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Araştırma Notu / Research Note

A Morphological Study (SEM) on a Parasitic Copepod: *Lernanthropus kroyeri* van Beneden, 1851

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Özet: Parazitik kopepod *Lernanthropus kroyeri* van Beneden, 1851'in morfolojik özellikleri (SEM). Bu çalışmada Bodrum civarındaki balık çiftliklerinden sağlanan levrek balığı parazitleri incelenmiştir. Çalışmalar sonunda parazitik kopepodlardan *Lernanthropus kroyeri* van Beneden, 1851, *Caligus minimus* Otto, 1821, *Ceratothoa oestroides* (Risso, 1826) tespit edilmiştir. Bu türlerden *L. Kroyeri*'nin levrek balığının solungaç filamentlerine tutunmaya iyi uyum sağlamış önemli parazitlerden biri olduğu görülmüştür. Bu nedenle *Lernanthropus kroyeri*'in morfolojik özellikleri taramalı elektron mikroskobu ve ışık mikroskobu ile incelenmiş; vücut üyeleri ve ağız parçaları şekillerle ve fotoğraflarla açıklanmaya çalışılmıştır.

Anahtar Kelimeler: *Lernanthropus kroyeri*, parazit, kopepod, SEM, levrek balığı, *Dicentrarchus labrax.*

Abstract: In this study, the sea basses obtained from the fish farms in Bodrum province have been examined for parasites. *Lernanthropus kroyeri* van Beneden, 1851, *Caligus minimus* Otto, 1821, *Ceratothoa oestroides* (Risso, 1826) were found as parasitic copepods. *L. kroyeri* were found as one of the most important parasites well adapted to attachment to the gill filaments of sea bass. The morphological characteristics of *Lernanthropus kroyeri* van Beneden, 1851 were studied by means of scanning electron microscopy and light microscopy. The appendages and mouthparts of the parasite are illustrated.

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

Introduction

Parasitic crustaceans are common on fish hosts in coastal marine and brackish waters. Three major groups of Crustacea contain fish parasites; Isopoda, Branchiura and Copepoda (Öktener and Sezgin, 2000).

Most of the investigations about parasites of the sea bass in Turkey are focused on the Aegean Coast, where fish farms are found. These parasites mostly reported after 1980 are; *Diplectenum* sp. and *Microcotyle* sp. (Hoşsucu, 1982); *Caligus* sp*., Lepeopthrius pectoralis, Lernaeocera branchialis* (Copepoda), *Rocinela danmoniensis, Anilocra* sp. (Isopoda) (Yeler, 1998); *Diplectenum aequans* (Monogenean), *Caligus minimus, Lernanthropus kroyeri* (Copepoda), *Meinertia oestroides* (Isopoda) (Tokşen, 1999), *Caligus* sp. (Cengizler, 2000).

Lernanthropus is the most common genus of parasitic copepods. More than 100 species have been described so far and it appears certain that the list is not complete. All species are parasitic on the gills of marine teleosts, most of them inhabiting warmer waters. Some species of *Lernanthropus* are strictly specific, but many are parasitic on several species of fish belonging to one genus, or on several genera of one family (Kabata, 1979).

There are several studies on the infestations of *Lernanthropus* (Yamaguti, 1969; Kabata, 1979; Kine, 1984; Timi and Etchegoin, 1996; Olivier *et al.*, 1997; Luque and Farfan, 1990; Deets and Kabata, 1991) in the different regions of the world. However, SEM studies on the determining of morphological characteristics of copepods are very rare (Olivier and Van Niekerk, 1995; Diabakate and Raibaut, 1996; Olivier *et al.*, 1997).

Lernanthropus is known to cause some pathological effects such as, necroses in epithel tissue and ligament, increase of mucus secretion, narrowing in capillary veins meanwhile *Lernanthropus* attaches to the gill filaments with third legs (Kinn, 1984).

Lernanthropus kroyeri van Beneden, 1851 has been recorded from many localities along the coast of Europe, from the Adriatic Sea to the Southern North Sea. The only host in all these waters appears to be *Dicentrarchus labrax* (Kabata, 1979). Two *Lernanthropus* species have been reported along the coast of Turkey; *Lernanthropus mugilis* on *Liza aurata* and *Lernanthropus kroyeri* on *Dicentrarchus labrax* (Altunel, 1983; Tokşen, 1999).

Material and Methods

20 specimens of sea bass, *Dicentrarchus labrax,* cultured in Bodrum province, were examined for parasitological study. The parasites were measured using micrometer. The data related to parasites have been recorded on the parasite cards. The parasites collected were fixed in 70% alcohol for LM observations. For SEM specimens were removed from the fish, fixed in 3% glutaraldehyde in 0.1 M phosphate buffer (Ph 7.2) at 4°C for 1 h. They were washed in the buffer before post-fixation in 1% osmium tetroxide in the same buffer at 4°C for 1 h. Specimens were then dehydrated through alcohol

series and critical-point dried. They were then sputter-coated with gold (Topçu, 1977). SEM photographs were taken with a Jeol electron microscope. The identifications were made according to Kabata (1979). Kabata (1979) was followed to identify the specimens.

Results and Discussion

SEM study on the morphology makes the diagnosis of *L. kroyeri* easy, even to generic level. The structure of the parasitic copepod in the present paper is shown in detail in Figures 1- 7.
Ordo: Siphonostomatoida
Family: Lernanthropidae
Genus: Lernanthropus Blainville, 1822
Lernanthropus kroyeri van Beneden, 1851
Synonym:
Lernanthropus Kröyeri van Beneden, 1851
Lernanthropus Kroyeri Beneden, 1851; Nordmann (1864)
Lernanthropus kroyeri Wilson (1922)
Habitat: Branchial filaments
Record of specimens: 10 males, 17 females
No. of fish investigated: 20
No. of fish infested: 15, Prevalence: 75%

Female (Figure 1, 2, 7): Cephalothorax with dorsal shield narrower anteriorly, posterior margin slightly concave, posterolateral corners rounded, anterolateral extended ventrally as prominent, rounded lobes. There is a deep constriction between cephalothorax and pregenital trunk (Figure 3, 4).

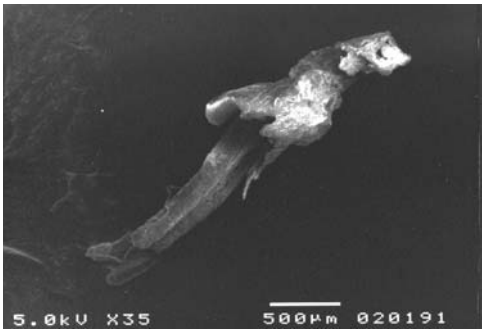

Figure1. Female of *Lernanthropus kroyeri* (original SEM).

Figure 2. Female of *Lernanthropus kroyeri* (original light microscope).

Dorsal plate of fourth leg-bearing segment 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. Mandible with nine teeth. Armature spines of legs with serrations along margins. Third legs protruding posteroventrally , parallel to each other. Fourth leg similar to that *L. gisleri*, but less slender. Fifth leg stumpy, short lobe surmounted by short seta. Uropod is fusiform and unarmed (Figure 5, 6, 7).

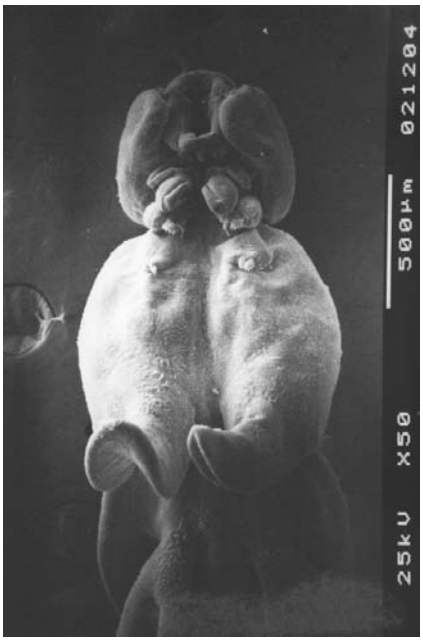

Figure 3. Cephalothorax of *Lernanthropus kroyeri.*

Figure 4. Parasitic attachments of *Lernanthropus kroyeri.*

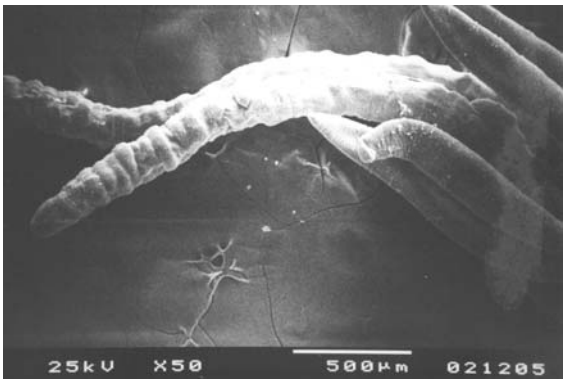

Figure 5. Posterior view of *Lernanthropus kroyeri.*

Figure 6. Legs 3, 4 of *Lernanthropus kroyeri.*

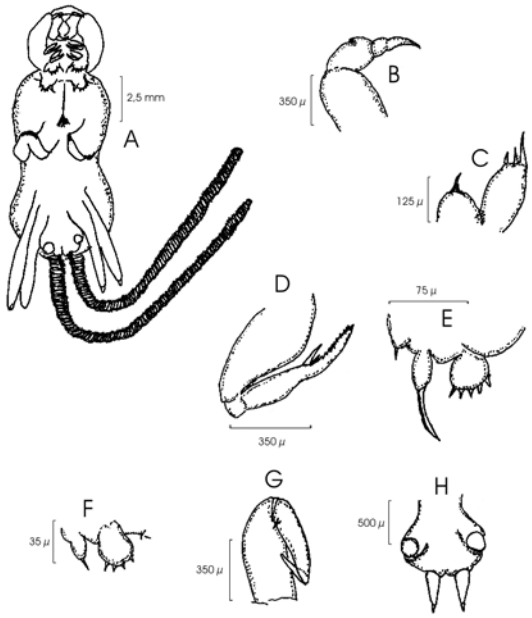

Figure 7. *Lernanthropus kroyeri* A. Adult female; B. Second antenna; C. First maxilla; D. Second maxilla; E. First leg; F. Second leg; G. Maxilliped; H. Urosome.

Total length is up to 21 mm according to Scott and Scott (1913), 4-5 mm to van Beneden (1851a), 5.2-7.0 mm to Kabata (1979). Our specimens were 7.5-15 mm with fourth legs.

The sea bass are being infected by parasites due to environmental factors such as pollution and over storage. It causes stress on the fish making its body weaker, due to uncontrolled transfer of larva, obtaining the larva and breeding from natural sources. For these reasons, the intensive fish culture gave a great importance to study of the parasites and diseases that it causes. It is necessary, therefore to find out the parasite faunas in the aquatic environment. This will give us to apply the preventive practices on the fish in the fish farms.

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