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# Hydrobiological and faunistic investigation of the Nematoda fauna of the Mesta river, South-West Bulgaria

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With 1 figure and 1 table

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**Schlagwörter**: Nematoda, Mesta, Bulgarien, Erstfund, Faunistik

**The present study for the first time gives a detailed information about the free-living Nematoda fauna of the Bulgarian section of the Mesta river in South-West Bulgaria. A total of 31 species (one new for the Bulgaria) were found; biocenotic data are added.**

## 1 Introduction

Nemathelminthes are one of the most numerous groups in the animal world, their exact number is not known. Compared with other groups of worms, nematodes have adapted to different living conditions due to their solid cuticle, which makes them less sensitive to the oxygen content and to the impact of other ecological factors. Free-living freshwater nematodes form an important part of the biomass of the meiobenthos, but they are mostly neglected in hydrobiological studies.

First information about the free-living nematodes in Bulgaria was given by VALKANOV (1934, 1935) who reported 13 species belonging to 6 genera. Information about fresh-water Nematoda was given by RUSSEV (1979) who reports 2 species from the Bulgarian-Romanian stretch of Danube river. Detailed information on the free-living freshwater nematodes in Bulgaria were given by STOICHEV (1996a, 1996b, 1998, 1999, 2000a, 2000b, 2000c). In the following, information about the Nematoda fauna of the Bulgarian section of the Mesta river is given.

### 2 Investigation area and sample sites

The Mesta river (Fig. 1) is located between the mountains Pirin in the west, Rila in the north and the Rhodopes in the east, between 41°25'-42°10' north and 23°20'-24°20' east. The Mesta river derives from the confluence of the rivers Biala Mesta and Cherna Mesta above the village Yakoruda. The total length is 246 km, 126 km belonging to Bulgaria. The drainage area comprises 2767 km$^2$; the mean discharge at the village of Kremen, 35 km above the Bulgarian-Greek border, is 22,5 m$^3$/s (MICHEV & al. 1980).

Most of its tributaries (Belitsa river, Biala Mesta river, Cherna Mesta river) are located in the upper reaches and rise from the southern slopes of Rila mountain. The riverbanks at the town Razlog and Yakoruda are tight and abrupt. In its upper reaches, the Mesta river has an inclination of 150

‰ which decreases to 30 ‰ towards Yakoruda village. The upper part is afforested with dwarf pine, and downwards with other conifers. The bottom of the river is covered with gravel and stones; its width is 60-80 m. At the inflow of Cherna Mesta river, the valley spreads to 300-400 m width. The hillside of the river is also abrupt and covered with low-stemmed forests.

At Yakoruda the cross-section of the valley is tight and deep, with abrupt slopes; after the village the valley opens to a width of 600 m. The vegetation decreases and the terrain at the village of Babek is heavily deforested, the width of the river bed here is 20-25 m. The river bottom is covered with gravel, sand and rounded stones.

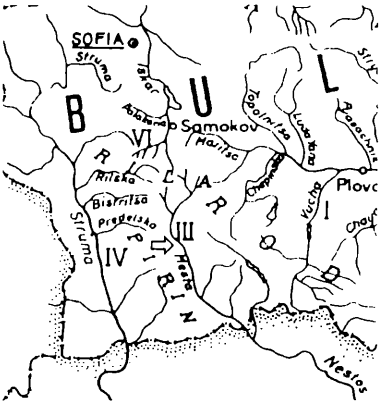


**Fig. 1 Mesta river, Southwest Bulgaria**

At the inflow of Belitsa river, the valley of Mesta river spreads to 1500 m. After the inflow of Babek river the valley narrows and its slopes become abrupt, with an inclination of 40 degree.

After entering the Gotse Delchev plain, the slope inclination decreases. The width of the valley is 3000-4000 m. The cross-section of the valley is trapezium-shaped. The bottom consists of sand and clay. This bed pattern is sustained untill the state border. The Mesta river flows into the Aegean sea in front of Tassos island, its Greek name is Nestos.

## 3 Material and methods

The main part of the investigated material from the Bulgarian section of the Mesta river was collected by B. Russev. It has also been supplemented by samples of the author. Altogether 108 samples were processed, being distributed as follows:

1 Byala Mesta river – 7 samples
2 Byala Mesta river – 7 samples
3 Mesta river above Yakoruda – 16 samples
4 Mesta river below Yakoruda – 17 samples
5 Mesta river at Belitsa village – 12 samples
6 Mesta river at Kraishte village – 9 samples
7 Mesta river at Gostun village – 12 samples
8 Mesta river at Gospodinci village – 10 samples
9 Mesta river at Hadjidimovo village – 18 samples

The analysis of dominant quantitative presence (frequency of occurence pF %, frequency of dominance DF %, and range of dominance Dt %) was made according to the method of De Vries (1937). The determination and the systematic presentation was made according to Gagarin (1981). The formula of De Man (1886) was also used to determine the qualitative composition of all spe-

cies. The zoobenthic fauna was collected with a Birge-Eckman bottom sampler. The collected samples were rinsed on two screens with pore diameter of 500 μm and 150 μm respectively. An important preliminary procedure is that the nematodes should be carefully heated up to 60 °C in a water bath before fixing and processing. As a result they become slacken and erected. Being thus fixed, they are more convenient to be measured. The only proper conservation for freshwater nematodes is by 4 % formaline solution. Thus fixed, the nematodes are preserved for a long period; alcohol and other fixatives would dehydrate the bodies.

## 4 Species composition

A total of 31 species from 13 genera and 11 families are included in the present study (Tab. 1). A comparison to investigations in the former Soviet Union (GAGARIN 1981) and Romania (CARAUSU 1943) indicates that free living fresh water Nematoda are well investigated. One species, *Diplogaster rivalis*, is new for the Bulgarian fauna.

## 5 Dominance analysis

An analysis of the index pF and the range of dominance Dt indicate that the very frequent species also dominate qualitatively in the nematode complex in various parts of the Mesta river. Besides species with high pF and Dt values (*Dorylaimus stagnalis* and *Monhystera filiformis*), species of high Dt and low pF values (*Plectus tenuis*) also occur. These data imply the stenobiontic characteristic of this species. The massive development of these species is only posssible within narrow limits of the environmental conditions. Outside of these limits the do not occur or they are not frequent.

According to the classification of frequency for free-living freshwater Nematoda of STOICHEV (1994) the species found in the Mesta river can be grouped as follows:

1. Very frequently found (pF >50 %): *Dorylaimus stagnalis, Monhystera stagnalis* (2 species). The biomass of that species is 2,53 g/m² and 2,14 g/m² respectively.
2. Frequently found (pF 10-50 %): *Mononchus truncatus, Eudorylaimus carteri, Monhystera filiformis, Plectus cirratus, Enoploides fluviatilis* (6 species).
3. Rarely found (pF 1-10 %): *Paradorylaimus filiformis, Monhystera paludicola, Prodesmodora circulata, Plectus tenuis* (9 species).
4. Very rare (pF <1 %): *Mononchus* sp., *Dorylaimus montanus, Monhystera* sp., *Cylindrolaimus melancholicus*, *Plectus* sp., *Enoploides* sp. (14 species).

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**Tab. 1. Qualitative composition, frequency of occurrence and a dominant analysis of the Nematoda species found in the Mesta river and some tributaries**

| Taxon | Site | pF (%) | DF (%) | Dt (%) |
|---|---|---|---|---|
| **Mononchidae** Filipjev 1934 | | | | |
| Mononchus truncatus Bastian 1865 | 1-3, 6-7, 9 | 23.14 | | |
| Mononchus sp. | 2 | 0.92 | | |
| **Dorylaimidae** de Man 1876 | | | | |
| Dorylaimus stagnalis Dujardin 1848 | 1-9 | 63.88 | 46.29 | 72.46 |
| Dorylaimus montanus Stefanski 1924 | 1 | 0.92 | | |
| Dorylaimus sp. | 3 | 0.92 | | |
| Paradorylaimus filiformis (Bastian 1865) | 7, 8 | 7.40 | | |
| Paradorylaimus sp. | 4 | 0.92 | | |
| **Qudsianematidae** Jairgipuri 1965 | | | | |
| Eudorylaimus carteri (Bastian 1865) | 6-9 | 14.81 | 2.77 | 18.70 |
| **Monhysteridae** de Man 1876 | | | | |
| Monhystera stagnalis Bastian 1865 | 1-5, 7-9 | 53.70 | 1.85 | 3.44 |
| Monhystera paludicola de Man 1880 | 2, 4 | 8.33 | | |
| Monhystera filiformis de Man 1880 | 1-4, 7-9 | 45.37 | 18.51 | 40.79 |
| Monhystera sp. | 4 | 0.92 | | |
| **Microlaimidae** Micoletzky 1922 | | | | |
| Prodesmodora circulata (Micoletzky 1913) | 2 | 1.85 | | |
| **Cylindrolaimidae** Micoletzky 1922 | | | | |
| Cylindrolaimus melancholicus de Man 1880 | 7 | 0.92 | | |
| Cylindrolaimus sp. | 2 | 0.92 | | |
| **Plectidae** Oerley 1880 | | | | |
| Plectus cirratus Bastian 1865 | 4, 6-9 | 32.40 | 4.62 | 14.25 |
| Plectus tenuis Bastian 1865 | 7, 8 | 6.48 | 5.50 | 85.64 |
| Plectus sp. | 5 | 0.92 | | |
| **Enoplidae** Dujardin 1845 | | | | |
| Enoploides fluviatilis Micoletzky 1923 | 1-3, 4-6, 7, 8 | 44.44 | 2.77 | 6.23 |
| Enoploides sp. | 3 | 0.92 | | |
| **Tripylidae** de Man 1876 | | | | |
| Tripyla glomerans Bastian 1865 | 2, 3 | 5.55 | | |
| Tripyla filicaudata de Man 1880 | 4, 5 | 3.70 | | |
| Tripyla selifera Buetschli 1873 | 4 | 0.92 | | |
| Tripyla sp. | 3 | 0.92 | | |
| Tobrilus gracilis (Bastian 1865) | 3, 6 | 30.55 | | |
| Tobrilus stefanskii (Micoletzky 1925) | 32 | 0.26 | | |
| Tobrilus longus (Leydy 1852) Andrassy 1959 | 2, 4 | 1.85 | | |
| Tobrilus sp. | 5 | 0.92 | | |

| Taxon | Site | pF (%) | DF (%) | Dt (%) |
|---|---|---|---|---|
| **Rhabditidae** ORLEY 1880 | | | | |
| Rhabditis filiformis BUETSCHLI 1873 | 3 | 2.77 | | |
| Rhabditis sp. | 2 | 0.92 | | |
| **Diplogasteridae** MICOLETZKY 1922 | | | | |
| Diplogaster rivalis (LEYDY 1854) BUETSCHLI 1873 | 2, 3 | 4.62 | | |
| Diplogaster sp. | 2 | 0.92 | | |

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