

**An Epizootiological study on *Mothocya epimerica*  
Costa, 1851 (Flabellifera: Cymothoidae)  
infestations in Sand Smelt, *Atherina boyeri* Risso,  
1810 (Perciformes: Atherinidae) found in the  
Sinop Coasts of the Black Sea**

**Karadeniz'in Sinop Kıyılarında bulunan  
Gümüşbalığı, *Atherina boyeri* Risso, 1810  
(Perciformes: Atherinidae)'deki *Mothocya*  
*epimerica* Costa, 1851 (Flabellifera: Cymothoidae)  
enfestasyonları üzerine epizootiyolojik bir  
araştırma**

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**Abstract**

In this study, a parasitic isopod, *Mothocya epimerica* (Flabellifera: Cymothoidae) is reported on the Sand Smelt, *Atherina boyeri*, from a small stream in the Sinop coast of the Black Sea. A total of 320 fish were investigated throughout the study period. All specimens of *M. epimerica* were found in the branchial cavities of *Atherina boyeri*. Infestation prevalence determined was 5% in overall samples, while it was 21.3% in April, the only month in which infestation recorded. Male fish were found to have higher infestation level than female fish. A slight increase in the infestation prevalence was also recorded as the size of fish increased.

**Key Words:** *Mothocya epimerica*, *Atherina boyeri*, Turkey

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## Introduction

Isopods are parasites of marine and freshwater fish. Members of the family Cymothoidae are obligatory parasites on fish. They are found attached to the skin or in the buccal cavities. Even, some species are found to “replace” the tongue of their host fish (Westman *et al.*, 1983). Isopods are known to cause some pathological effects such as, local lesions, with or without retarded growth and a reduction of the condition factor (Sadzikowsky and Wallace, 1974; Lanzing and O’connor, 1975; Colorni *et al.*, 1997). Studies on the infestations of isopods are very rare (Trilles, 1969, 1972a, 1972b, 1977, Monod, 1971, Radujkovic, 1982a, 1982b) and many aspects of their biology are still little known (Lanzing and O’Connor 1975; Grabda, 1991; Lester and Roubal, 1995). The members of the family Cymothoidae have been recorded in Mediterranean, Adriatic and Black Sea and Atlantic Ocean and mainly found to infect sand smelt (Trilles *et al.*, 1989, Trilles, 1991). *Mothocya epimerica*, a member of the family Cymothoidae, was recorded in the Romanian coasts of the Black Sea by Vasiliu (1932) and Chiriac (1977). Studies on the isopod parasites in Turkey are quite rare and limited to the Sea of Marmara (Demir, 1952, Akmirza, 1998), Aegean Sea (Geldiay and Kocataş, 1972, Kırkım, 1998) and Mediterranean Sea (Trilles, 1977). *M. epimerica* has recently been reported by Öktener and Sezgin (2000) in the Sinop region of the Black Sea in Turkey.

In this study, the distribution of *Mothocya epimerica* is presented on sand smelt, *Atherina boyeri* in terms of infestation prevalence, fish size and sex.

## Materials and Methods

A total of 320 *Atherina boyeri* were collected monthly from a brackish water site in Sinop using a scoop net during the period April – July 2000. Following their capture, all the fish were brought alive into the Parasitology Laboratory at the Fisheries Faculty. Total length, weight and sex of the fish were recorded immediately after their capture to avoid any loss of isopods. The fish were divided into 6 length classes. All isopod specimens were collected from the branchial cavities of the fish by using fine needles and forceps. The specimens were fixed and preserved in 70% alcohol. Their identification was done according to Möller and Sanders (1986), Trilles (1989) and related papers. Water temperature, salinity and pH levels of the fishing site were recorded by a digital reader (Horiba-100) each month.

Fishing site is located at the extreme north of Sinop (Figure 1). It is a small stream that flows water into the Black Sea in most of a-year period depending on the rainfall regime in the region. The study period was restricted to four months only, the reasons being that; 1. Several attempts in February and March yielded no *Atherina boyeri* specimens because of high water level and currency. 2. The connection point between the stream and the Black Sea was blocked in May and there was no water passage into the Sea. 3. Another attempt made in August also yielded no specimens because there was no fish left in the stream.

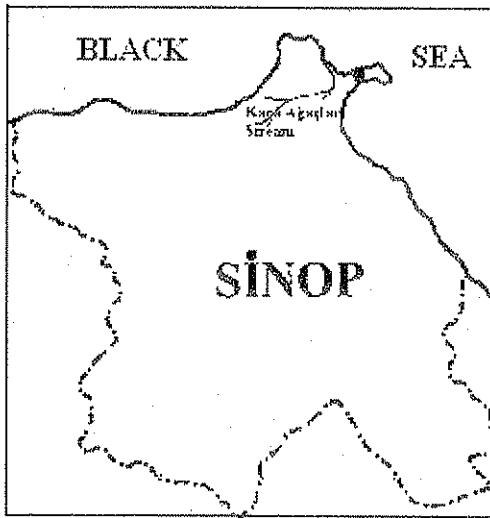


Figure 1. Sampling site for *Atherina boyeri*.

## Results

### 1. Infestation prevalence and Mean Intensity levels of *Mothocya epimerica*

All the specimens of *M. epimerica* were found in the branchial cavities of *Atherina boyeri*. Overall infestation recorded was 5%. In monthly basis, *M. epimerica* was recorded only in April with a prevalence of 21.3% (Table 1). No infestation was recorded in the other months.

Mean *M. epimerica* intensity was very low and recorded as 1.18 (1-2 individuals per infested fish (Table 1).

**Table 1.** Infestation Prevalence (%) and Mean Intensities of *Mothocya epimerica* in the branchial cavities of *Atherina boyeri*.

| Months  | No of Fish |          | Prevalence (%) | Mean Intensity |
|---------|------------|----------|----------------|----------------|
|         | Examined   | Infested |                |                |
| April   | 75         | 16       | 21.3           | 1.18 (1-2)     |
| May     | 71         | 0        | 0              | 0              |
| June    | 26         | 0        | 0              | 0              |
| July    | 148        | 0        | 0              | 0              |
| Overall | 320        | 16       | 5              | 1.18 (1-2)     |

**2. Prevalence and Mean Intensity levels of *M. epimerica* according to fish length classes.**

*Mothocya epimerica* infestation was recorded only in 4 length classes out of six. There was no infestation in the smallest and largest size of fish. A clear decrease in the infestation prevalence was recorded as the size of fish increased in April and overall samples (Table 2). The mean intensity levels also showed a similar pattern (Table 2).

**Table 2.** Infestation Prevalence (%) and Mean Intensities of *Mothocya epimerica* according to length classes of *Atherina boyeri*.

O: Overall A: April

| Length classes (mm) | No of Fish Examined |    | No of Fish Infested |   | Prevalence (%) |      | Mean Intensity |            |
|---------------------|---------------------|----|---------------------|---|----------------|------|----------------|------------|
|                     | O                   | A  | O                   | A | O              | A    | O              | A          |
| 70 - 79             | 15                  | 0  | 0                   | 0 | 0              | 0    | 0              | 0          |
| 80 - 89             | 61                  | 26 | 8                   | 8 | 13.1           | 30.7 | 1.12 (1-2)     | 1.12 (1-2) |
| 90 - 99             | 12                  | 31 | 6                   | 6 | 4.8            | 19.3 | 1.33 (1-2)     | 1.12 (1-2) |
| 100 - 109           | 77                  | 11 | 1                   | 1 | 1.3            | 9.1  | 1              | 1          |
| 110 - 119           | 36                  | 5  | 1                   | 1 | 2.7            | 20   | 1              | 1          |
| 120 >               | 7                   | 2  | 0                   | 0 | 0              | 0    | 0              | 0          |

**3. Prevalence and Mean Intensity levels of *M. epimerica* according to host sex.**

A total of 208 female and 112 male fish were examined for the presence of *Mothocya epimerica*. Infestations recorded on female *Atherina boyeri* were lower than those recorded on male fish (Table 3). Mean Intensity levels were also very low and close to each other in female and male fish (Table 3).

**Table 3.** Infestation Prevalence and Mean Intensity of *Mothocya epimerica* according to the sex of *Atherina boyeri*.

| Samples | No of Fish Examined |     | No of Fish Infested |    | Prevalence (%) |      | Mean Intensity |            |
|---------|---------------------|-----|---------------------|----|----------------|------|----------------|------------|
|         | F                   | M   | F                   | M  | F              | M    | F              | M          |
| April   | 39                  | 36  | 5                   | 11 | 12.8           | 30.5 | 1.25 (1-2)     | 1.18 (1-2) |
| Overall | 208                 | 112 | 5                   | 11 | 2.4            | 9.8  | 1.25 (1-2)     | 1.18 (1-2) |

F: Female M: Male

#### 4. Water temperature (°C), pH and salinity levels in the sampling site

Water temperature, pH and salinity levels in the sampling site changed from 18 °C, 7.9 and 1.3‰ in April to 27 °C, 7.3 and 1‰ in July, respectively.

#### Discussion

In this study, it was shown that the infestation with *Mothocya epimerica* in sand smelt, *Atherina boyeri* is quite low as was reported from other Cymothoid species by other workers, such as 3.6% in *Livoneca* sp. infestations in Red Sea silverside *Atherinomorus lacunosus* (Colorni *et al.* 1997) and 1.5% in *Cymothoa ktiskhani* in *Platycephalus insidiatrix* (Babu *et al.* 1985). The overall incidences of the parasite recorded in the fish species mentioned above were also low in accordance with the results obtained here.

Reports are quite rare on the relationship between the sex of host fish and the prevalence and incidence of Cymothoids. Babu *et al.* (1985) noted that the infestations of *Cymothoa ktiskhani* in *Platycephalus insidiatrix* located only on female individuals of the host (1.2% in overall) in contrast with the results obtained here. Colorni *et al.* (1997) reported an association of female and male isopods being together in the same host and site specificity of female and male *Livoneca* sp. individuals in the oral cavity and gill chamber of the host *Atherinomorus lacunosus*, respectively. However, *Atherina hepsetus*, *Atherina mochon* and *Atherina rissoi* (all Mediterranean species) and *Atherina presbyter* (Atlantic species) have been described as hosts for the genus *Mothocya* Costa 1851, which settle only in the gill chambers of the host fish (Brian, 1912; Trilles, 1968, 1976, 1994). *Mothocya epimerica* was also found in the branchial cavities of *Atherina boyeri* in accordance with the other Atherinids mentioned above.

A decrease in the prevalence and intensity of *Mothocya epimerica* infestation was observed with an increase in the fish size in the present study. Eventhough a size comparison was not done between non-infested

and *Mothocya epimerica*-infested *Atherina boyeri* because of the limited number of infested host, results given by Colorni *et al* (1997) showing that both groups of fish had similar condition factor might suggest that no adverse affect would appear in the development of *Atherina boyeri* studied here.

A comprehensive pathology was not performed in the present study, however, dystrophic and deformed filaments were observed in the first gill arch. Similar findings were also noted by Colorni *et al* (1997) in infestations of gill arches by male *Livoneca* sp.

In the sampling site where this study was conducted, *Gasterosteus aculeatus*, *Aphanius* sp. *Gobius* sp. *Mugil cephalus* and *Liza aurata* were also examined for other parasitological examination purposes, no infestation was recorded in these fish species with the isopod *Mothocya epimerica*. Colorni *et al* (1997) reported that *Livoneca* sp infested only *Atherinomorus lacunosus* while another indigenous species of Red Sea Silverside *Hypoatherina temmincki* had no infestation at all. So it can be suggested that a host specificity is present for *M. epimerica*, at least in the present study.

### Özet

Bu arařtırmada Karadeniz'in Sinop sahilindeki küçük bir dereden elde edilen gümüş balığı *Atherina boyeri* üzerinde parazitik bir izopod olan *Mothocya epimerica* rapor edilmektedir. Arařtırma boyunca toplam olarak 320 adet balık incelenmiştir. Tüm *M. epimerica* bireyleri *Atherina boyeri*'nin solungaç boşluklarında bulunmuştur. Enfestasyon yüzdesi tüm örneklerde %5 iken, Nisan ayında %21.3 olmuştur. Erkek balıklar dişilere nazaran daha yüksek oranda enfeste bulunmuştur. Enfestasyon yüzdesi artan balık boyu ile artmıştır.

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