

VETERINARSKI ARHIV 78 (4), 363-367, 2008

***Ceratothoa oestroides* (Risso, 1826) in bogue (*Boops boops* L.) and picarel (*Spicara smaris* L.) from the Velebit channel in the Northern Adriatic**

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MATAŠIN, Ž., S. VUČINIĆ: *Ceratothoa oestroides* (Risso, 1826) in bogue (*Boops boops* L.) and picarel (*Spicara smaris* L.) from the Velebit channel in the Northern Adriatic. Vet. arhiv 78, 363-367, 2008.

ABSTRACT

Buccal cavities of bogues (*Boops boops* L.) and picarels (*Spicara smaris* L.), caught near the town Novi Vinodolski (Velebit Channel, Croatia), were examined for the presence of crustacean parasite *Ceratothoa oestroides*. Sampling was carried once monthly during the period from June to September 2003. The parasite was found in five of 39 bogues (prevalence = 12.82%) and in 17 of picarels (prevalence - P = 10.43%), or totally in 22 fish (P = 10.89%). P was somewhat higher during the first three months. A statistically minimal correlation was found between the fish length and the length of the parasite.

Key words: bogue (*Boops boops* L.), picarel (*Spicara smaris* L.), *Ceratothoa oestroides*, Northern Adriatic Sea

Introduction

Ceratothoa oestroides (Risso, 1826) is a long known crustacean isopod (family *Cymothoidae*) parasitizing the buccal cavity of marine fishes in coastal areas. According to TRILLES (1994), *C. oestroides* is euryxenic - it can infest several phylogenetically unrelated fish species. For instance, CHARF-CHEIKHROUKA et al. (2000) have identified it in members of six families of freely living fishes: the *Sparidae*, *Carangidae*, *Chupeidae*, *Maenidae*, *Scorpaenidae* and *Mugilidae*. The parasite can cause considerable health problems in cage reared sea bass (*Dicentrarchus labrax*) and in sea bream (*Sparus*

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aurata), although both species are not listed as hosts in natural environments (ŠARUŠIĆ, 1999; CHARFI-CHEIKHROUHA et al., 2000).

The reported geographic distribution of *C. oestroides* includes locations in Algeria (TRILLES, 1994; ZOUHIR et al. 2007), Croatia (ŠARUŠIĆ, 1999), France (TRILLES, 1969), Lebanon (BARICHE and TRILLES, 2005), Montenegro (TRILLES et al., 1989), Morocco (TRILLES, 1969), Tunisia (CHARFI-CHEIKHROUHA et al., 2000), Turkey (ÖKTENER and TRILLES, 2004) and northeast Atlantic, including the northwest coasts of Africa (HORTON, 2000).

In Croatia, *C. oestroides* has been reported from marine fish farms in the central part of the Adriatic region and from fish around the cages (ŠARUŠIĆ, 1999; MLADINEO, 2002, MLADINEO, 2006). According to ŠARUŠIĆ (1999), a common host of this parasite around cages was the bogue (*Boops boops*). We present data about the presence of this parasite in bogue and in picarel (*Spicara smaris*) from a more northern location, the Velebit Channel.

Materials and methods

Bogues and picarels were collected in the Velebit Channel near the town of Novi Vinodolski once monthly from June through November. Fishing by hook and line at the depth of 35 to 40 m was conducted always at the same location. The fish were examined for the presence of parasites in the buccal cavity immediately after being taken from the sea. Isolated parasites were stored in 70% ethanol and brought to the laboratory for identification on the basis of literature data (TRILLES, 1964; TRILLES, 1969). The total length of each parasite and parasitized fish was measured in cm, recorded and analyzed by Statistics for Windows, release 7.1 for detection of correlation.

Results and discussion

A total of 202 fish, 39 bogues and 163 picarels, were collected. The average length of bogues was 15.72 cm and of picarels 14.94 cm. Data on monthly fish catches and the prevalence of *C. oestroides* in the buccal cavities of fishes are presented in Table 1. Both a male and a female parasite were found only in one picarel. All other fish were infected by one parasite of either sex, or by a single developmental stage.

During the sampling period, the monthly prevalence (P) of *C. oestroides* was highest in June in both fish species and showed a regression during the following months (Table 1.) The comparison of collated data for three summer months with data for three autumnal ones showed the P for bogues to fall from 16.7 to 11.1 and for picarels from 14.3 to 8.4. The somewhat higher prevalence in the total number of sampled bogues than in picarels is in agreement with the findings of ŠARUŠIĆ (1999) and CHARFI-CHEIKHROUHA et al. (2000). Oppositely related values were reported for a location in Algeria (P = 7.9%

for bogue, P = 12% for pickarel) by ZOUHIR et al. (2007). The highest prevalence of *C. oestroides* among free living fishes, found in a close relative of picarel (*S. smarís*, P = 26.7) from the Sea of Marmara by ÖKTENER and TRILLES (2004), was far above the values recorded here.

Table 1. Monthly data about the prevalence of *C. oestroides*

Month	Bogue		Pickarel		Both species	
	Number*	P**	Number*	P**	Number*	P**
VI	1/4	25.00	3/18	16.67	4/22	18.18
VII	0/2	0	2/14	14.28	2/16	12.50
VIII	1/6	16.67	3/24	12.50	4/30	13.33
IX	0/1	0	4/37	10.81	4/38	10.53
X	0/4	0	2/31	6.45	2/35	5.71
XI	3/22	13.64	3/39	7.69	6/61	9.84
Total	5/39	12.82	17/163	10.43	22/202	10.89

* Numerator denotes the number of parasitized fish and denominator the number of caught fish;

** P = prevalence.

Table 2. Correlation of body lengths of parasitized fishes and of *C. oestroides* in their buccal cavities

	N	\bar{A}	SD	Σ	Min.	Max.	r	P
Bogue	5	15.72	2.25	78.60	12.50	18.40	0.21	0.74
<i>C. oestroides</i>	5	1.49	0.68	0.74	0.74	2.32	-	-
Pickarel	17	14.94	1.65	268.90	12.70	18.60	0.20	0.40
<i>C. oestroides</i>	18	1.43	0.88	25.70	0.38	3.22	-	-

Meanings of symbols: N = number of parasitized fishes/parasites; \bar{A} = arithmetic mean; SD = standard deviation; Σ = sum; Min. = minimal length of fish/parasite; Max. = maximal length of fish/parasite; r = correlation coefficient; P = statistically significant correlation.

Monthly data about P at a same location for a free living fish species are not available in the literature. In reared fish, data for P were collected at times of crisis. ŠARUŠIĆ (1999) found high P levels during the entire year in table sea breams (*S. aurata* L.) grown under unfavourable zoo-technical conditions. HORTON and OKAMURA (2001) reported high infestations (P = 45-50) in sea bass (*D. labrax* L.) on a farm both in July and September, while MLADINEO (2002) reported high infestation and mortalities on two farms during the spring. On the other hand, adult *C. oestroides* were not found on five of seven farms

examined from June 2004 to March 2005 (MLADINEO, 2006). More data on seasonality of P in free living fishes at various locations and around farms might be helpful for understanding the outbreaks of cerathotoasis in cages.

As in the studies by TRILLES (1964) and POULIN (1995), the length of parasitized fishes was weakly correlated with the length of the parasite in their buccal cavities (Table 2.). As in other studies on the prevalence of *C. oestroides* in free living populations, external examination of the fish did not reveal any pathological alterations. Data on anaemia, growth retardation, emaciation, injured tissues and mortalities as well as secondary bacterial infections in cerathotoasis of cultured sea bass and bream (ŠARUŠIĆ, 1999; CHARFI-CHEIKHROUHA et al., 2000; HORTON and OKAMURA, 2001; MLADINEO, 2002; MLADINEO, 2006) indicate the need to include determination of more parameters in studies of parasitized free living fishes.

In conclusion, this study revealed for the first time the presence of *C. oestroides* in bogues (P = 12.82) and picarels (P = 10.43) in the Velebit channel. The six monthly samples (June - October) indicated a decreased prevalence in autumn. Further studies are desirable on the prevalence of this parasite in a wide spectrum of potential hosts among free living species. The scope of research should encompass a morphological and physiological comparison of parasitized specimens with those of the same species and age which are free of the parasite in the buccal cavity.

Acknowledgements

The authors would like to thank Ivona Mladineo, Oceanographic Institute, Split, for help in identification of the parasite.

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Received: 6 September 2007

Accepted: 2 July 2008

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SAŽETAK

Usne šupljine bukava (*Boops boops* L.) i gira oblica (*Spicara smaris* L.) ulovljenih u blizini Novog Vinodolskog (Velebitski kanal, Hrvatska) pregledane su na prisutnost račića - nametnika *Ceratothoa oestroides*. Uzorci su uzmani jednom mjesečno, u razdoblju od lipnja do studenoga 2003. Nametnik je utvrđen u usnoj šupljini u pet od 39 pregledanih bukava (prevalencija 12,82) i u 17 od 163 gire oblice (prevalencija = 10,43), odnosno ukupno u 22 ribe (prevalencija = 10,43). Pretežitost nametnika bila je nešto veća tijekom prva tri mjeseca. Statistički minimalna korelacija utvrđena je između dužine riba i dužine nametnika.

Ključne riječi: bukva, *Boops boops* L., gira oblica, *Spicara smaris* L., *Ceratothoa oestroides*, sjeverni Jadran
