

## New data and notes on the distribution of *Nitokra spinipes spinipes* Boeck, 1865 (Crustacea: Copepoda: Harpacticoida) in Bulgaria

APOSTOL APOSTOLOV

*Knjaz Alexander Battenberg Blvd., Entr. A, 8000 Bourgas, Bulgaria, apostolov2003@abv.bg*

**Abstract.** The present study reports a new locality of *Nitokra spinipes spinipes* Boeck, 1865. During 1988-1989 a large number of *Nitokra spinipes spinipes* were found in the biofilter at the aquaculture station in Pomorie Town, on the Pomorie Lake coast. This is the first record of the *Nitokra spinipes spinipes* found trapped in the technical equipment for water purification used in aquaculture.

**Key words:** New locality, biofilter, taxonomy.

### Introduction

Harpacticoid copepods represent a large part of the meiofauna in many benthic communities (Hicks & Coull 1983). *Nitokra spinipes spinipes* is a common harpacticoid species found in brackish-water environments throughout the world (Gopalan 1977, Dudakova 2012). They have been described as a key link to upper trophic levels in benthic communities and they are a common food resource for fish larvae in aquaculture. It is assumed that the harpacticoids are the most important component in the diets of some larval and juvenile fish (Alheit & Scheibel 1982, Hicks & Coull 1983), but their overall role in nutrient and energy transfer in marine benthic food webs is not well studied.

The aim of present paper is to give the first data on the copepod harpacticoid composition inhabiting the technical equipment used in aquaculture for water purification. The *Nitokra spinipes spinipes* Boeck, 1865 found in the biofilter at the Aquaculture Base in Pomorie Town belongs to the genus *Nitokra* Boeck, 1864. Members of the genus are marine, but some species extend their inhabiting range to brackish waters or even to freshwaters. In Bulgaria, this genus is represented by 14 species, 1 subspecies (Apostolov & Marinov 1988).

### Material and Methods

The samples were collected on 08.04.1988 (20 ♀♀), 01.03.1989 (10♀♀), and 01.04.1989 (30♀♀) using a hand-net with mesh size of 0.40 mm. Sampling was carried out from biofilter at the Aquaculture Base located on the shore of lake Pomorie. The material was sorted at the laboratory of Aquaculture Base, according to classical methods. The specimens were fixed in 70% ethanol for long term storage. Morphological terminology follows Huys & Boxshall (1991) and Lang (1948, 1965).

## Results and Discussion

Sixty females of this species have been collected (Fig. 1). It is quite probably, that the abundant presence of *N. spinipes spinipes* into the biofilter at the aquaculture base is the result of the mixing of waters from the Black Sea and Lake Pomorie in the installation structure. There are three types of mixing water in the biofilter - from Black Sea (18‰), from Lake Pomorie (47-55‰) and groundwater with salinity of 25-30‰. These waters are full of various representatives of meiobenthos, including harpacticoid species. Therefore, *N. spinipes spinipes* may be described as a brackish water species which is resistant to rapid changes in water salinity, and that is why this species has adapted successfully to the waters of a biofilter. This widespread estuarine benthic copepod apparently has the ability to survive on diverse and nutritionally poor diets, a quality that is useful in a variable, detritus-dominated environment.



**Fig. 1.** *Nitokra spinipes spinipes* ♀.

**Morphology.** Morphological features of this species in the biofilter in the Aquaculture Base of Pomorie Town were studied. Our specimens (Fig. 1.) are that of *N. spinipes spinipes* in the general appearance of the spinule arrangement and at the same time some part of the spinule arrangement resembles that of *N. spinipes armata* Lang. According to Lang (1965), the subspecies *N. spinipes armata* differs from *N. spinipes spinipes* in the ornamentation of the abdominal somites and in the anal operculum. The number of spines in the anal operculum in *spinipes* are 15, in *armata* - 10 and in our specimens between 8 and 10.

Such variability of *N. spinipes spinipes* in the ornamentation of the abdominal somites and in the anal operculum has been established by other authors from different regions. The presence of systematic scars in our specimens of *N. spinipes spinipes* and the *N. spinipes armata* confirms its variability.

The variability of *N. spinipes spinipes* gave a reason to Sewell (1924) and Lang (1965) to describe two subspecies: *N. spinipes orientalis* Sewell, 1924 (Red Sea and Indian Ocean) and *N. spinipes armata* Lang, 1965 (Californian, Pacific coast).

According to Wells & Rao (1987) and Chang & Yoon (2008) due to the global geographic distribution of the species *N. spinipes spinipes* and its wide variability, they do not accept the existence of separate subspecies. Our specimens support their opinion.

**Preferred habitat.** *N. spinipes spinipes* prefers only shallow areas of water bodies. Frequently, this species is found also in estuaries (Weiss et al., 1996) and rock pools, which are characterized by rapid and significant fluctuations of temperature, salinity, and dissolved oxygen concentration (Wulff 1972).

In addition, *N. spinipes spinipes* prefers sandy sediments, where it is an interstitial species or it inhabits the phytal as a plankton species (De Troch et al., 2005; Karlsson &

Eklund 2004). *N. spinipes spinipes* is well adapted to a wide range of salinity (from 0 to 30‰). In Pomorie Lake *N. spinipes spinipes* is also found at salinity of 47-60. Most authors agree that this species is a representative of brackish water fauna (Lang 1948; Borutzkyi, 1952). Adaptation to a wide temperature range (from 0 to 26°C) is characteristic of *N. spinipes spinipes* (Dahl 2008).

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