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**SHORT COMMUNICATION** **KISA ARAŞTIRMA**

# First report of *Eimeria sardinae* (Apicomplexa: Coccidia) from the Turkish coast of the Black Sea

## *Eimeria sardinae* (Apicomplexa: Coccidia) türü parazitin Karadeniz'in Türkiye kıyısından ilk bildirimi

**Ahmet Özer[1]* • Türkay Öztürk[1] • Violetta Yurakhno[2] • Yulia M. Kornyychuk[2]**

[1]*Sinop University, Faculty of Fisheries and Aquatic Sciences, 57000 Sinop, Turkey*
[2]*Institute of Biology of the Southern Seas, 2 Nakhimov Av., Sevastopol 299011, Russia*
**Corresponding author: aozer@sinop.edu.tr*

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**Özet:** Karadeniz'in Sinop kıyılarından Mayıs 2011 – Mayıs 2013 tarihleri arasında yakalanan mezgit balığının, *Merlangius merlangus* L., 1758, parazitleri araştırıldı ve incelenen 530 adet balıktan Mart 2012 tarihinde yakalanan 1 adedinin barsak içeriğinde çok sayıda *Eimeria sardinae* (Thélohan, 1890) Reichenow, 1921 ookistinin varlığı belirlendi. Bu parazit türü ne Karadeniz'in Türkiye kıyılarında ne de mezgit balığında daha önce bildirilmedi. Dolayısıyla bu tür Türkiye parazit faunası için yeni bir kayıttır, fakat mezgit balığı bu tür için gerçek bir konak olmayabilir. Mezgit balığının bağırsak içeriğinde bulunan *E. sardinae* ookistleri bu parazitin konağı olduğu bilinen ve mezgit balığının doğal besinini oluşturan *Sprattus sprattus* ya da *Engraulis encrasicolus* gibi avlar ile alınmış olabilir.

***Anahtar kelimeler*:** *Eimeria sardinae*, *Merlangius merlangus*, *Sprattus sprattus, Engraulis encrasicolus*, Karadeniz

**Abstract:** Whiting *Merlangius merlangus* L., 1758 collected from the Black Sea coasts of Sinop, Turkey, during May 2011 – May 2013 period were examined for parasites and one of 530 examined fish specimens caught in March 2012 had numerous oocysts of *Eimeria sardinae* (Thélohan, 1890) Reichenow, 1921 in its intestinal content. The parasite has not been reported previously from the Turkish Black Sea coasts as well as from this fish. Hence this is a new record for the Turkish parasite fauna. Nevertheless, whiting might not be a true host of this parasite. *E. sardinae* oocysts found in the intestine content of whiting might have come from natural preys such as *Sprattus sprattus* or *Engraulis encrasicolus* that are known host of this parasite.

***Keywords*:** *Eimeria sardinae, Merlangius merlangus, Sprattus sprattus, Engraulis encrasicolus, Black Sea*

## INTRODUCTION

*Eimeria sardinae* (Thélohan, 1890) Reichenow, 1921 (syn.: *Coccidium sardinae* Thélohan, 1890, *Eimeria oxyphila* Dobell, 1919, *E. oxyspora* Dobell, 1919, *E. patagonensis* Timi and Sardella, 1998, *E. snijdersi* Dobell, 1920 and Eimeria sp. of Morrison and Marryatt, 1990) is a cosmopolitan coccidian has been reported from Clupeiformes, including twaite shad *Alosa fallax*, Pacific herring *Clupea harengus*, European anchovy *Engraulis engrasicolus*, European pilchard *Sardina pilchardus*, Spanish sardine *Sardinella aurita* and Madeiran sardine *S. maderensis*, South African sardine *Sardinops sagax* and European sprat *Sprattus sprattus* living in Atlantic and Pacific Oceans, Mediterranean Sea, Black Sea, Adriatic Sea, North Sea, Barent Sea, White Sea and it has been found only in male gonads (Pellerdy, 1965; Daoudi et al., 1989; Morrisson, 1991; Diouf, 1993; Diouf and Toguebaye, 1994; Tolonen and Karsbakk, 2003; Yurakhno and Gaevskaya, 2004; Reed et al., 2011). However, Dragoui et al., (1995) reported several developmental stages of this parasite in both male and female gonads of *Sardinella aurita* and *Sardina pilchardus* near Tunisian shores. In the present study, a survey was conducted to determine the parasites of whiting from the Sinop coast of the Black Sea.

## MATERIALS AND METHODS

During parasitological survey of 530 whiting, *Merlangius merlangus L.,* 1758, specimens were collected by commercial fishermen from the Black Sea around Sinop Province in Turkey between May 2011 and May 2013. Common parasitological methods were used to examine all internal organs, including intestine. For this purpose, smears were prepared from all tissues and examined under a light microscope (Olympus BX51) by using phase-contrast. Whenever necessary, photographs were taken by DP-25 digital camera using data-processing software DP2-BSW

## RESULTS

Out of 530 fish specimens examined, numerous coccidian oocysts (Figure 1A) were observed only in the intestinal smears of one female whiting (with a total length of 15.0 cm and weight of 19.6 gr) caught in March 2012. Oocysts were spherical and varied in size, from 41.4 µm to 42.9 µm (Figure 1B); the sporocysts were fusiform, sharply pointed and measured 26,9 to 29.5 µm by 3.5 – 4.0 µm (Figure 1C). Observed coccidians were identified as *Eimeria sardinae* according to methodology provided by Lom and Dykova (1992).

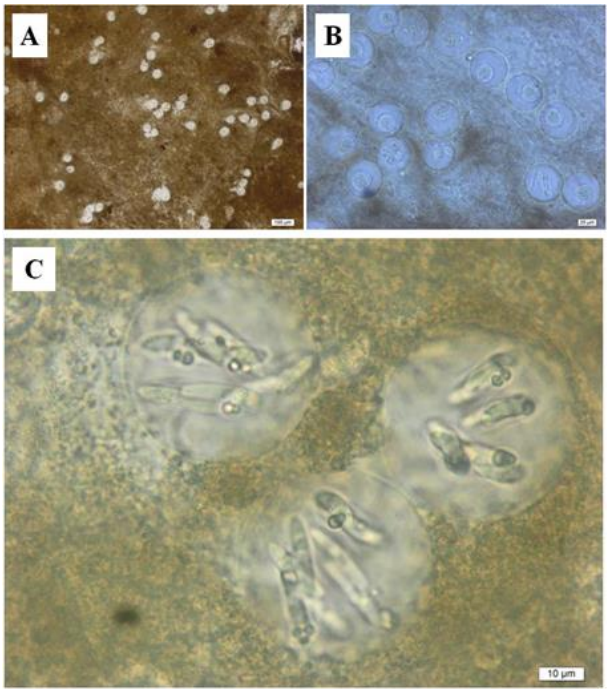


**Figure 1.** *Eimeria sardinae* oocysts and sporozoites. A. Numerous oocyts in intestinal smear of whiting, B. Developing sporozoites in oocysts, C. Mature sporozoites in oocytes.

## DISCUSSION

A fish survey near Crimean Black Sea coast had shown that *E. sardinae* used *Sprattus sprattus* and *Engraulis encrasicolus* as hosts and it infests only the gonads of male fish (Dogel, 1940; Pogoreltseva, 1964; Gaevskaya et al., 1975; Yurakhno and Gaevskaya, 2004). The most intensive sporulation of *E. sardinae* occurs during postspawning period of sprat (from May to September) when fish testes exempt from most of the sperm. This suggests a balanced host-parasite relationship in the system of "sprat – *Eimeria sardinae*". As *E. sardinae* prevalence in sprat population near Crimean Black Sea coasts ranged from 23 to 80 % and significantly varied in investigated sprat stocks, this parasite believed to be suitable biomarker for identification of local sprat stocks (Yurakhno and Gaevskaya, 2004; Kornyychuk et al., 2007).

Morrison and Hawkins (1984) reported *E. sardinae* infesting host fish up to 90-100% and in heavy infestations as much as 19% of testis was found to be replaced by the parasite agglomerations. In those fish, spermatic cords were found to be distorted but still distinguishable and replacement of testicular tissue by *E. sardinae* reduced sperm production, thus detrimentally affected *Clupea harengus* stocks. It may also cause testes atrophy and reduce male fecundity where developed intensively in *Sardinella maderensis* (Diouf and Toguebaye, 1994). So, this parasite species has a potential for pathology and detrimental effects on fish host stocks. It could also be noted that *E. sardinae* infections in sprat and anchovy might be a factor influencing negatively the fecundity of *S. sprattus* or *E. encrasicolus* males, thus a research study to evaluate this assumption should be warranted – as well as using this parasite as a biomarker for the identification of local sprat and anchovy stocks around the Turkish coasts.

Our data and observations have led us to conclude that *Eimeria sardinae* oocytes present in the intestine of whiting due to ingestion of European sprat or European anchovy as food fish; so, *M. merlangus* is not a true host for the oocysts. Nevertheless, *E. sardinae* is a new parasite record for Turkish fauna.

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