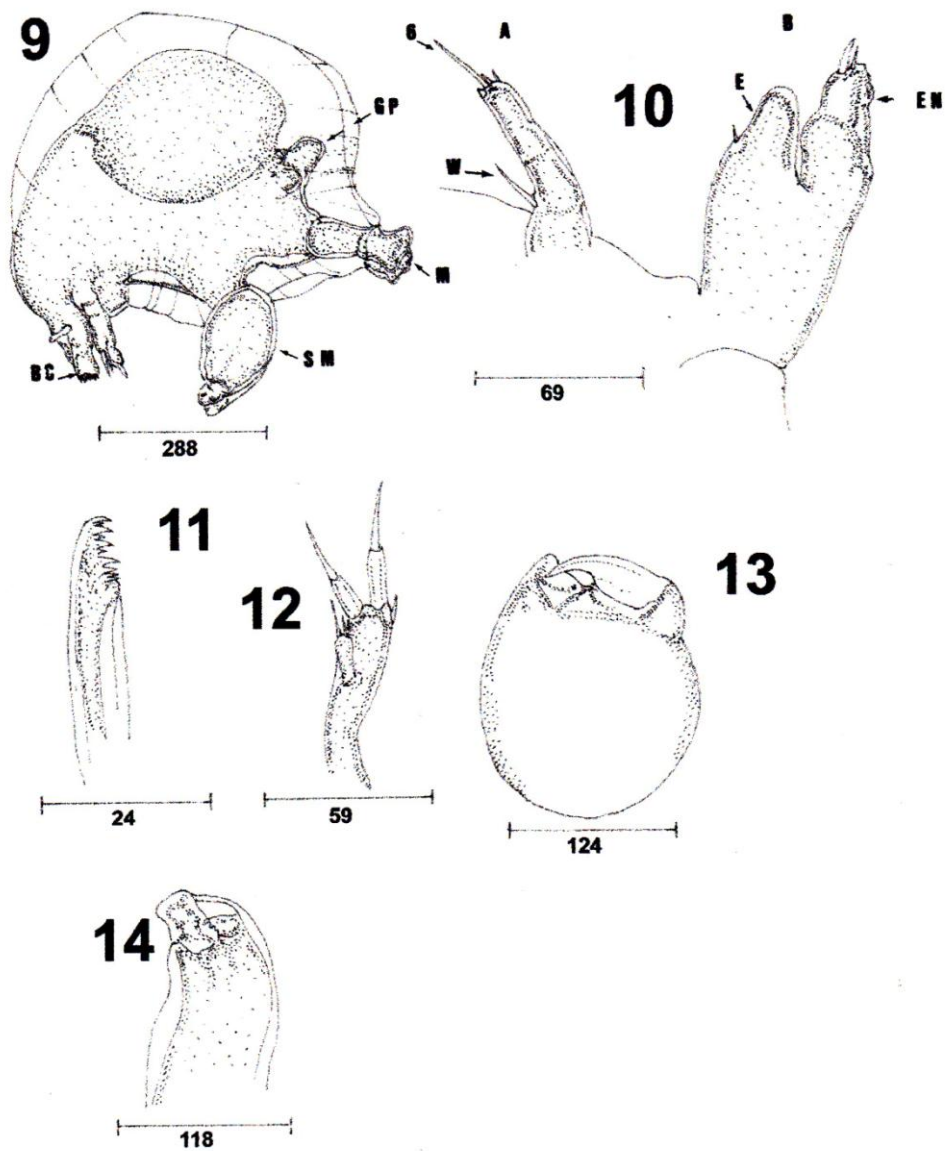
The present specimens, parasitic on *S. oculatus*, can be distinguished from *C. characis* by the length of the female genital process, which is longer in *C. characis*, by the trunk shape, and especially by the length of the second maxilla, which is shorter in *C. characis*. The male shows other differ-

ences in the length of the trunk and the genital process, as well as in the shapes of the second maxilla and maxilliped.

Consequently, the presently described *Clavellotis* specimens cannot be considered conspecific with any of the previously mentioned species. The second maxilla is longer than



Figs 5-8. Female *Clavellotis sebastidis* sp. nov., appendages: 5. Second antenna; EN - endopod, E - exopod. 6. Mandible. 7. First maxilla; E - exopod, EN - endopod. 8. Maxilliped; B - basal seta, C - corpus, CL - claw, D - denticles, SH - shaft



Figs 9–14. Male *Clavellotis sebastidis* sp. nov.: 9. Male entire, lateral view; BC – buccal cone, GP – genital process, SM – second maxilla, M – maxilliped. 10. First antenna and second antenna; A – first antenna, B – second antenna, E – exopod, En – endopod, W – whip, 6 – seta six. 11. Mandible. 12. First maxilla. 13. Second maxilla. 14. Maxilliped

in those species. *Clavellotis* shows typically distinctive appearances in the trunk and genital process. This, in addition to differences in the maxilliped and second maxilla, preclude its inclusion within the previously described species of *Clavellotis*. The authors suggest the creation of a new taxon for the specimens that parasitize *S. ocellatus*; the name proposed is *Clavellotis sebastidis*.

This is the first record of *Clavellotis* from the southern Atlantic, and the first on *Sebastes* species.

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