

THE APPENDAGES OF *LOPHOURA TETRAPHYLLA* HO, 1985 (COPEPODA: SPHYRIIDAE) A PARASITE OF *ANTIMORA* *ROSTRATA* IN DEEP WATERS OF THE NORTHWEST ATLANTIC OCEAN

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The detailed structure of the cephalothoracic appendages of *Lophoura tetraphylla*, a parasitic copepod of *Antimora rostrata*, are described. The first and second antennae possess a structure similar to that reported for other genera in the family Sphyriidae. The morphology of the mandible of *L. tetraphylla* is discussed in relation to other previous descriptions of this appendage. *Lophoura tetraphylla*, like other members of the family, is shown to exhibit extensive regressive metamorphosis of the appendages during the mesoparasitic stage of its life cycle.

Les structures détaillées des appendices céphalothoracique de *Lophoura tetraphylla*, un copépode parasite d'*Antimora rostrata*, sont décrites. Les structures des premières et deuxième antennes sont similaires à celles rapportées pour d'autres genres de la famille Sphyriidae. La morphologie de la mâchoire inférieure est discutée par rapport aux descriptions antérieures de cet appendice. *Lophoura tetraphylla*, comme d'autres membres de cette famille, montre la métamorphose régressive des appendices pendant la stade mésoparasitique de son cycle vital.

Introduction

The structure of the appendages of adult female sphyriid copepods are, virtually unknown. Wilson (1919) described the structure of some of these appendages for 6 genera (*Opimia*, *Paeon*, *Perplexis*, *Lophoura*, *Sphyrion* and *Trypaphylus*). Kabata (1979) in his review of the family Sphyriidae Wilson, 1919 gave detailed descriptions of the appendages for *Sphyrion lumpi* (Kroyer, 1845) a parasite of *Sebastes* sp. in the North Atlantic. *Sphyrion lumpi* possesses appendages which may be considered typical of the family. The first and second antennae and first and second maxillae are reduced to sub-spherical swellings with remnants of apical armature in the form of short setae (first maxillae exempt of apical armature). The maxillipeds, swimming legs and occasionally, the second maxillae, are sometimes lost after metamorphosis in some genera (Kabata 1979). As far as is known, only four species, *Paeonocanthus antarcticensis* Hewitt, (1965), a parasite of *Bathylagus* sp. in the North and South Atlantic, *Paeon ferox* Wilson, (1919) and *P. versicolor* Wilson, (1919) from the gill cavities of charcharhinid sharks and, *S. lumpi* retain complex appendages (maxillipeds) after metamorphosis during the mesoparasitic stage of their lives (Hogans, 1986; Wilson, 1919; Kabata, 1979).

To examine the extent of reduction of the appendages in the post-metamorphosis female sphyriid I have examined several species recovered from hosts collected in Canadian Atlantic waters. The appendages of *Lophoura gracilis* Wilson, (1919) are described in a separate paper (Hogans and Dadswell 1985). Another species which I have found, *Lophoura tetraphylla*, is a parasite of the flesh of the blue hake (*Antimora rostrata*). It was recently described by Ho (1985) from two specimens collected in deep waters of the continental slope of the Northwest Atlantic. Due to a scarcity of material, Ho was unable to describe the appendages of this parasite in detail. Herein, the appendages of two adult female *L. tetraphylla* are described.

Materials and Methods

The two specimens of *L. tetraphylla* were recovered from the somatic musculature of *A. rostrata* collected during a cruise of the R/V Gyre, Texas A&M University), in the Carson Canyon area near the eastern edge of the Grand Banks of Newfoundland. Depth of capture was 1700 m. The copepods were dissected from the fish at sea and fixed and stored in 70% ethanol. The cephalothorax of each specimen was cleared in 85% lactic acid. Figures were drawn with the aid of a camera lucida.

Lophoura tetraphylla Ho, 1985 (Fig. 1)

General appearance: *Lophoura tetraphylla* is a typical sphyriid copepod having a complex holdfast, several clavate uropods (branching or single, depending upon the genus and often referred to as respiratory cylinders) and a large, robust genital segment. In general appearance the specimens collected for this study did not differ significantly from those described by Ho (1985) who gave the distinguishing feature of the species as a holdfast as large as or larger than the trunk. The smallest of the two specimens recovered possessed a holdfast about three-quarters the size of the trunk. Holdfast structure (four, large spherical processes) not size, is probably the best distinguishing character for the species. The shape of the cephalothorax (cylindrical with two lateral pad-like processes), holdfast, neck, trunk, uropods and perianal elevation of the four known specimens of *L. tetraphylla* are similar.

The appendages: The first and second antennae of *L. tetraphylla* (Fig. 2) are located near the anterior extremity of the cephalothorax on the dorsal surface. Each is sub-spherical and armed at the apex with a single seta. The second antenna is approximately three times the size of the first and located slightly anterior to it. Their structure is similar to that reported for *S. lumpi*, although this species possesses a second antennae with two apical setae (Kabata 1979).

The mouth of *L. tetraphylla* is siphonostome and located near the end of the cephalothorax on the ventral surface. When the cephalothorax is cleared, the mandibles (Fig. 3) can be seen to lie on each side and slightly within the mouth tube. Each mandible is armed with 6 teeth of various sizes, the largest being medial in position. The mandible structure is unlike that reported for other sphyriids (no species identified) by Wilson (1919): stylet-shaped with adjacent surfaces set with a row of five teeth. Wilson's is apparently the only description (no figures were included) of the mandible of a female sphyriid copepod other than that of *L. tetraphylla*. It is likely that Wilson (1919) did not correctly interpret the structure of the mandible in his paper.

Slightly below and on each side at the mouth tube are either the first or second maxillae. Their position would indicate they are the first maxilla as the second are often found more posterior to the mouth in *S. lumpi* (Kabata, 1979) and *L. gracilis* (Hogans and Dadswell, 1985). The structure of these appendages, subspherical and armed apically with two short setae, however is similar to that reported for the second maxilla of *S. lumpi*. If these appendages are first maxillae, then the second are lost in *L. tetraphylla*. Since the first maxilla of both *S. lumpi* and *L. gracilis* lack apical armature, I suggest that *L. tetraphylla* possesses indiscernable first maxillae, and second maxillae in a position more anterior than is usual for the family. A careful examination of both specimens collected for this study shows a complete lack of both maxilliped and swimming legs; a typical feature for the majority of genera within the family Sphyriidae.

Mesoparasitic families of copepods, such as the Lernaevidae, and Pennellidae, do not undergo regressive metamorphosis (Kabata pers. comm.). It is assumed that the structure of the appendages remain fairly constant from initial attachment to the host to the maturation of the females. In Pennellidae for example, the appendages remain

structurally as extensive as they were in the copepodid stage, but are dwarfed by the excessive growth of the cephalothorax and holdfasts (see Kabata 1979). This can be seen in the Lernaecidae, as well; members of this family also retain complex appendages which are extremely small in proportion to the total size of the parasite. Since the premetamorphosis stages of the female sphyriid copepod (except for the early metanauplius of *S. lumpi*) are unknown, it can only be assumed from the available information on the adults that the appendages of the female sphyriid are relatively simple and change significantly during its life-history, undergoing extensive regressive metamorphosis. The site of attachment of *L. tetraphylla* on its host is apparently specific; all four known specimens being recovered from the somatic musculature. This is a feature shared with some other genera (*Lophoura*, *Opimia*, *Paeon*) in the family (Wilson, 1919).

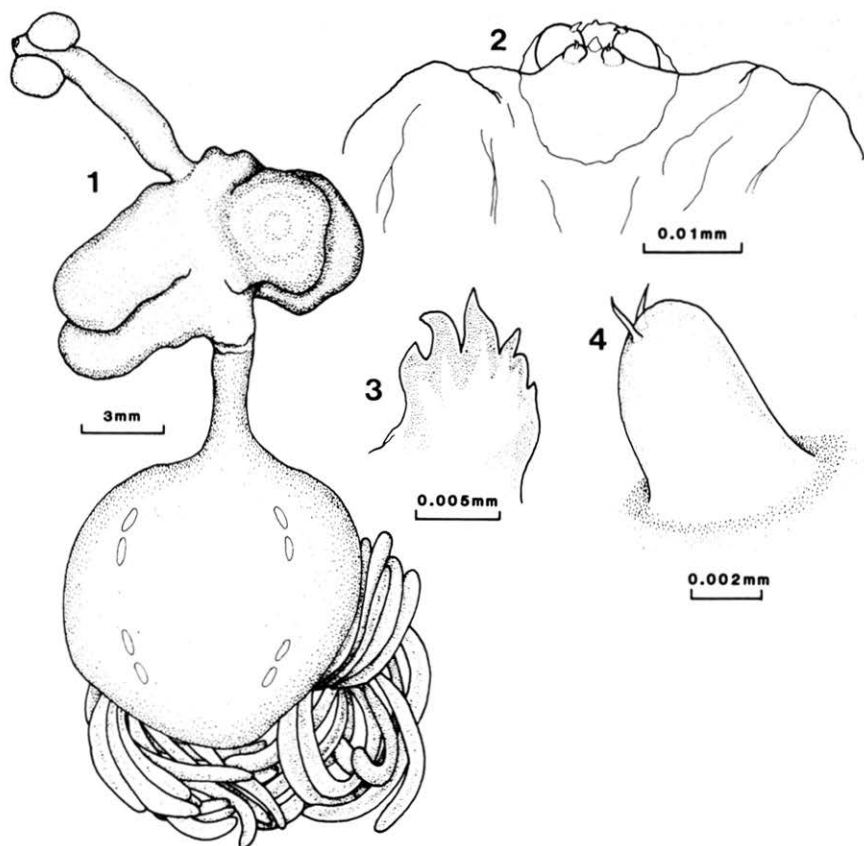


Fig 1 *Lophoura tetraphylla* Ho, 1985, dorsal.

Fig 2 Anterior extremity of cephalothorax, dorsal.

Fig 3 Mandible, ventral.

Fig 4 Second maxilla (?), ventral.

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