Lamproglena hoi n.sp. (Copepoda: Lernaeidae) from two yellowfish hosts, *Barbus marequensis* and *Barbus polylepis*, caught in a river in Mpumalanga, South Africa

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ABSTRACT

DIPPENAAR, S.M., LUUS-POWELL, W.J. & ROUX, F. 2001. *Lamproglena hoi* n.sp. (Copepoda: Lernaeidae) from two yellowfish hosts, *Barbus marequensis* and *Barbus polylepis*, caught in a river in Mpumalanga, South Africa. *Onderstepoort Journal of Veterinary Research*, 68:209–215

Lamproglena hoi n.sp. species was collected from the gill filaments of largescale yellowfish, *Barbus marequensis* A. Smith, 1841 and smallscale yellowfish, *Barbus polylepis* Boulenger, 1907 from the Spekboom River, Mpumalanga, South Africa. The genus *Lamproglena* is characterized. Morphological features of *L. hoi* are described and illustrated by means of drawings and scanning electron micrographs. This species is also compared with congener species described from other *Barbus* spp.

Keywords: Copepoda, Cyclopoida, *Lamproglena hoi*, morphology, *Barbus marequensis*, *Barbus polylepis*, South Africa

INTRODUCTION

The genus *Lamproglena* was established in 1832 by Alexander von Nordmann and currently comprises 37 nominated species with a cosmopolitan distribution. Piasecki (1993) mentioned a total of 41 species (and subspecies), but he failed to list the species and/or subspecies which he at the time considered as valid species of *Lamproglena*. The number of species he mentioned possibly includes species that have been synonymized or transferred to other lernaeid genera. For example, *Lamproglena aubentoni* Dollfus, 1960 was synonymized with *Lamproglena hemprichii* (Fryer 1964); *Lamproglena nyasae* Fryer, 1956 was synonymized with *Lamproglena monodi* (Fryer 1959) and *Lamproglena ophiocephali* Yamaguti, 1939 with *Lamproglena chinensis* (Sproston, Yin & Hu 1950); *Lamproglena intercedens* Fryer, 1964 was transferred to *Catlaphilla* (Ho 1998); *Lamproglena gurayai* Battish & Brar, 1989 was transferred to *Indolernaea seengalae* (Ho 1998) and *Lamproglena seenghalae* Kumari, Khera & Gupta, 1989 to *Indolernaea* (Ho 1998). Therefore, it seems that the species complex of the genus is still very confusing because of the very scanty and incomplete descriptions of many of the existing species.

All the species of this genus are gill parasites of freshwater fish, except *Lamproglena lichiae* Von Nordmann, 1832, controversially collected from the doublespotted queenfish (*Scomberoides lysan* (Forsskål, 1775)) from the Red Sea (Fryer 1968). Of the 37 species, 13 have been reported from Africa with four of them (*L. monodi* Capart, 1944; *Lamproglena clariae* Fryer, 1956; *Lamproglena barbicola* Fryer, 1961; and *Lamproglena cornuta* Fryer, 1964) being recorded from southern Africa.

MATERIALS AND METHODS

Copepods were collected from the gill filaments of both largescale, *Barbus marequensis* A. Smith, 1841 and smallscale yellowfish, *Barbus polylepis* Boulenger, 1907 that were caught in the Spekboom River

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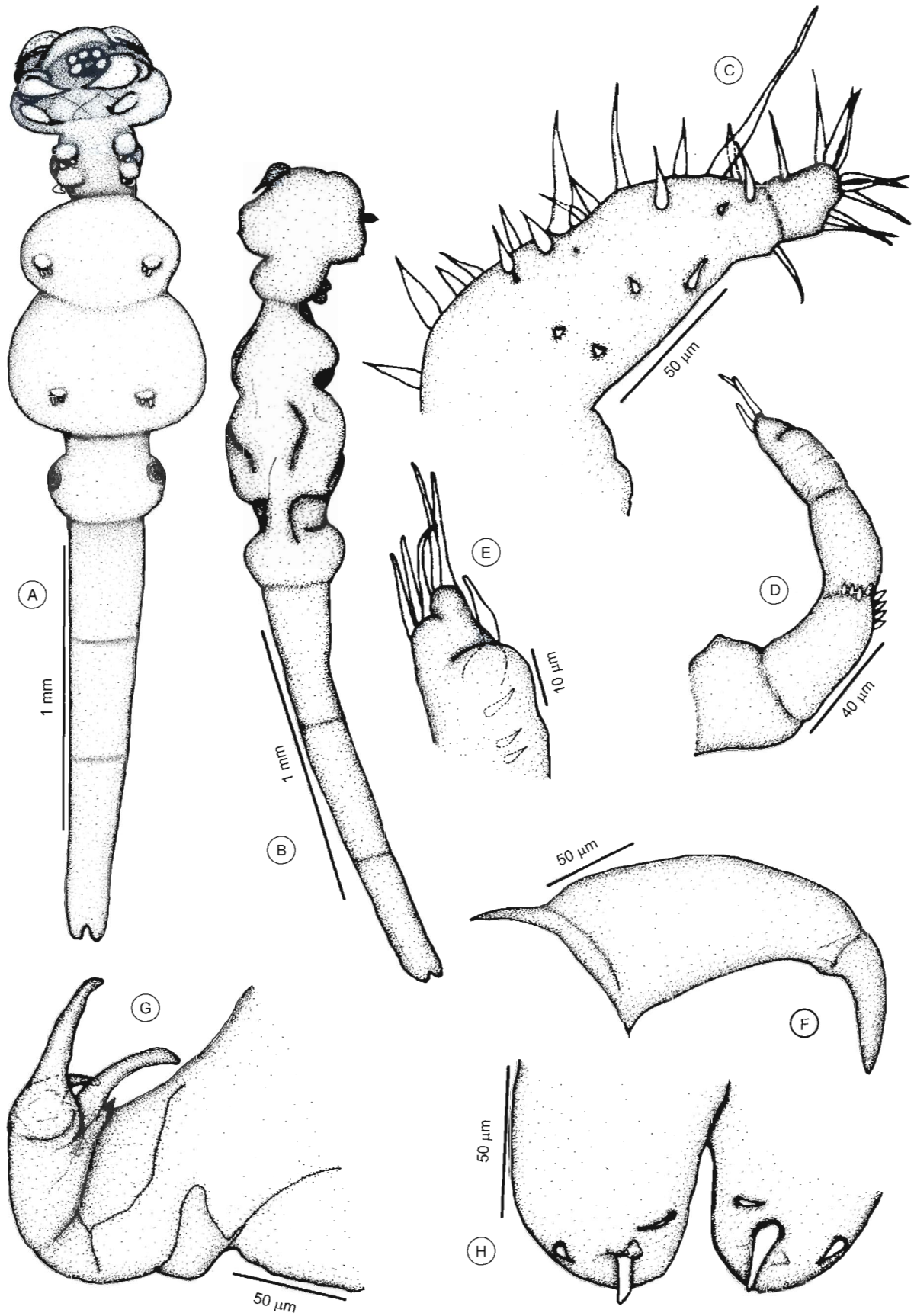
A
1 mm
B
1 mm
C
50 µm
D
40 µm
E
10 µm
F
50 µm
G
50 µm
H
50 µm

in Mpumalanga, South Africa. Their specifics regarding field collections are recorded below. The collected parasites were fixed and preserved in 70% ethanol. In the laboratory, they were cleaned and studied, using the wooden slide technique (Humes & Gooding 1964). Before being dissected, the copepods were cleared and stained in lactic acid into which a small amount of lignin pink had been dissolved. Measurements were made using an ocular micrometer and drawings were made with the aid of a *camera lucida*. For scanning electron microscopy (SEM) studies, the material to be studied was dehydrated through graded ethanol, followed by immersion in hexamethyldisilanzane for 30 min. Before mounting, specimens were dried by placing them in a slight vacuum to remove the hexamethyldisilanzane, and after mounting it was sputter-coated with gold-palladium. Anatomical terminology used in this report conforms mostly to that of Kabata (1979).

Characteristics of the genus *Lamproglena*

The genus *Lamproglena* can be distinguished by the following characteristics: body distinctly divided into cephalothorax, free leg-bearing thoracic segments and abdomen; cephalothorax partially separated from first leg-bearing thoracic segment; first and second leg-bearing thoracic segments form a distinct neck; third and fourth thoracic segments form incipient trunk; fifth thoracic segment usually separating genital complex from anterior thoracic segments by forming a waist-like constriction; abdomen three segmented; antennae setose; maxillipeds tipped with one to five claws; thoracic legs indistinctly or distinctly segmented.

Lamproglena hoi n.sp.

The specimens collected from both host species show the same morphological features. Female (Fig. 1–3). Body (Fig. 1A, B) elongated, approximately 3 mm long (n = 10, range 2,7–3,3 mm), with indistinct segmentation. Four distinct constrictions divide the organism into "head", "neck", "two-segmented trunk", "waist" (see Piasecki 1993), genital complex and abdomen. Dorsal surface of "head" (cephalothorax) (Fig. 3A) with specific patterns of more heavily sclerotized regions, as well as traces of nuchal organ, located centrally. The "neck" consists of the first two fused leg-bearing thoracic segments, while thoracic segments bearing legs 3 and 4, constitute the "trunk". The "waist" is formed by the fifth leg-bearing segment and has the same width as the "neck". The genital complex is unsegmented. Orifices of oviducts situated ventrolaterally on the genital complex. Abdomen indistinctly three-segmented, segments slightly decreasing in length and width from anterior to posterior, proximal part of first segment of same width as "neck" and "waist". Caudal rami (Fig. 1H, 3E and F) fused with abdomen, each with one prominent seta terminally and two smaller setae, one laterally and one medially to prominent seta.

First antenna (Fig. 1C) uniramous, indistinctly two-segmented, tapering from broad base to apex, with 22 setae (of varying sizes) on basal segment and nine setae on small distal segment. Second antenna (Fig. 1D) uniramous, indistinctly four-segmented, tapering; basal segment short and broader than other three segments, unarmed; second segment distally with an elevated area, bearing 8–10 small setae of the same size; third segment unarmed; terminal segment (Fig. 1E) bearing four setae on inner surface with distal seta larger, situated on thumb-like elevation and five setae on terminal margin (two on elevated area, three below elevated area). Oral region surrounded by sucker-like structure (Fig. 3B) surrounding the oral region consisting of six distinct bumps. Mandible and first maxilla not observed. Second maxilla (Fig. 1F) uniramous, robust, two-segmented, each devoid of setae; basal segment short and broad; subchela with shaft tapering, ending in a conspicuous claw, claw curved and heavily sclerotized. Maxilliped (Fig. 1G, 3C) subchelate, two-segmented, corpus broad and about twice as long as subchela, unarmed; subchela tipped with three claws of about equal size, one with spine-like extention at basis.

Legs 1–4 biramous, with three-segmented exopod and two-segmented endopod. Sympod of subsequent legs gradually diminishes in size. Exopod of legs 1–4 with long seta on outer margin of basal segment, smaller seta distally on outer margin of second segment, distal segment with varying armature. Endopod of legs 1–4 with basal segment unarmed and distal segment with varying armature. Leg 1 (Fig. 2A) distal segment of exopod with four apical setae (two long setae medially and two short setae laterally); distal segment of endopod with one large seta terminally and one smaller distolateral seta. Leg 2 (Fig. 2B) distal segment of exopod with two unequal apical setae; distal segment of endopod with two apical conical processes and three small processes on medial margin. Leg 3 (Fig. 2C) distal segment of

FIG. 1 *Lamproglena hoi* adult female

A General habitus, ventral view
B General habitus, dorsal view
C First antenna
D Second antenna
E Tip of second antenna
F Second maxilla
G Maxilliped
H Caudal rami

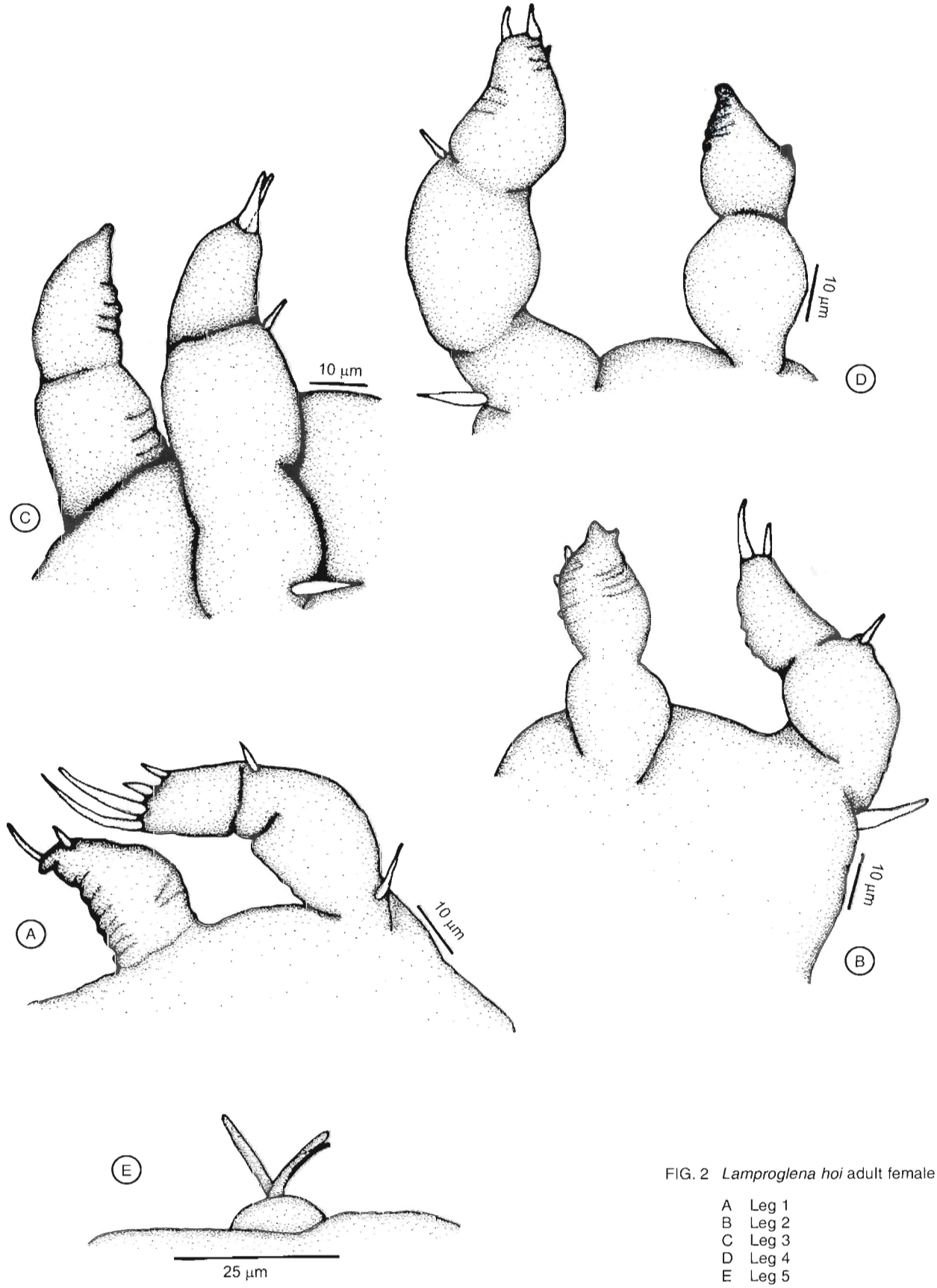

FIG. 2 *Lamproglena hoi* adult female

A Leg 1
B Leg 2
C Leg 3
D Leg 4
E Leg 5

exopod with two apical setae of equal size; distal segment of endopod with one apical conical process. Leg 4 (Fig. 2D) distal segment of exopod with two small, equal sized apical setae and one small sub-apical seta medially; distal segment of endopod with very small apical and medial processes. Leg 5 (Fig. 2E, 3D) reduced, present as a bump tipped with two setae and a third seta anterior to elevated bump.

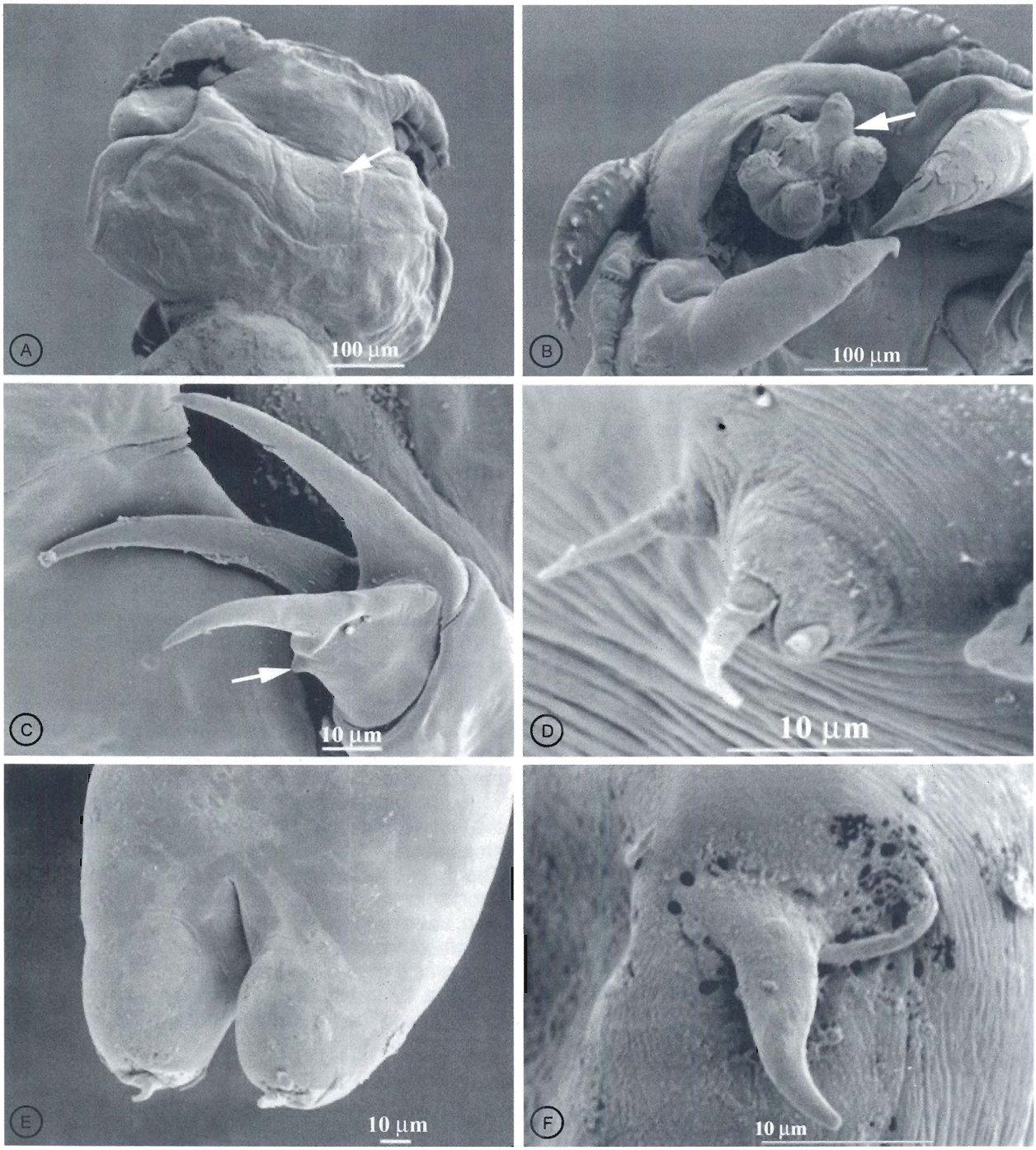

FIG. 3 *Lamproglena hoi* adult female

A Cephalothorax, dorsal view, nuchal organ (arrowed)
B Cephalothorax, ventral view, sucker-like structure (arrowed)
C Maxilliped, spine-like extension (arrowed)
D Leg 5
E Caudal rami, ventral view
F Armature of caudal ramus

Host, locality and date of capture

Barbus marequensis A. Smith, 1841 and *Barbus polylepis* Boulenger, 1907 (Cypriniformes: Cyprinidae) caught in the Spekboom River (24°54'S 30°24'E), Mpumalanga, South Africa on 12 July 1999.

Specimens collected and infection site

Twenty females from *Barbus marequensis* and three females from *Barbus polylepis*, attached to lamellae of gill filaments. No males were collected.

Type material

Three females from *Barbus marequensis* and one female from *Barbus polylepis* deposited in the South African Museum (SAM A44828 and SAM A44829, respectively), remaining female specimens have been retained in the personal collection of the first author.

Etymology

The species epithet, *hoi*, honours Prof. Ju-shey Ho for his fine contributions to our understanding of symbiotic Copepoda.

DISCUSSION

To date two species of *Lamproglena* have been recorded from three species of *Barbus*. *L. barbicola* was found on *Barbus altianalis radcliffi* from Lake Victoria, Africa (Fryer 1961), while *Lamproglena jordani* Paperna, 1964 was collected from both *B. canis* and *B. longiceps* from Lake Tiberias, Israel (Paperna 1964).

In comparing *Lamproglena hoi* with *L. jordani* (Paperna 1964), it is clear that the shape of the body differs considerably. *L. jordani* does not have the distinct "neck" that divides the body into a "head" and "trunk" as observed in *L. hoi*. The free thoracic segments are partly fused in *L. jordani* whereas those of *L. hoi* are distinctly separated by constrictions between the second and third leg-bearing segments as well as the third and fourth leg-bearing segments. The abdomen of *L. jordani* is two-segmented, while that of *L. hoi* is indistinctly three-segmented. The first antenna of *L. jordani* is in essence similar to that of *L. hoi*, but on that of *L. hoi* setae were found mostly along the anterior margin (Fig. 1C), with only a few setae scattered over the rest of the appendage. The segmentation and chaetotaxy of the second antenna of *L. hoi* differs from that of *L. jordani*. If we assume that our interpretation of the segmentation (Fig. 1D) differs from that of Paperna (1964) (cf. Plate III A_2), there are still differences in the chaetotaxy, especially that of the terminal segment (Fig. 1E). The second maxilla of *L. hoi* has only one claw whereas that of *L. jordani* consists of one large claw and one small hook distally. The maxillipeds of the two species are very alike. The legs of the two species greatly differ in structure and armature.

L. hoi seems to be very similar to *L. barbicola* (Fryer 1961), but *L. hoi* is about 2 mm (almost 50%) shorter in overall length with distinct differences in segmentation. In *L. hoi* there are no constrictions between leg-bearing segments one and two, or between the adjacent segments of the abdomen, or between the abdomen and the caudal rami. *L. hoi* has an array of 22 setae on the anterior margin of the first segment of the first antenna whereas this segment in *L. barbicola* lacks the anterior fringe of setae. The second antenna of the two species seem to be similar, except for the interpretation of the segmentation (cf. Fig. 9 in Fryer (1961) with Fig. 1D, E in this report) and although Fryer (1961) did not discuss the setation of the second antenna, a comparison of his illustration with that of our specimen clearly indicates vast differences. *L. barbicola* has a wide-walled, horseshoe-shaped, sucker-like structure surrounding the oral region whereas this structure in *L. hoi* consists of six distinct bumps [cf. Fig. 6 in Fryer (1961) with Fig. 3B in this report]. The second maxilla and maxilliped of the two species are similar. Thoracic legs 1–4 of *L. hoi* demonstrate obvious differences in setation in comparison with that of *L. barbicola*. *L. barbicola*'s thoracic legs all display a similar structure with two-segmented exo- and endopods bearing uniform armature [cf. Fig. 10 in Fryer (1961)] whereas that of *L. hoi* display a different structure with three-segmented exopods and two-segmented endopods and a more complex armature (Fig. 2A–D).

After reviewing the literature of *Lamproglena*, *L. hoi* shows much similarity in general appearance with *L. lichiae* (see Piasecki 1993), apparently being the only marine species within the generally accepted freshwater genus *Lamproglena*. The terminal segment of the first antenna of *L. lichiae* apparently has only two small setae, whereas that of *L. hoi* has nine setae. The tip of the second antenna of *L. lichiae* has five short spines while that of *L. hoi* is surmounted by five long, apical and four subapical setae of varying sizes. *L. lichiae* has the same structure covering the oral region as that of *L. hoi* [cf. Fig. 35 in Piasecki (1993) with Fig. 3B in this report)\], while the second maxilla and maxilliped also seem to be similar for the two species.

REMARKS

It seems as if the species composition of the genus *Lamproglena* is very confusing due to scanty descriptions and incomplete illustrations. Therefore the authors suggest that a complete and thorough revision of the genus, should be undertaken.

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