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Ecological characteristics of free-living fresh water Nematodes

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With 2 Tables

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The present study gives information on the ecological characteristics of free-living fresh water nematodes.

1 Introduction

Due to their small dimensions and uncomplicated composition, nematodes have occupied almost the whole biosphere and inhabit all possible habitats (Novikova 1971, Stoykov 1980, Gagarin 1981) including underground habitats (Alther & Debouteville 1972, Dole 1983, Dole & Chessel 1986, Jibert 1986, Pandoursk, 1994, Beron 1994) and marine habitats (Stoykov 1977, 1978).

From a point of view of nematode ecology, there is a specific interest in the species distribution related to the characteristics of the substrate, in connection with their nutritional patterns. An ecological classification based on the labial apparatus related to nutritional patterns of marine nematodes was given by Wieser (1953) and Stoykov (1980).

2 Distribution of free-living fresh water nematodes in connection with their nutritional patterns

In the present study we distinguish four groups of free-living fresh water nematodes.

Group A – specialised detritophagous. This group is represented by nematodes having a small mouth chamber with no "teeth" inside. Their main food consists of detritus. They inhabit algae and macrophytic periphyton in sludge and sand.

Group B – non-specialised detritophagous. The nematodes in this group have a well developed mouth chamber with no teeth inside. Their food consists of large detritus. These species are frequently found in sand and sludge abunding in detritus.

Group C – phytophagous. They have a well developed mouth chamber with little teeth inside. Besides detritus, their food consists of algae, mostly Diatomeae. These species are frequently found in sand and sludge abunding in detritus.

Group D – carnivorous. These nematodes have a well developed mouth chamber with strong maxilla and teeth. Their food consists of algae, and carnivorous nutritional patterns are charactristic for many among them. Habitats preferred by them are sludge and sand. They can also be found on clay.

Table 1 shows fresh water nematodes found in Bulgaria, according to their labial apparatus structure. The table indicates that the sand and sludge habitats are inhabited by representatives of all groups, the largest share being for the representatives of non-specialised detritophages (60,6 %), followed by specialised detritophages (19,6 %), phytophages (13,1 %) and the carnivorous (6,7 %).

Tab. 1: Distribution of free-living nematodes from Bulgarian inland waters by type of nutritional pattern. A = specialised detritophagous, B = non-specialised detritophagous, C = phytophagou, D = carnivorous

Taxon	Type of nutrition			
	A	B	C	D
Mononchus truncatus Bastian, 1865		x		
Mononchus sp.		x		
Mylonchulus brachyurus (Buetschli, 1873)		x		
Aquatides aquaticus (Thorne, 1930)		x		
Dorylaimus stagnalis Dujardin, 1848		x		
Dorylaimus montanus Stefanski, 1924		x		
Dorylaimus sp.		x		
Paradorylaimus filiformis (Bastian, 1865)		x		
Laimydorus flavomaculatus (Linstow, 1876)		x		
Eudorylaimus carteri (Bastian, 1865)		x		
Paractinolaimus macrolaimus (de Man, 1880)		x		
Paractinolaimus sp.		x		
Thornia steatopyga (Thorne et Schwanger, 1936)		x		
Monhystera stagnalis Bastian, 1865		x		
Monhystera paludicola de Man, 1880		x		
Monhystera dispar Bastian, 1865		x		
Eumonhystera filiformis Bastian, 1865				
Monhystera macraphis Filipjev, 1930				
Monhystera vulgaris de Man, 1880				
Monhystera similis Buetschli, 1873				
Monhystera simplex de Man, 1880				
Monhystera sp.				
Prodesmodora circulata (Micoletzky, 1913)				
Chromadorina viridis (Linstow, 1876)				
Punctodora ratzemburgensis (Linstow, 1876)				
Punctodora bioculata (Schultze in Carus, 1857)				
Paraphanolaimus behniigi Micoletzky, 1923				
Aphanolaimus viviparus Plotnikoff, 1899				
Aphanolaimus aquaticus Daday, 1897				
Cylindrolaimus communis de Man, 1880				
Cylindrolaimus melancholicus de Man, 1880				
Axonolaimus spinosus (Buetschli, 1874)				
Axonolaimus sera Tchesunov, 1976				
Chronogaster typicus (de Man, 1921)				
Chronogaster boettgeri Kischke, 1956				
Plectus assimilis Bueschli, 1873				
Plectus inquirendus Andrassy, 1958				
Plectus cirratus Bastian, 1865				
Plectus tenuis Bastian, 1865				

Taxon	Type of nutrition A	B	C	D
Enoploides fluviatiiis Micoletzky, 1923				x
Enoploides sp.				x
Prismatolaimus intermedius (Buetschli, 1873)				
Prismatolaimus dolichurus de Man, 1880				
Tripyia glomerans Bastian, 1865				
Tripyla filicaudata de Man, 1880				
Tripyla selifera Buetschli, 1873				
Tripyla sp.				
Trischistoma monhystera (de Man, 1880)				
Trischistoma arenicola (de Man, 1880)				
Tobrilus gracilis (Bastian, 1865)				
Tobrilus stefanskii (Micoletzky, 1925)				
Tobrilus abberans (W. Schneider, 1925)				
Tobrilus sp.				
Rhabditis filiformis Buetschli, 1873				
Rhabditis sp.				
Diplogaster rivalis (Leydig, 1854)				
Mononchoides striatus (Buetschli, 1876)				
Mononchoides striatulus (Fuchs, 1933)				
Diplogaster aquaticus Gagarin, 1977				
Paraigolaimella anomala Gagarin, 1977		x		
Panagrolaimus hygrophilus Bassen, 1940		x		
Total	12	37	8	4

3 Distribution of free-living fresh water nematodes by habitats

Table 2 shows that the species density is the highest (49 species) in soft habitats: sludge, sludge and sand, sand, coarse sand, clay and sand, clay; pelophylic and psamophylic representatives are the most frequent. In solid habitats (gravel; gravel and sand) 37 species have been found. It is clear that solid habitats are are inhabited by less species, and most deficient in species are habitats in which penetration in the sediment is impossible (clay, clay and sand) (Stoichev 1996).

Only a small part of free-living fresh water nematodes inhabit determined types of habitats (only soft or only solid habitats), probably stenotopic species. Another, large part of nematodes inhabit many habitats from different types which proves the eurytopic characteristics of the class. For a large part of the nematodes inhabiting different habitat types (solid and soft), the substrate is not a limiting factor.

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Tab. 2:. Distribution of free-living nematodes from Bulgarian inland waters by habitats

Taxon	Solid habitat		Soft habitat						
	Gravel	Gravel Sand	Sludge	Sludge Sand	Sand	Coarse sand	Clay Sand	Clay	Peri-phyton
Mononchus truncatus Bastian, 1865	X	X							X
Mononchus sp.	X								
Mylonchulus brachyurus (Buetschli, 1873)		X							
Aquatides aquaticus (Thorne, 1930)		X	X	X	X		X		
Dorylaimus stagnalis Dujardin, 1848	X	X	X	X	X	X			X
Dorylaimus montanus Stefanski, 1924			X						
Dorylaimus sp.		X							
Paradorylaimus filiformis (Bastian, 1865)	X	X			X	X			
Laimydorus flavomaculatus (Linstow, 1876)			X	X					X
Eudorylaimus carteri (Bastian, 1865)			X						X
Paractinolaimus macrolaimus (de Man, 1880)			X	X					
Paractinolaimus sp.		X							
Thornia steatopyga (Thorne & Schwanger, 1936)		X							
Eumonhystera filiformis Bastian, 1865		X		X	X	X			
Monhystera stagnalis Bastian, 1865			X						
Monhystera paludicola de Man, 1880		X							
Monhystera dispar Bastian, 1865		X			X				
Monhystera macraphis Filipjev, 1930	X				X	X			
Monhystera vulgaris de Man, 1880				X	X	X			
Monhystera similis Buetschli, 1873			X	X	X				
Monhystera simplex de Man, 1880			X						
Monhystera sp.		X							
Prodesmodora circulata (Micoletzky, 1913)	X	X				X			X
Chromadorina viridis (Linstow, 1876)			X	X		X			
Punctodora ratzemburgensis (Linstow, 1876)			X	X	X	X			
Punctodora bioculata (Schultze in Carus, 1857)		X	X						
Paraphanolaimus behniigi Micoletzky, 1923			X	X					
Aphanolaimus viviparus Plotnikoff, 1899		X							
Aphanolaimus aquaticus Daday, 1897	X	X							
Cylindrolaimus communis de Man, 1880	X	X		X					
Cylindrolaimus melancholicus de Man, 1880				X	X				
Axonolaimus spinosus (Buetschli, 1874)			X						
Axonolaimus sera Tchesunov, 1976		X	X	X					
Chronogaster typicus (de Man, 1921)				X					
Chronogaster boettgeri Kischke, 1956		X	X	X	X				
Plectus assimilis Bueschli, 1873					X				
Plectus inquirendus Andrassy, 1958			X	X	X				
Plectus cirratus Bastian, 1865		X	X						
Plectus tenuis Bastian, 1865		X	X	X					
Enoploides fluviatilis Micoletzky, 1923				X	X		X		
Enoploides sp.	X	X	X						
Prismatolaimus intermedius (Buetschli, 1873)			X						
Prismatolaimus dolichurus de Man, 1880		X	X						
Tripyla glomerans Bastian, 1865		X				X			
Tripyla filicaudata de Man, 1880		X				X			
Tripyla selifera Buetschli, 1873		X							
Tripyla sp.		X							
Trischistoma monohystera (de Man, 1880)		X							
Trischistoma arenicola (de Man, 1880)		X	X						
Tobrilus gracilis (Bastian, 1865)	X		X		X	X			
Tobrilus stefanskii (Micoletzky, 1925)	X	X	X						
Tobrilus abberans (W. Schneider, 1925)				X					
Tobrilus sp.		X	X						
Rabditis filiformis Buetschli, 1873		X	X			X			
Rabditis sp.				X					
Diplogaster rivalis (Leydig, 1854)		X	X						
Mononchoides striatus (Buetschli, 1876)			X						
Mononchoides striatulus (Fuchs, 1933)			X	X	X	X			
Diplogaster aquaticus Gagarin, 1977				X	X				
Paraigolaimella anomala Gagarin, 1977			X	X	X				
Panagrolaimis hygrophilus Bassen, 1940		X	X	X					
Total	37	49	24	18	13	2	?	?	?

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