

INFECTION OF SARDINE EGGS BY A PARASITIC DINOFLAGELLATE *ICHTHYODINIUM CHABELARDI* HOLLANDE AND CACHON, 1952 IN CROATIAN WATERS

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ABSTRACT

The infection of sardine eggs by a parasitic dinoflagellate (Ichthyodinium chabelardi) in the eastern central Adriatic was investigated. This syndinian parasitizes the vitelline vesicle of sardine embryos and after eclosion bursts the yolk causing the death of the newly hatched larvae. Sardine eggs are mainly infected during winter period. Mean percentages of contaminated eggs were: January - 48.2%, February - 47.7%, March - 39.7%, April - 27.0%, May - 6.8%, September - 2.6%, October - 14.8%, November - 19.7% and December - 50.0%. The high mortality caused by Ichthyodinium chabelardi should be taken into account in future studies of mortality during the embryonic stage.

Key words: sardine eggs, parasitic dinoflagellate, *Ichthyodinium chabelardi*, eastern central Adriatic

INTRODUCTION

Understanding the processes affecting recruitment is a fundamental objective in fishery research. It is generally assumed that the major mortality of a year brood occurs during the early life history of fishes. During the embryonic period, abiotic factors (water temperature, salinity, dissolved oxygen, mechanical damage, UV radiation) and predation are primary sources of mortality. Major causes of larval mortality seem to relate to starvation and predation, and perhaps to the interaction of these factors (Hunter, 1984).

Diseases of fish eggs caught at sea are not well studied, parasitism being one of the factors that can cause high mortality. Hollande and Cachon (1952, 1953) described a new genus and species of dinoflagellate (*Ichthyodinium chabelardi* Hollande and Cachon, 1952) parasite of sardine eggs among the other teleost eggs. In a recent review of dinoflagellate taxonomy, Taylor (1987) considers this species as belonging to the Subclass Syndiniophycidae, Order Syndiniales, Family Syndiniaceae. The referred endoparasite can contaminate up to 80% of *Sardina pilchardus* (Walbaum, 1792) eggs during winter months (Meneses & Ré, 1991).

The aim of this paper is to present some new data

about the findings of this endoparasite on sardine eggs in the eastern central Adriatic.

MATERIAL AND METHODS

In 1990 a monthly sampling programme directed at hydrographic data and the plankton community was carried out in the eastern central Adriatic by the research vessel "Bios". Fig. 1 shows the three locations where the Institute of Oceanography and Fisheries has performed investigations for more than 40 years (Stations Kaštelanski zaljev, Pelegrin, Stončica).

The material was collected by double vertical hauls of a plankton net of "Hensen" type in the period January 1990-December 1990. Samples were fixed immediately after collection in 4% buffered formalin. In the laboratory, plankton volumes were measured by displacement and fish eggs and larvae sorted with the aid of a stereoscopic microscope. The formalin fixed sardine eggs were graded into the series of 11 stages described by Gamulin and Hure (1955). Sardine eggs contaminated by *Ichthyodinium chabelardi* were enumerated under a stereoscopic microscope and, in certain cases, a light microscope using transmitted light.

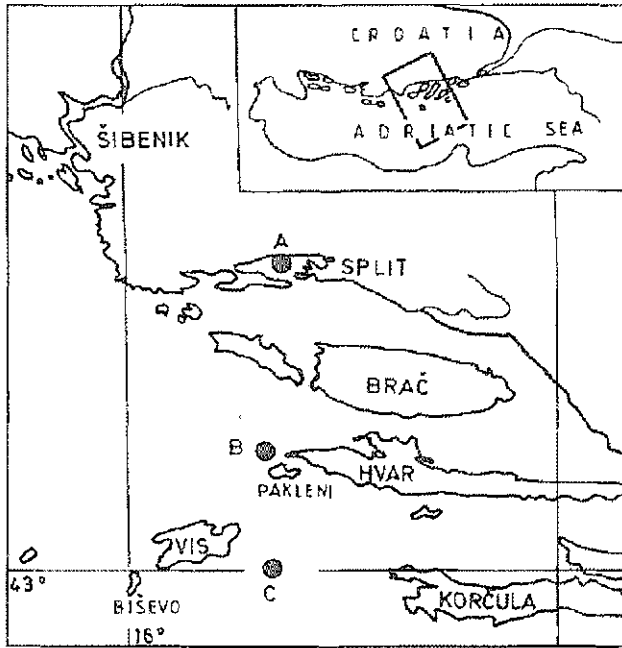


Fig. 1: Locations of sampling stations in the vicinity of Split, eastern middle Adriatic (A - Kašela Bay, B - Pelegrin, C - Stončica).

Sl. 1: Lokacije vzorčnih postaj v bližini Splita, vzhodni srednji Jadran (A - Kašela, B - Pelegrin, C - Stončica).

RESULTS AND DISCUSSION

Sardine eggs were not found in June, July and August, since spawning period of sardine is from October (September) to April (May) (Regner et al., 1987). *Ichthyodinium chabelardi* parasitizes the vitelline vesicle of sardine embryos (Fig. 2) and after eclosion the yolk sac bursts causing the death of the newly hatched larvae. In the first early stages of development of the eggs (before the closure of the blastopore, stages I to V) it was not possible to detect the parasite. Thus, eggs parasitized by *Ichthyodinium chabelardi* (referred hereafter as infected or contaminated eggs) correspond always to eggs in the later stages of development (stages VI to XI).

The abundance (expressed in number of eggs per 10m²) of sardine eggs sampled monthly at the three stations is presented in Table 1; also presented are the abundance of infected and noninfected eggs and the percentage of contaminated eggs. Mean percentages of contaminated eggs were: January - 48.2%, February - 47.7%, March - 39.7%, April - 27.0%, May - 6.8%, September - 2.6%, October - 14.8%, November - 19.7% and December - 50.0%. From these data it can be inferred that *S. pilchardus* eggs contaminated by this syndinian parasite occurred primarily from December to April, suggesting that infection takes place during winter months. This results are very similar to those presented



Fig. 2: *Sardina pilchardus* eggs contaminated by *Ichthyodinium chabelardi* sampled in the eastern central Adriatic (Croatian waters).

Sl. 2: Z zajedalskim oklepnim bičkarjem *Ichthyodinium chabelardi* okužene ikre sardel (*Sardina pilchardus*), vzorčenih v vzhodnem srednjem Jadranu.

by Meneses & Ré (1991) who found in Portuguese waters contaminated sardine eggs primarily from January to March. Karlovac (1967) mentioned the presence of this parasite on the sardine eggs collected in the seasons 1951/52 and 1952/53 in the central Adriatic without any precise data about the occurrence, abundance, and stages of development at which parasite occur. Hollande and Cachon (1953) who reared infected sardine eggs in order to study *Ichthyodinium chabelardi* life cycle, were unable to infect other healthy eggs with the resulting spores under controlled conditions. For this reason, it is not known how and in which egg stage contamination takes place. More experimental rearing work is required to solve this and other problems related to the life cycle of this parasitic dinoflagellate. The high mortality caused by *Ichthyodinium chabelardi* should be taken into account in future studies of mortality during the embryonic stage, as well as in the related studies of the processes affecting recruitment in sardines and other commercial important fishes.

Month Mesec	Station Postaja	Contaminated eggs (stages VI-XI) okužene ikre		Noncontaminated eggs (stages VI-XI) neokužene ikre		Total N of eggs skupno število
		%	N/10m ²	N/10m ²	N/10m ²	
January	Kaštela	47.1	27.8	27.9	78.9	
	Pelegrin		0.0	0.0	0.0	
	Stončica	49.3	17.0	119.0	331.5	
February	Kaštela	43.1	34.8	336.0	374.5	
	Pelegrin	50.0	27.9	27.9	74.4	
	Stončica	50.0	5.6	5.6	100.8	
March	Kaštela	42.9	16.6	22.1	127.0	
	Pelegrin		0.0	0.0	0.0	
	Stončica	36.4	9.2	16.1	27.6	
April	Kaštela	33.3	29.8	59.6	304.0	
	Pelegrin	1.2	6.8	544.0	587.3	
	Stončica	46.5	596.8	686.0	1363.0	
May	Kaštela	8.2	15.0	182.5	597.5	
	Pelegrin		0.0	0.0	0.0	
	Stončica	5.3	5.8	27.6	33.8	
September	Kaštela	3.5	4.5	12.1	27.6	
	Pelegrin		0.0	0.0	0.0	
	Stončica	1.7	4.5	22.1	127.0	
October	Kaštela	12.8	27.9	27.9	74.4	
	Pelegrin		0.0	0.0	0.0	
	Stončica	16.7	6.2	31.0	148.8	
November	Kaštela	25.0	5.7	17.1	176.7	
	Pelegrin	0.0	0.0	9.0	9.0	
	Stončica	14.3	4.7	28.3	788.2	
December	Kaštela	50.0	27.8	27.8	331.5	
	Pelegrin		0.0	0.0	0.0	
	Stončica	50.0	5.6	5.6	100.8	

Tab. 1: The abundance (expressed in number of eggs per 10 m²) of sardine eggs sampled monthly at the three stations in the eastern central Adriatic.

Tab. 1: Abundanca iker sardele (izražena v št. iker na 10 m²) v mesečnih intervalih na treh postajah v vodah vzhodnega srednjega Jadrana.

IKRE SARDEL V HRVAŠKIH VODAH OKUŽENE Z ZAJEDALSKIM OKLEPNIM BIČKARJEM *ICHTHYODINIUM CHABELARDI* HOLLANDE IN CACHON, 1952

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POVZETEK

Avtor članka poroča o raziskovanju okuženosti iker sardele, ki jo v vodah vzhodnega srednjega Jadrana povzroča zajedalski oklepni bičkar. Potem ko ta zajedalec okuži rumenjakov mešiček sardelinih zarodkov, se razpoči rumenjaka vrečka in na novo odložene ikre poginejo. Oklepni bičkar okužuje ikre sardele predvsem v zimskem času. Srednje odstotne vrednosti okuženih iker so bile: januar - 48,2%, februar - 47,7%, marec - 39,7%, april - 27,0%, maj - 6,8%, september - 2,6%, oktober - 14,8%, november - 19,7% in december - 50,0%. To visoko smrtnost, ki jo povzroča *Ichthyodinium chabelardi*, bi bilo po avtorjevem mnenju treba upoštevati v prihodnjih raziskavah smrtnosti v zarodni fazi sardele.

Ključne besede: ikre sardele, zajedalski oklepni bičkar, *Ichthyodinium chabelardi*, vzhodni srednji Jadran

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