

Araştırma Makalesi

GILL LESIONS CAUSED BY INFECTION OF *LERNANTHROPUS* SPP.  
BLAINVILLE, 1822 ON CULTURED SEA BASS, *DICENTRARCHUS LABRAX*  
(L.)

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Kültür Levrek *Dicentrarchus labrax* (L.) Balıklarında *Lernanthropus* spp.  
Blainville, 1822 Enfeksiyonunda Solungaç Lezyonları

**Özet:** Bu çalışma, *Lernanthropus* spp. Blainville, 1822 ile enfekte deniz levrek, *Dicentrarchus labrax*, balıklarının solungaçlarındaki histopatolojik değişiklikleri tespit etmek amacı ile yürütüldü. 15 adet balık örneği 2003 yılının Mayıs ayında Ege denizinde Bodrum civarında kıyıya yakın ticari bir levrek balığı işletmesinden temin edildi. *Lernanthropus* spp. ile enfekte levrek balıklarının solungaçlarında solgunluk, mukus üretiminde artış ve hemorajiler vardı. Solungaçlarda parazitin dağılımı tespit edildikten sonra parazitler bütün parazitli balıklardan uzaklaştırıldı ve parazitlerin sayısı kaydedildi. Histopatolojik çalışma için, solungaç dokuları *Lernanthropus* spp. ile enfekte levrek balıklarından alındı ve % 10'luk tamponlanmış formalin solüsyonunda fikse edildi. Fiksasyon sonrası dokular 5 µm'lik kesitleri elde edebilmek için rutin olarak işlendi. Sonra bu kesitler hematoxilen ve eosin ile boyandı. İncelenen balıkların solungaçlarında 80 adet parazit tespit edildi. Parazitlerin dağılımlarının solungaçların anterior ve posterior hemibranch kısımları ile orta zonda idi. Enfeksiyonun yoğunluğu balık başına 1'den 20 parazite kadar değişti. Histopatolojik yönden parazitin bulunduğu solungaç kısımlarına yakın bölgedeki sekonder lamellalarda erozyon, yıkım ve koagülasyon nekrozu gözlemlendi. Ayrıca, sekonder lamellaların distal uç kısımlarında vakuoler dejenerasyon da mevcuttu.

**Anahtar Kelimeler:** Deniz levreği, *Dicentrarchus labrax*, Crustacean parazit, *Lernanthropus* spp., Histopatolojik değişiklikler.

**Summary:** This study was carried out to investigate the histopathological changes of sea bass, *Dicentrarchus labrax* (L.) gills infected with *Lernanthropus* spp. Blainville, 1822. Fifteen samples of sea bass (85 and 140 g.) from a commercial sea bass fish farm at the Aegean coast in Bodrum peninsula were collected in May 2003. Fish infected with *Lernanthropus* spp. had frayed and pale gills, increased mucus production and also haemorrhages on the gills. After the distribution of parasites on gills were determined,

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parasites were removed from all parasites fish and then the number of parasites were recorded. For histopathological study, gill tissues were taken from sea bass fish infected by *Lernanthropus* spp. and fixed in 10 % buffered formalin solution. After fixation, the tissues were routinely processed to give sections of 5 µm. Then, these were stained with haematoxylin and eosin. The gills of 15 sampled fish contained 80 parasites. Distribution of parasites was anterior and posterior hemibranch and middle zone of the gill. The intensity of infection ranged from 1 to 20 parasites per fish. The gills of 15 sampled fish contained 80 parasites. Distribution of parasites was anterior and posterior hemibranch and middle zone of the gill. Histopathologically near the site of parasite attachment on the gills erosion, desquamation and coagulative necrosis of the secondary lamellae were observed. Vacuoler degeneration in the distal ends of the secondary lamellae also occurred.

**Key Words:** Sea bass, *Dicentrarchus labrax*, Crustacean parasite, *Lernanthropus* spp., Histopathological changes.

### Introduction

The European sea bass, *Dicentrarchus labrax* (L.) is one of the most valuable commercial fish in Turkey; intensive farming for this species was developed in the early 1980s and then the sea bass industry was grown rapidly (10,24). The production of *D. labrax* in Turkey raised 14353 tonnes in 2002 (8). Despite of its importance, there is little information on the pathology associated with its ectoparasites. Most of the important crustacean species infecting sea bass, *D. labrax* included *Ergasilus* spp., *Caligus minimus*, *Colobomatus labrachis* and *Lernanthropus kroyeri* belong to the subclass copepoda (5). Genus *Lernanthropus* Blainville, 1822 is among the most common genera of parasitic copepods. The members of this genus are parasitic on the gills of marine teleosts (12). Data about systematic and morphologic features of *Lernanthropus* spp.: Phylum: Arthropoda, Class: Crustacea, Subclass: Copepoda, Order: Siphonostomatoida, Family: Lernanthropidae Kabata, 1978, Genus: *Lernanthropus* Blainville, 1822 (13,15,25). In members of Lernanthropidae, the body is composed of cephalothorax, thorax and abdomen (13). *Lernanthropus* species are characterized by third and fourth legs with elongate fleshy rami and egg string extending straight backward. In female parasite, the head is fused with first thorax segment, resulting cephalothorax oblong or pyriform. The abdomen has one or two segments. The elongated egg string has uniseriate and strongly flattened eggs. In males, the head is fused with first segment. The abdomen is one segment. The caudal rami are claviform. The rami of third and fourth legs are fused or separated. However, these always extend backward. The fifth legs of the male parasite are absent (22,25).

*Lernanthropus* species have a parasitic living on marine teleosts (22,25) and have been reported to affect sea bass, *D. labrax* and *Lates calcarifer*, (1,2,18), yellowtail kingfish, *Seriola lalandi lalandi*, (19) and common sea bream *Pagrus pagrus*, (14).

Although the effects of the copepod genus *Ergasilus* on the host gills have already been studied, there is little work on the effects of the genus *Lernanthropus* on host gill tissue (5,15).

Therefore, the aim of this study was to investigate the histopathological changes of sea bass, *D. labrax* gills infected with *Lernanthropus* spp. Blainville, 1822.

### Material And Methods

Fifteen samples of sea bass (85 and 140 g) from a commercial sea bass fish farm at the Aegean coast in Bodrum peninsula were collected in May 2003. The fish were euthanised with benzocaine (100 mg/l.) (9), weighted, and necropsied (17). Samples of muscle, gill, kidney, liver, spleen, air bladder from the fish were removed and then examined for protozoa and monogeneans under the light microscope at the fish disease laboratory in the farm (17,23). To investigate the parasite distribution on the gills, the gill arches divided three zones as internal, middle and external (6).

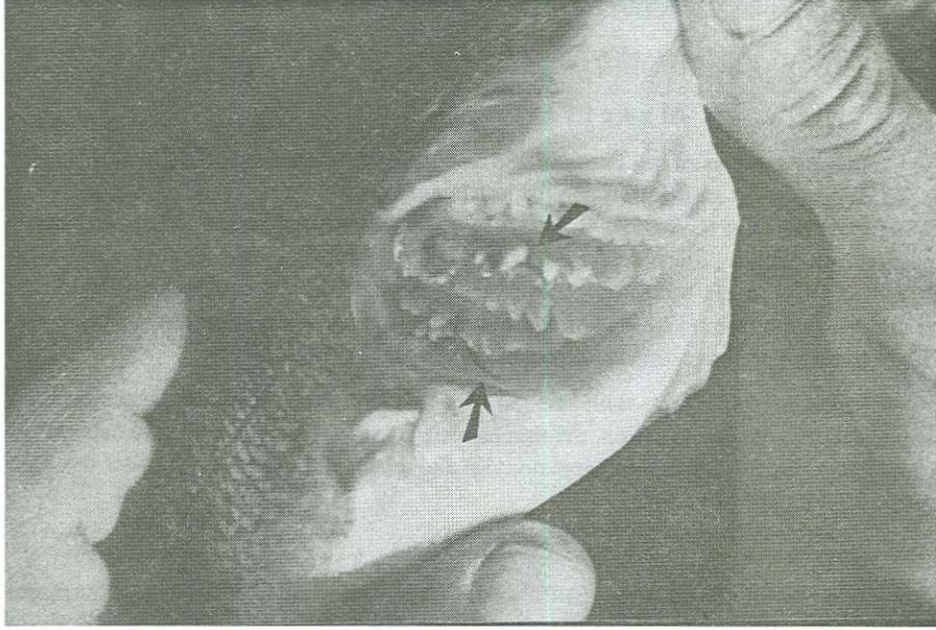
Pieces of gill tissue with the parasite attached were fixed in 10 % buffered formalin solution. After fixation, the tissues were routinely processed to give sections of 5  $\mu$ m. These were stained with haematoxylin and eosin, and then viewed under the light microscope (3,21).

### Results

Samples of sea bass (n=15) (80 and 140 g.) were collected from a commercial sea bass fish farm established as floating marine cage, at the Aegean coast in Bodrum peninsula in May 2003. During the study, the sea water temperature was 22 °C and the salinity was 32,4 ‰. The daily fish losses were 2 % in the farm. It was observed in sea bass fish infected with *Lernanthropus* spp. that anorexia, respiratory distress, rapid gill movements and swimming to the near water surface.

Furthermore, the affected fish had frayed and pale gills, increased mucus production and also haemorrhages on the gills caused by the feeding activity of the parasite (Figure 1). Ecto or / and endoparasites were not observed in the examined other tissues.

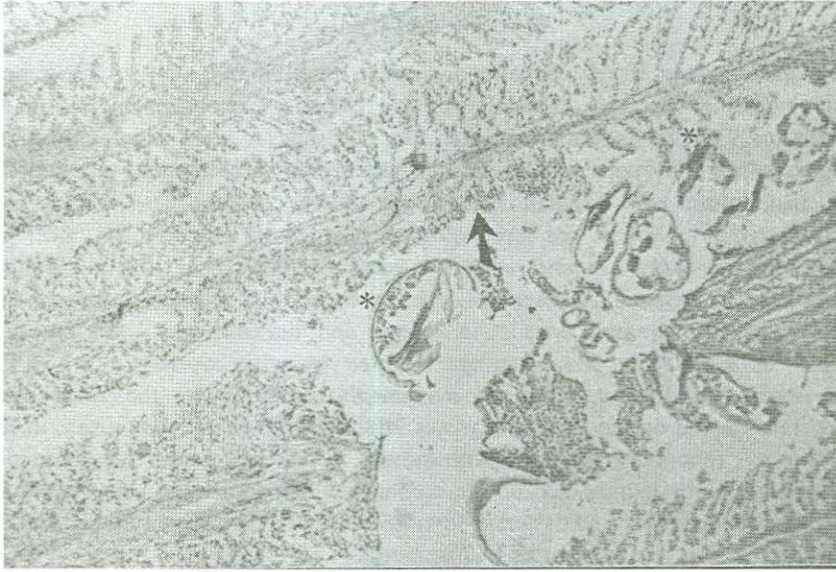
The gills of 15 sampled fish contained 80 parasites. Distribution of parasites was anterior and posterior hemibranch and middle zone of the gill. In this study, the body of the examined parasite species consisted of cephalothorax, thorax and abdomen. Female parasite had an oblong cephalothorax and an egg-string. The egg-string comprised of uniseriate and flattened eggs. In male parasite, the rami of third and fourth legs were separated. The total length of the parasite (male) was measured as 3.4 mm. (average). The length of the parasite (female) was measured as 5.5 mm (average). It was observed that the female parasite had an egg-string at the caudal part of the its body. The length and width of the egg-string were also measured 3.5 mm. and 0.26 mm. (average). The intensity of infection ranged from 1 to 20 parasites per fish



**Figure 1.** Sea bass, *D. labrax* gill infected by *Lernanthropus* spp. (arrowed).

**Şekil 1.** *Lernanthropus* spp. ile enfekte deniz levreği, *D. labrax* (okla gösterilmiştir) solungacı.

Histologically, near the site of the parasite attachment erosion, desquamation and coagulative necrosis of the secondary lamellae were observed (Figure 2). Vacuolar degeneration in the distal ends of the secondary lamellae also occurred (Figure 3)



**Figure 2.** Erosion (arrowed), desquamation and coagulative necrosis in the secondary lamellae near the site of parasite attachment (black asterisks) H+E X 63.

**Şekil 2.** Parazitin (siyah asteriskler) tutunduğu bölgenin yakınındaki sekonder lamellalarda koagulasyon nekrozu, dökülme ve erozyon (okla gösterilmiştir) H+E X 63.



**Figure 3.** Vacuolar degeneration (arrowed) in the distal ends of the secondary lamellae H+E X 400.

**Şekil 3.** Sekonder lamellaların uç kısımlarında vakuoler dejenerasyon (okla gösterilmiştir) H+E X 400.

### Discussion

Crustaceans are largely aquatic and more than 36,000 species have been described including copepods, branchiurans and isopods. Copepods, a class in the crustaceans, are found in fresh and sea water. Marine fishes are parasitized by a variety of copepods so parasitic copepods are increasingly serious problems in cultured fish and can also impact wild populations (4,16,20). Most copepods are gill or skin parasites. *Lernanthropus* spp. are morphologically suited to attach to the host gill (5,11,15,18). In this study, *Lernanthropus* spp. were observed on the gills of examined fifteen sea bass, *D. labrax*. *Lernanthropus* spp. on the gills of the host causes frayed and pale gills, an increased production mucus and haemorrhages on the gills (5,7,11,13). In addition to these findings reported by other workers (5,7,11,13), anorexia, respiratory distress, rapid gill movements, swimming to the near water surface were observed on the gills of sea bass infected by *Lernanthropus* spp. in this study. Davey (7) reported that this parasite showed a clear preference for the medial sector of the posterior hemibranch of the second gill (7). However, distribution of parasites was found anterior and posterior hemibranch and middle zone of the gill of the infected sea bass. This results reported by other authors (5,7,12,15).

Manera and Dezfuli (15) reported that the intensity of infection of the sea bass infected by *Lernanthropus kroyeri* ranged from 1 to 24 parasites per host. But, the intensity of the infection on the parasitized sea bass in this study was found from 1 to 20 parasites per fish. This data was lower than the other researchers' findings (15). According to Kabata (11) and Manera and Dezfuli (15), crustaceans have some local effects on the gills of fish such as erosion, destruction due to the attachment and feeding of parasite. In this study, histopathologically these effects were detected; however, coagulative necrose and vacuoler degeneration in the distal ends of the secondary lamellae also observed.

The effects of some crustacean parasites such as *Ergasilus* spp., *Nerocilia orbiguyi* on the host gill were already studied (5,15). Although *Lernanthropus* species reported in sea bass, *D. labrax* (1,2,5,22), there is little information effects, especially histopathological, of this parasite on host gill (5,15). As a result, the histopathological effects of *Lernanthropus* spp. on sea bass, *D. labrax* gill were first investigated with this study in Turkey.

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