A CONTRIBUTION TO THE KNOWLEDGE ON THE MORPHOMETRY AND THE ANATOMICAL CHARACTERS OF *PENNELLA BALAENOPTERAE* (COPEPODA, SIPHONOSTOMATOIDEA, PENNELLIDAE), WITH SPECIAL REFERENCE TO THE BUCCAL COMPLEX

BY

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ABSTRACT

*Pennella balaenopterae*, the largest known copepod, still presents many questions regarding its morphological features and its mode of life. Twelve specimens of *P. balaenopterae* were collected from *Balaenoptera physalus* in the northeastern Atlantic Ocean. Their morphological characteristics have been analysed by scanning electron microscopy and a detailed morphometric study has been accomplished. The buccal complex is described for the first time, providing details on the mouth, first maxillae, second maxillae, and buccal styles, together with a new, trilobed structure not previously described for the genus. Other appendages are also presented, including the first antenna, second antenna, swimming legs, and other external and internal structures. The results are discussed and compared with those found in the literature, together offering a more complete picture of the anatomy of this species.

RÉSUMÉ

*Pennella balaenopterae*, le plus grand copépode connu, pose encore des questions quant à ses caractères morphologiques et son mode de vie. Douze spécimens de *P. balaenopterae* ont été récoltés sur *Balaenoptera physalus* dans l’océan Atlantique nord-oriental. Leurs caractéristiques morphologiques ont été analysées en microscopie électronique à balayage et une étude morphométrique détaillée a été réalisée. Le complexe buccal est décrit pour la première fois, fournissant des détails sur la bouche, les maxillules, les maxilles et les styles buccaux, avec une nouvelle structure trilobée, qui n’avait pas été décrite auparavant pour le genre. D’autres appendices sont aussi présentés, incluant les antennes, les antennes, les pattes natatoires ainsi que d’autres structures externes et internes. Les résultats sont discutés et comparés avec ceux trouvés dans la littérature, l’ensemble offrant une image plus complète de l’anatomie de cette espèce.

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INTRODUCTION

Copepods are one of the most important groups of ectoparasites living on fishes and other marine animals. The number of parasitic species of copepods has been estimated to be around 1600 to 1800, 75% of which belong to the order Siphonostomatoida (cf. Kabata, 1992).

The members of the family Pennellidae, order Siphonostomatoida, are typically mesoparasitic and differ from other families of that order, because in their life cycle they have intermediate hosts (Kabata, 1979). The genus *Pennella* Oken, 1816, is among the most representative of this family, including the only copepods that parasitize marine mammals, next to fishes and other groups of invertebrates. In spite of this peculiarity and its zoological importance, *Pennella* is one of the least known genera in its family. The high degree of metamorphosis shown by the adult females, their phenotypic plasticity, and the difficulty involved in obtaining a sufficient number of specimens for description, might well explain the current systematic confusion with regard to the identification of the various species (Kabata, 1979, 1992). Especially also the buccal area of the pennelid copepods is still inadequately known, because it is very small and difficult to study in detail (Castro & Baeza, 1991).

*Pennella balaenopterae* Koren & Danielsen, 1877, the largest known copepod, is no exception, and there are still many uncertainties regarding its morphological characters and biological cycle. The literature on this species consists of only a few papers; most of them are outdated, and some are definitely misleading. Anthony & Calvet (1905) provided a general description of the species’ morphology. A more detailed study was accomplished by Turner (1905), who analysed the parasite’s internal anatomy. Some morphometric data can be found in Brian (1944), who analysed two specimens, and in Raga & Sanpera (1986), who studied specimens collected from fin whales, *Balaenoptera physalus* L., 1758, in waters off the northwestern Iberian Peninsula. Other reviewers of the genus *Pennella* have tried to create some order in the criteria for the systematics of the group, with varying success. Leigh-Sharpe (1928) and Delamare Deboutteville & Nunes-Ruivo (1951) reviewed the genus, the former author describing the morphology of *P. balaenopterae* rather inaccurately. Kabata (1979), gave a complete review of the species that parasitize fish, whence *P. balaenopterae* was not included. More recently, Hogans (1987) explicitly distinguished between *Pennella filosa* (L., 1758) and *P. balaenopterae*, using external morphological characters. He next concluded that *P. balaenopterae* is the only species in the genus that parasitizes marine mammals. Papers on distribution and reports on the presence of *P. balaenopterae* are not abundant either, the information being confined to Wilson (1920), Heegard (1943), Margolis & Dailey (1972), Raga & Sanpera (1986), Dailey & Vogelbein