

# *Ichthyobodo* spp. Infection in Meagre (*Argyrosomus regius*) from Turkey: Parasitological and Pathological Findings

Granyöz Balığına (*Argyrosomus regius*) *Ichthyobodo* spp. Enfeksiyonunun Türkiye'den Bildirimi: Parazitolojik ve Patolojik Bulgular

Banu Yardımcı<sup>1</sup>, Gökmen Zafer Pekmezci<sup>1</sup>, Behire Işıl Didinen<sup>2</sup>, Seçil Metin<sup>2</sup>

<sup>1</sup>Ondokuz Mayıs Üniversitesi, Veteriner Fakültesi, Su Ürünleri Hastalıkları Anabilim Dalı, Samsun, Türkiye

<sup>2</sup>Süleyman Demirel Üniversitesi, Eğirdir Su Ürünleri Fakültesi, Isparta, Türkiye

## ABSTRACT

**Objective:** The aim of this study is to describe the first report of *Ichthyobodo* spp. infection in meagre (*Argyrosomus regius*) fry in a marine aquaculture facility in Turkey.

**Methods:** The material of the study was composed of 30 meagre *A. regius* in 2-3 g weight taken from the fry adaptation unit of a fish farm in the Aegean Sea. In this study, parasitological and pathological examinations were performed on the meagre. *Ichthyobodo* spp. was determined on the body surfaces and gills.

**Results:** Pathological examination revealed grayish mucous and erosions between the pin head and lentin over the skin of the examined specimens. Microscopic examinations revealed significant spongiosis, vacuolar degeneration, and hyperplasia in epidermal malpighian cells and hyperplasia in goblet cells.

**Conclusion:** In the present study, *Ichthyobodo* spp. infection was for the first time determined in an alternative cultured meagre in Turkey. (*Türkiye Parazitol Derg* 2016; 40: 48-50).

**Keywords:** *Ichthyobodo* spp., *Argyrosomus regius*, histopathology, Turkey

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## ÖZ

**Amaç:** Çalışmanın amacı Türkiye'de denizde yetiştiriciliği yapılan Granyöz balığı yavrularında *Ichthyobodo* spp. enfeksiyonunun ilk defa tanımlanmasıdır.

**Yöntemler:** Çalışmanın materyalini Ege denizindeki balık çiftliğinin yavru adaptasyon ünitesinden alınan 2-3 gr ağırlığındaki 30 balık oluşturdu. Patolojik ve parazitolojik inceleme yapıldı. Vücut yüzeyi ve solungaçlarda *Ichthyobodo* spp. tespit edilmiştir.

**Bulgular:** Patolojik incelemede, balıkların dış yüzeylerinin grimsi renkte bir mukus tabakası ile kaplı olduğu ve deri üzerinde toplu iğne başından mercimek büyüklüğüne değişen boyutlarda erozyonlar gözlemlendi. Mikroskopik incelemede, epidermiste malpighian hücrelerinde belirgin spongiosis, vakuoler dejenerasyon ve hiperplaziye ile birlikte goblet hücrelerinde de hiperplaziye rastlandı.

**Sonuç:** Sonuç olarak, yetiştiricilikte alternatif bir tür olan granyöz balıklarında Türkiye'de ilk defa *Ichthyobodo* spp. enfeksiyonu tanımlandı. (*Türkiye Parazitol Derg* 2016; 40: 48-50).

**Anahtar Kelimeler:** *Argyrosomus regius*, histopatoloji, *Ichthyobodo* spp., Türkiye

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## INTRODUCTION

Meagre *Argyrosomus regius* (Asso, 1801) is a teleost fish species that belongs to the Sciaenidae family. Meagre could be a suitable candidate species for the diversification of aquaculture in the Mediterranean region, and has been ranked in eighth position out of 27 species. The farming of

meagre started in Europe in the second half of the 1990s in Italy and France, followed by Spain (2004), Turkey (2005), and Greece (2007), and has now also started in Egypt. Total aquaculture production of meagre has increased from a few tonnes in 2000 to approximately 4000 tonnes in 2008 and 10 000 tonnes in 2010 (1). Meagre has grown rapidly, with production output in 2011 exceeding over 14 000 tonnes (2).

**Address for Correspondence / Yazışma Adresi:** Dr. Banu Yardımcı E.mail: byardimci@omu.edu.tr

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The ectoparasitic flagellate *Ichthyobodo* spp. is known to induce ichthyobodosis in both wild and farmed fish populations. Ichthyobodosis causes heavy infections on the skin and gills and can cause mortality, representing a common problem in fish farms. Formerly known as *Costia necatrix*, it is an important cosmopolitan distribution issue. *Ichthyobodo* spp. (mostly recorded as *I. necator*) has been identified and reported with different freshwater and marine fish worldwide (3). Their life cycle includes one free-swimming dispersive phase, alternating with an attached, feeding stage. The flagellate has been frequently associated with outbreaks in cultured and aquarium fish (4). Until recently, the genus *Ichthyobodo* contained a single variable species, *I. necator*, identified from different hosts. However, small subunit ribosomal RNA gene sequences of parasites from different fish and environments have shown that *I. necator* actually represents several different species (5). An infected fish body surface may appear gray in color, with spots, discoloration, and mucus secretion. The action of the *Ichthyobodo* results in the destruction of epidermal cells, producing widespread pathological changes. Skin histopathological lesions include spongiosis, vacuolation, and edema, followed by degeneration and sloughing of epidermis (6).

The aim of this study was to describe the first report of *Ichthyobodo* spp. infection in meagre (*A. regius*) fry in a marine aquaculture facility in Turkey.

## METHODS

A total of 30 meagre fish in an adaptation unit from a fish farm were randomly collected and transported to the laboratory for parasitological examination in August 2013. The investigation was performed with smear or squash preparations under a light microscope (magnification 100-1000 $\times$ ). Skin was scraped onto the slides, dried at room temperature, and stained with 5% Giemsa solutions. The flagellates were studied by light microscopy and identified as *Ichthyobodo* spp. by their morphological characteristics, which have been described by Lom and Dykova, 1992. Following the parasitological examination, the gills and skin were fixed in 10% neutral formaldehyde solution for pathological examination. Tissue samples were routinely processed and embedded in paraffin. Tissue sections 4–6  $\mu$  in width were stained with hematoxylin–eosin (HE) and examined under a light microscope.

## RESULTS

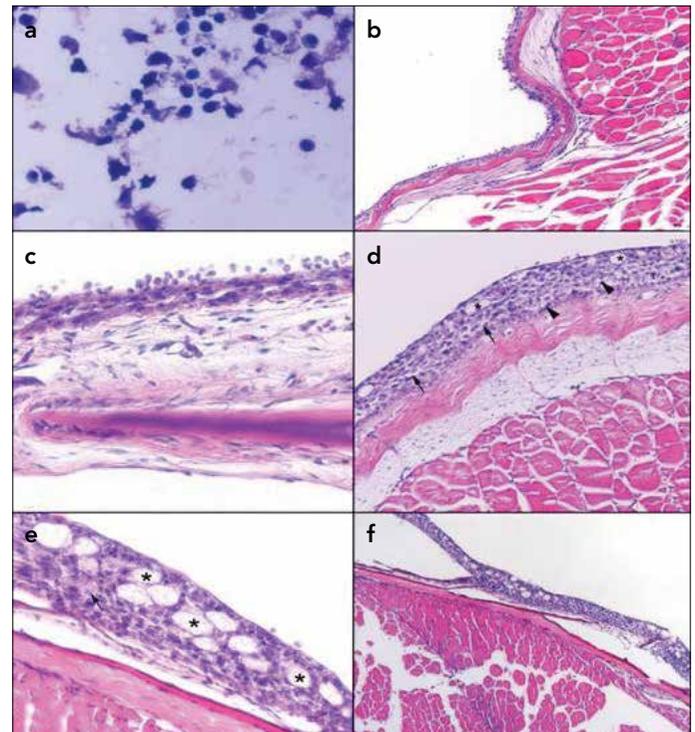
All the fish samples were infected with *Ichthyobodo* spp. Specimens of free-swimming forms of *Ichthyobodo* spp. were identified by their oval body, which contained two free unequal flagellae ventrally and a centrally located nucleus (Figure 1a). Macroscopic examination revealed grayish mucous and erosions between the pin head and lentin over the skin. In the microscopic examination, pyriform-shaped parasites were seen to be attached to the epithelial cells of the skin with hypertrophied proboscis. In the epidermis, mild hyperplasia of the malpighian cells and depletion of the goblet cells were observed where *Ichthyobodo* spp. was dense (Figure 1b, c) and significant spongiosis, vacuolar degeneration, and hyperplasia of malpighian cells were seen where *Ichthyobodo* spp. were less dense or

absent. There was also significant hyperplasia of the goblet cells (Figure 1d, e). In addition, epidermal cells were seen to have lost their interdigitating cell membranes, and the outer surface layers of the epidermis occasionally seemed to slough off (Figure 1f). Although the gill filaments were lightly infected, there was no apparent pathological change seen.

## DISCUSSION

Although there have been reports on the occurrence of *Ichthyobodo* spp. in fish hosts from Turkey (7-10), in the present study, *Ichthyobodo* spp. is reported for the first time in meagre, *A. regius*, in Turkey.

The skin of infected meagres showed extensive epidermal hyperplasia, vacuolation, and spongiosis within this study. Symptoms resembled those seen in farmed salmonids infected with *I. necator* (11-13) and in Japanese flounder with *Ichthyobodo* spp. (14, 15). In previous studies, epidermal hyperplasia, vacuolation, and spongiosis were seen to occur in densely infected areas, but in contrast with these studies, these findings were seen in less densely infected areas in this study. This condition was attributed to the unattachment of the parasites to the epithelial cells due to the degeneration of the upper level epidermis cells. Previous studies reveal optimal or high mortality rates in densely infected farms, but in the present study, the insignificant mortality rate was thought to be correlated with the early



**Figure 1. a. f.** Wet mounts of the free-swimming stage of *Ichthyobodo* spp. (Giemsa, X1000). b, c. Skin surface of a meagre excessively infected with *Ichthyobodo* spp. of epidermis and absence of goblet cells (HE, X200; X400). d, e. Epidermis of a meagre less densely infected with *Ichthyobodo* spp. showing of the hyperplasia of malpighian cell and goblet cells (asterisk), severe vacuolation (arrowheads) and spongiosis (arrows) (HE, X200; X400). f. Sloughing of the epidermis of an infected meagre (HE, X100).

diagnosis and treatment protocol. The cytoplasmic degeneration occurring around the parasite's cytostome suggested that the parasite may feed on the cytoplasm by releasing digestive enzymes or toxic substances from the cytostome tube, as suggested in *I. necator* (12). The main cause of fish deaths may be attributable to breakdown of the osmoregulatory system due to severe epidermal destruction, followed by the starvation of fish due to decreased appetite.

Although *Ichthyobodo* spp. was reported in both the gills and skin of fish (6), the parasites in the present investigation showed a distribution in the meagre juveniles, where they were abundant on the skin surface and fins, but rare on the gills. In the present study, *Ichthyobodo* spp. on meagres was found to occur in large numbers over the whole body surface, indicating the possibility of direct skin infections.

## CONCLUSION

With this study, *Ichthyobodo* spp. infection in meagre, a very popular alternative species in the last few years, was determined parasitologically and pathologically. This study demonstrates that the marine *Ichthyobodo* spp. is an important parasitic pathogen of meagre, and is responsible for growth retardation and mortalities in fish culture facilities. It can cause large economic losses in marine aquaculture. An effective method for controlling *Ichthyobodo* infections is formalin treatment, but further investigations should be directed to prevent outbreaks of ichthyobodiasis.

**Etik Komite Onayı:** Bu çalışma için etik komite onayına gerek yoktur.

**Hasta Onamı:** Bu çalışma için hasta onamına gerek yoktur.

**Hakem Değerlendirmesi:** Dış Bağımsız.

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**Conflict of Interest:** The authors have no conflict of interest.

**Financial Disclosure:** The study has not been founded.

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