

The Morphology of *Lernanthropus kroyeri* van Beneden, 1851 (Copepoda: Lernanthropidae) Parasitic on Sea Bass, *Dicentrarchus labrax* (L., 1758), from the Aegean Sea, Turkey

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SUMMARY: A detailed redescription of *Lernanthropus kroyeri* van Beneden, 1851 is provided based on observations made with the aid of scanning electron microscopy. Specimens were obtained from the host, the sea bass *Dicentrarchus labrax* (L., 1758) obtained from a commercial aquaculture enterprise in Izmir (western Turkey).

Key Words: Copepod parasite, *Lernanthropus kroyeri*, sea bass, *Dicentrarchus labrax*, SEM.

Ege Denizinde Levrekde (*Dicentrarchus labrax* L., 1758) Görülen Parazitik, *Lernanthropus kroyeri*'nin van Beneden, 1851 (Copepoda: Lernanthropidae) Morfolojisi

ÖZET: Bu çalışmada *Lernanthropus kroyeri*'in ayrıntılı tanımı verilmiştir. Örnekler Türkiye'nin batısında İzmir'de yetiştiricilik yapan ticari bir işletmeden temin edilen levreklerden (*Dicentrarchus labrax* L.) alınmıştır. Morfolojik ayrıntılar taramalı elektron mikroskopu kullanılarak görülmüştür.

Anahtar Sözcükler: Kopepod parazit, *Lernanthropus kroyeri*, levrek, *Dicentrarchus labrax*, SEM.

INTRODUCTION

Lernanthropus De Blainville, 1822, with more than 100 nominal species, is the most species and most widespread genus of the family Lernanthropidae and is considered to be a common genus of parasitic copepods on fishes (7). Some species of *Lernanthropus* are strictly host specific, but many are parasitic on several species of fish belonging to one genus, or on several genera of the one family (6, 10, 12, 17, 18). The genus is virtually unknown from Turkish waters with the only references being as follows: *Lernanthropus kroyeri* was first recorded from *D. labrax* in Turkey by Tokşen (19), *L. brevis* from *D. labrax* (1), *L. mugilis* from *Liza aurata* (2). Recently, there have been additional reports on *L. kroyeri* in Turkey (9, 15).

Lernanthropus is known to cause some pathological effects on its host. It attaches to the gill filaments of its host using antennae and third legs and pathological effects such as erosion, desquamation, necrosis in branchial epithelial tissue, increase of mucus secretion, narrowing in capillary veins have

been reported (8, 11, 20). The morphological terminology of the parasitic copepods has given rise to confusion in the past. The terminology of Kabata (6) as modified by Huys and Boxshall (4) is adopted. Recently, Olivier and van Niekerk (13) and Olivier et al. (14) have described new species of *Lernanthropus* using scanning electron microscopy.

The present study reports the morphological details of *L. kroyeri*.

MATERIALS AND METHODS

This study was carried out in April 2004. Sea bass, *Dicentrarchus labrax*, were sampled from a commercial aquaculture facility in İzmir. Twenty females and five males of *Lernanthropus kroyeri* were collected from gill filaments of the host, fixed in 10% formalin and brought to laboratory for further investigation. Parasites were post-fixed in 2.5% glutaraldehyde in 0.1 M phosphate buffer (pH 7.4) at 4°C (overnight) and then washed in buffer twice. The specimens were dehydrated through alcohol series and dried in air. They were then sputter-coated with gold (21). SEM photographs were taken with a JEOL JSM-5200 (Tokyo, Japan) electron microscope.

RESULTS

Female (Fig. 1, 2); body elongate, length from anterior margin of cephalic shield to posterior margin of dorsal plate 2.9 mm (range= 2.6-3.4 mm); length including fourth legs 3.7 mm (range=3.3-4.5 mm).

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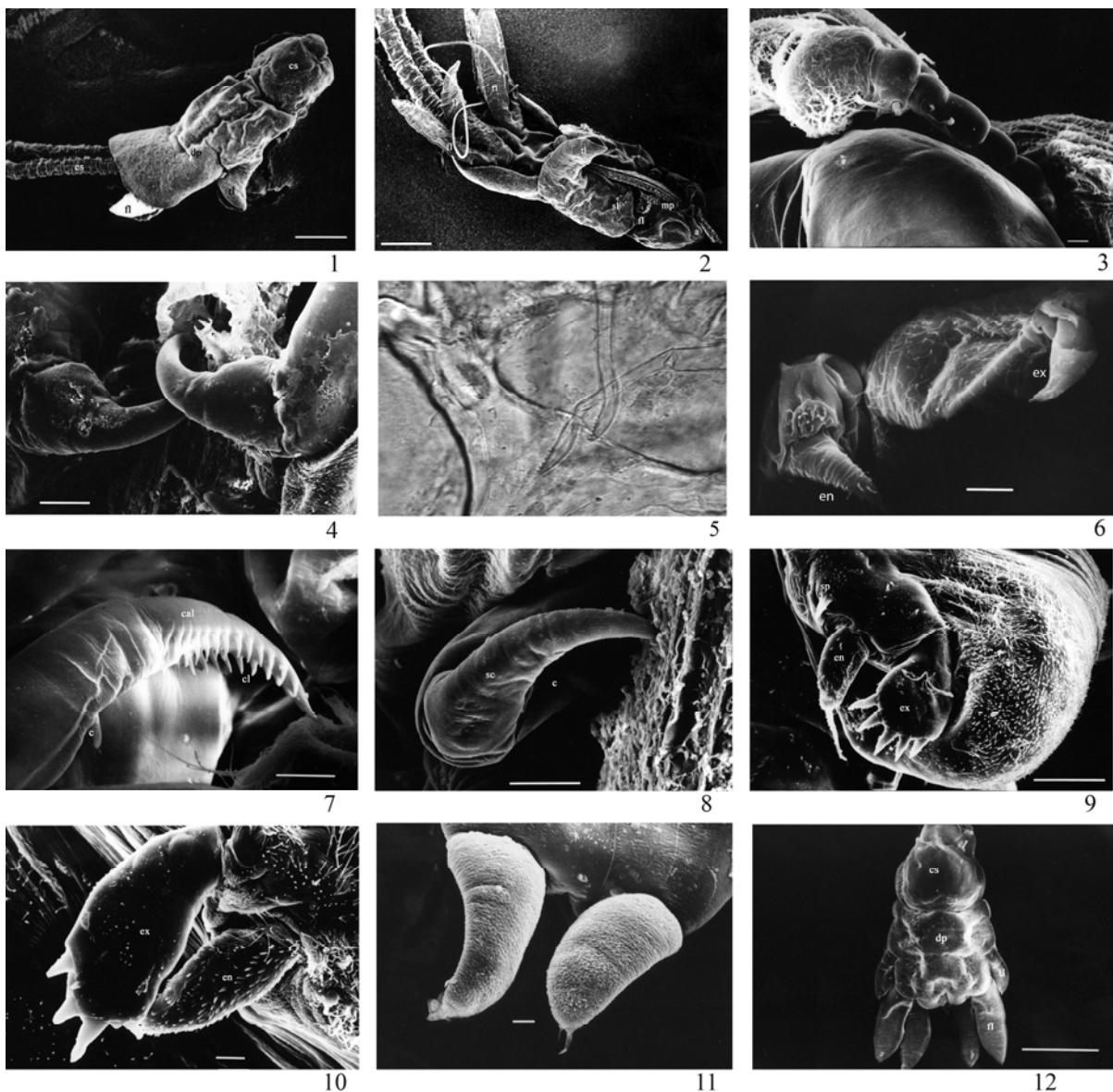


Fig. 1: Dorsal view of female, cs: cephalic shield, ds: dorsal plate, tl: third leg; fl: fourth leg, es: egg sac, Scale, 500 µm.; **Fig. 2:** Ventral view of female, a: antenna, mp: maxilliped, fl: first leg, sl: second leg, tl: third leg; fl: fourth leg, es: egg sac, scale bar, 500 µm.; **Fig. 3:** Antennule of female, scale bar, 10 µm.; **Fig. 4:** Antenna of female, scale bar, 10 µm.; **Fig. 5.** Mandible with seven teeth (light microscopy); **Fig. 6.** Maxillule, en: endopod, ex: exopod, scale bar, 10 µm.; **Fig. 7.** Tip of Maxilla, c: canna, cal: calamus, scale bar, 10 µm.; **Fig. 8.** Maxilliped, female, c: corpus, sc: subchela, scale bar, 50 µm.; **Fig. 9.** First leg, female. en: endopod, ex: exopod, sp:sympodial process, scale bar, 50 µm.; **Fig. 10.** Second leg, female; en: endopod, ex: exopod, scale, 10 µm.; **Fig. 11.** caudal rami; **Fig. 12.** *L. kroyeri*, male, dorsal view, scale, 500 µm.

Cephalic shield length 0.81 mm (range = 0.66 – 0.99). Body surface ventrally ornamented with patches of setules. Cephalothorax with dorsal shield slightly narrower anteriorly, anterolateral corners more rounded than posterolateral corners in dorsal view. Deep constriction between cephalothorax and pregenital trunk. Latter with prominent, rounded anterolateral corners and slightly convex lateral margins. Dorsal plate of fourth pedigerous somite well delimited from third legs,

broader posteriorly, in some specimens with posteromedian notch, often somewhat asymmetrical. Genito-abdominal tagma small, with abdomen not distinctly delimited, subquadrangular.

Antennules (Fig. 3) seven-segmented; first segment with one seta, second segment with two setae, third with short seta, fourth one short, two long setae, fifth with one seta, sixth with two setae, seventh with nine terminal setae. Antenna (Fig. 4) robust, two-segmented; corpus large, curving inwards,

tapering.

Mandible stylet-like, originating outside mouth cone, anterior to base of maxillule; tip curving to fit inner contour of labium; tip with flattened shaft, margined with seven recurved teeth (Fig. 5). Maxillule (Fig. 6) bilobate with inner lobe smaller than outer. Maxilla uniramous, distally calamus with two rows of spiniform denticles (Fig. 7) Maxilliped robust, terminal claw with longitudinal striae (Fig. 8).

First leg (Fig. 9) with large setule-covered sympod bearing one slightly curved, stout setose spine medial to endopod: endopod with spicules distally, bearing one long spiculate apical seta: exopod with five prominent spines on terminal margin, inner surface of spines denticulate. Second leg (Fig. 10) smaller than first. Endopod cylindrical, tapering to short apical seta; exopod with four distal spines, spicules less conspicuous, sympodial process lateral to exopod, with filiform terminal seta, Third leg (Fig. 1, 2), large, foliaceous, protruding posteroventrally slightly folded along longitudinal axis. Fourth leg (Fig. 1, 2) bifurcate, lobes lanceolate. Fifth leg not observed. Caudal rami terminal, tapering with two apical and two proximal setae dorsally (Fig. 11) Egg sac long, uniserial, with numerous eggs (Fig. 1, 2).

Male (Fig. 12) smaller than female, mean body length 1.8 mm; range = 1.5 – 2.4 mm lacking dorsal plate.

DISCUSSION

Crustacean parasites are numerous and have a worldwide distribution in fresh, brackish and salt waters (5). Copepods comprise the largest group of crustacean parasites on fish, numbering more than 1700 species (3) and both local and general pathological effects have been reported (5, 11, 20). Data on the structural and functional properties of host tissue, as well as the attachment modality and feeding habits of parasitic crustacean copepods, are available (3, 5, 16). *Lernanthropus* species attach to the host gill by means of the piercing action of the antennae, which are assisted by the maxillipeds and the modified third legs (6).

The present study shows the detailed shape of cephalothorax, dorsal plate, antennule, antenna, mandible, maxillule, maxilla, maxilliped, and the first to fourth legs.

Kabata (7) observed that the mandible in some specimens had nine teeth and similarly, Özel et al. (15) stated that *L. kroyeri* had nine teeth on its mandible. We observed that a female specimen of *L. kroyeri* had marginal seven recurved teeth and this probably represents individual variation.

The total body length is up to 21 mm according to Scott and Scott (1913), 4-5 mm (van Beneden, 1851a), 5.2-7.0 mm (6), and 7.5-15 mm (15). The length of one female specimen of *L. kroyeri* from Izmir, including the fourth leg, was smaller at 3.3- 4.5 mm and the male was only 1.5-2.4 mm.

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