

Contribution to the study of the free-living freshwater nematodes from Vodas River, Edessa, Greece

STEFAN STOICHEV

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2, Str. "Major Yuri Gagarin", 1113 Sofia, Bulgaria, stefanstoichev@yahoo.com

Abstract: Hydrobiological studies of Vodas River in Edessa, Greece were performed in 2022. The present study provides the first information on free-living freshwater nematodes from Voda River in Edessa, Greece. In our study, we identified 7 species of freshwater free-living nematodes belonging to 6 genera. This is the first detailed study on free-living freshwater nematodes from the Vodas River in Edessa, Greece. The 3 species (marked by +) and 2 genera (marked by *) are new to the hydrofauna of Greece.

Key words: Free-living freshwater nematodes, Vodas River, Greece.

Introduction

The Vodas River in Greece is located in the northern part of the country, in the region of Macedonia, near the border with North Macedonia. (Fig. 1). It passes through the city of Edessa (Voden). It is located on a plateau at an altitude of 320 m above sea level above the Slanitsa Valley. The city is located on the Voda River (today Vodas). The modern name, Edessa, is associated with water. It comes from the Phrygian word for water. The river that flows through the city is called Edessaids (in Greek) It is also known by the names Water (Voda) and Vodas. Everything in the city bears the name “water“ or “waterfall “ in one language or another. The city has many bridges, canals and rivers, which finally come together and pour out with a powerful roar. The present-day Greek city of Edessa is the former Bulgarian city of Voden. The Vodas River flows through the city, feeding two large waterfalls. A pleasant city park has been built along the waterfalls. The rocks behind one of the waterfalls have formed an interesting cave.

Material and Methods

Vodas River is located in Edessa, Greece (Fig. 2 A, B, C, D). A total of 9 samples were collected in Vodas River in 2022. Due to the enormous speed of the water, the samples were taken from calmer places after the waterfall (Fig. 2 A, C). Samples were fixed in 4% formalin, then heated in a water bath to stretch and measure. Some of the nematodes were collected by scraping at stones. Others were collected by scooping substrate from the bottom and straining it through sieves with sizes ranging from 0.5 mm to 50 microns.

The determination and the presentation of the species was made according to Gagarin (1981).

The formula of De Man (1886) was used to determine the species' qualitative composition.

In our study, we identified 7 species of freshwater free-living nematodes belonging to 6 genera.



Fig. 1 . Map of Vodas River in Edessa, Greece.



2A



2B



2C



2D

Fig. 2. A, B, C, D – Vodas River in Edessa, Greece.

Results and Discussion

The present study provides the first detailed information on free-living freshwater nematodes from Vodas River in Edessa, Greece. The enormous quantity of the nematodes, which, according to some authors (Rees 1940), amount to several millions of specimens/m², determines their significance for the balance of the organic substances in the water basins. Free-living freshwater nematodes, together with copepods, constitute the main component of the meiobenthos in continental water bodies. They often dominate benthic multicellular animals in terms of biomass. Due to their small size and simple structure, freshwater free-living nematodes are found everywhere – they have been recorded from the ice of Antarctica and Greenland to hot mineral springs. Gagarin (1981). The metabolism of substances in water occurs mainly through the slightly permeable cuticle of free-living freshwater nematodes. Aquatic nematodes actively search for food and have well-developed organs of touch and smell. They also have an organ of vision. Breathing occurs with the entire surface of the body.

Nematodes represent an example of such an evolutionary state of a taxonomic unit, which is designed by Severtsov (according to Paramonov 1970) with the term biological progress. The species density of the longitudinal distribution of the species is unequal. Free-living nematodes are a major component of freshwater meiofaunal communities, where they often attain very high densities (>1 million individuals per m², Traunspurger, 2000; Traunspurger et al., 2012).

A large proportion of nematodes inhabit very different substrates, which proves their eurytopic nature. Some nematodes prefer only hard or only soft substrates. These nematodes exhibit stenotopic character. The freshwater nematode fauna is ecologically diverse. Its composition includes typical freshwater inhabitants, species migrating to saline pre-estuarine river areas, freshwater species, organisms inhabiting rock growths, mosses, and others that sometimes fall into the water due to washing away of coastal rocks. In our study, we identified 7 species of freshwater free-living nematodes belonging to 6 genera.

The 3 species (marked by +) and 2 genera (marked by *) are new to the hydrofauna of Greece.

The distribution of free-living freshwater nematodes found by us is presented in Table 1.

Table 1. Species composition and distribution of free-living freshwater nematodes in Voda River in Edessa, Greece.

	Nematoda	Distribution
1	<i>Tobrilus gracilis</i> (Bastian, 1865)	Cosmopolitan in Europe.
2	<i>Dorylaimus stagnalis</i> Dujardin, 1848	Cosmopolitan in Europe.
3	<i>Rhabditis filiformis</i> Butschli, 1873 + *	Cosmopolitan in Europe. Found among rotting macrophyte debris
4	<i>Plectus cirratus</i> Bastian, 1865 + *	Found in the mud. Found in the growths on stones. Recorded once.
5	<i>Eudorylaimus carteri</i> (Bastian, 1865) Andrassy, 1959	Cosmopolitan in Europe.
6	<i>Tripyla glomerans</i> Bastian, 1865	Cosmopolitan in Europe.
7	<i>Tripyla filicaudata</i> de Man, 1880 +	Found in the growths on stones.

The longitudinal distribution of free-living freshwater nematodes in the Vodas River is clearly uneven. No specimens are found in the upper part of the river, where the speed of the water in its rapid waterfalls is enormous. The species are found in the lower part of the river, where the speed of the river flow slows down and creates more favorable conditions for life.

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