Lauterbornia H. 13: 73-83, Dinkelscherben, März 1993

Current review on Oligochaeta from macrozoobenthic communities of the Bulgarian rivers

[Die Oligochaeta im Makrozoobenthon der bulgarischen Flüsse]

Yordan Uzunov and Liudmila Kapustina

With 1 Figure and 2 Tables

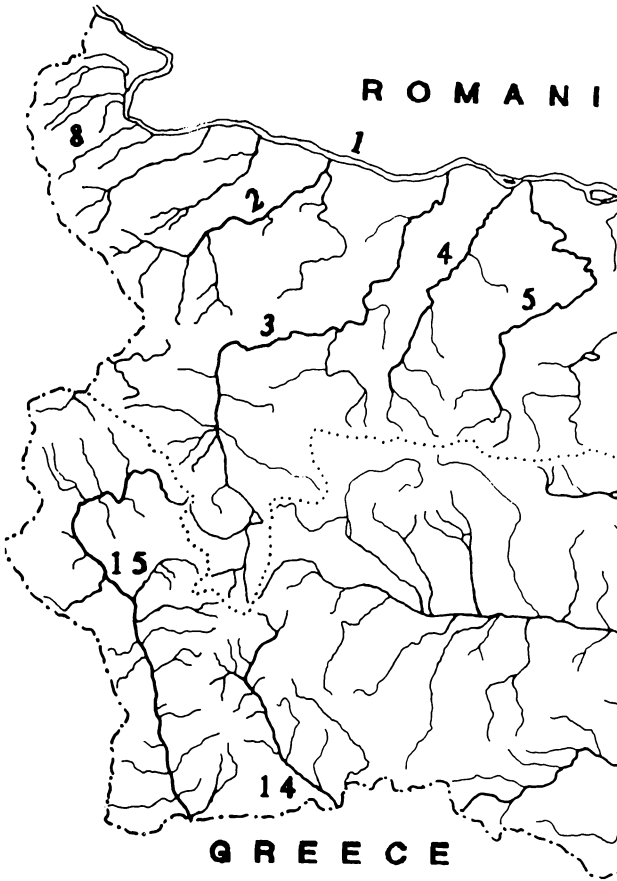
Schlagwörter: Oligochaeta, Makrozoobenthon, Donau, Bulgarien, Fließgewässer, Stehgewässer, Ähnlichkeit, Artidentität, Sörensen, Faunistik

Actual information about the species richness and distribution of the aquatic oligochete species from the macroinvertebrate bottom communities of the Bulgarian river basins and several other water bodies.

Aquatic oligochetes are an essential and sometimes even the only component of riverine invertebrate communities. In the last three decades they were extensively studied in order to determine the biological sufficiency and water quality of the Bulgarian rivers by means of saprobic and structural analyses of bottom communities. Some time ago UZUNOV (1980) published a generalized list of species richness, occurrence and dominance of aquatic Oligochaeta, based on 1040 samples from 11 Bulgarian rivers (Fig. 1). The investigations continued, the number of sampling points within the river basins further increased and new information was obtained about their oligochete species composition. Meanwhile, many of the ideas about the taxonomic status of various genera/species were revised (TIMM & FINOGENOVA 1987).

The brief review, presented here, is a second attempt to generalize the available data (both published and unpublished), referring to aquatic Oligochaeta, from the macrozoobenthos of the Bulgarian rivers and some other water bodies. Alongside, it aims to up-date the concepts about their taxonomic status.

A total of 1875 quantitative and qualitative samples served as a basis for this presentation to which considerably contributed Prof.Dr. B. Russev and his collaborators from the Group on Biopotamology & Saprobiology in the Department of Hydrobiology at the Institute of Zoology, Bulgarian Academy of Sciences. In addition, abundant collection of samples was provided in 1987 during the National Youth's Action "Clean Rivers", covering 3 times (spring, summer, autumn) about 320 different sites all over the country. The authors' surveys on various inland rivers were also taken into consideration. As far as the Danube is concerned, this paper has generalized data initially obtained by Prof. Dr. B. Russev (until 1986) and by the successive 1988-1991 expeditions jointly organized with the Institute of Hydrobiology (Kiev, Ukraine) in 1988-1990 and the International Centre of Water Studies (Amsterdam, Holland) in 1991 within the Bulgarian-Rumanian stretch (Danube-km 375-845).



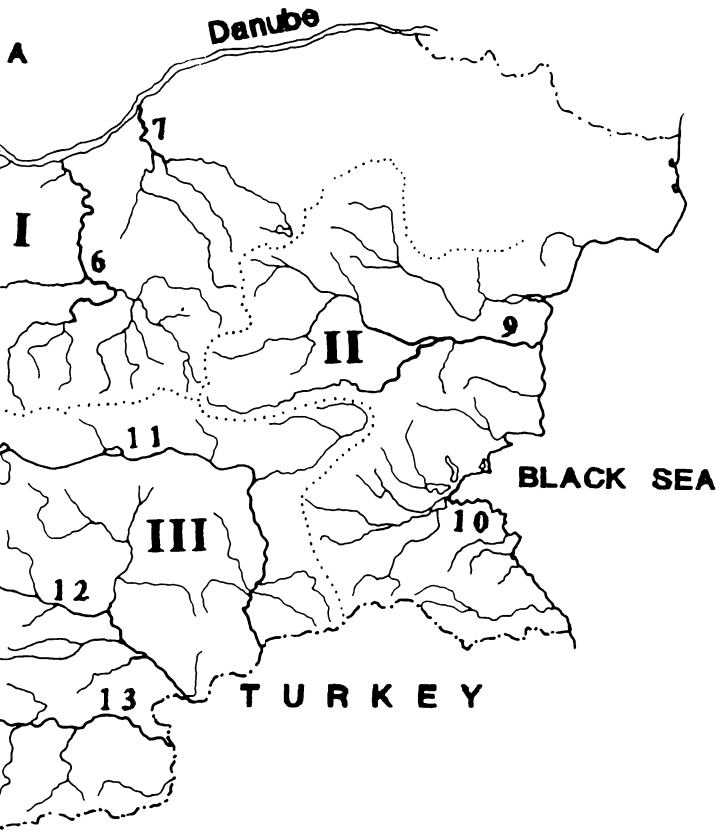


Fig. 1: Principal map of the river net of Bulgaria (75% of M 1:2 000 000)
Catchment areas and basins are marked as followed: Danube area (I): Danube River (1) and its tributaries: Ogosta (2), Iskar (3), Ossam (4), Vit (5), Jantra (6), Russenski Lom (7), and smaller ones (8); Black Sea area (II): Kamtchia (9) and smaller tributaries (10); Aegean area (III): Tundzha (11), Maritsa (12), Arda (13), Mesta (14) and Struma (15). Studied stagnant water bodies (16) are not marked on the figure

Tab. 1 presents generalized data about the distribution of aquatic Oligochaeta, found in the macrozoobenthos of 15 river basins, belonging to three catchment areas: the Danubian (the Danube is presented separately), the Black Sea (s. str.) and the Aegean ones. Column 16 involves additional species, observed in stagnant water bodies (fresh-water and brackish lakes, swamps, reservoirs). For convenience sake oligochetes are listed in generic and species alphabetic order. Their status is determined according to TIMM & HNOGENOVA (1987).

About 106 taxa (46 genera from 8 families) have been registered so far in the list of macrozoobenthic oligochetes, established in the Bulgarian rivers and some other water bodies, including also a few species (*Dero* sp., *Homochaeta* sp., *Psammoryctides* sp., *Rhyacodrilus* sp., etc.) whose taxonomic status is to be determined (species nova?). The newly enlisted species (10 genera) have a better insight into oligochets fauna than UZUNOV gained (1980). Although there are still discussions, trying to elucidate whether it is correct to add certain soil lumbricids to the list of aquatic oligochets (UZUNOV & AFANASSIEV 1991), all species registered in bottom samples are given in Tab. 1. Most of them are wellknown representatives of the European limnofauna but *B. vejdovskianum* is mentioned for the first time in the Bulgarian one. Of special interest are *S. fossularis* in the Danube and its adjacent water bodies (AFANASSIEW & UZUNOV 1990; UZUNOV & AFANASSIEV 1991), *H. chappuisi* in several rivers (SUBCHEV & STANIMIROVA 1986), *P. simplex* (brackish?) in the Tundja river and *R. falciformis* in the Strouma (ISLAM & al. 1986) and Yantra rivers, etc.

The number of species, recorded after 1980, varies within a wide range for the individual river basins and depends primarily on the extent to which oligochetes communities have been studied rather than on the number of samples. Thus, for instance, 279 samples within the Strouma river basin have not diversified the species composition, established by ISLAM & al. (1986) while only 39 within the catchment area of the Kamchia river, a Black Sea tributary, have revealed 20 out of the total 22 oligochaete species. Expressed in percentage from all species, the newly registered ones in the catchment areas of Kamchia (90.9 %) and some other Black Sea tributaries (83.8 %) prove that practically the oligochaete fauna in them has been poorly studied until recently. The newly registered species have also a high relative share in the river basins of Ossam (56.1 %), Arda (40.7 %) and in the smaller/shorter Danubian tributaries (32.4 %), while the oligochets, found in the Danube (5.1%), Maritsa (9.3%), Tundja and Iskar (17.1 %) are assumed to be sufficiently explored.

Tab. 1: Distribution of aquatic Oligochaeta in the river basins under study

+ known from published sources; * first record for the river basin; ** first record for the Bulgarian limnofauna

Catchment ares and basins. Danube area (I): Danube river (1) and its tributaries Ogosta (2), Iskar (3), Ossam (4), Vit (5), Jantra (6), Russenski Lom (7) and smaller ones (8). Black Sea area (II): Kamtchia (9) and smaller tributaries (10). Aegean area (III): Tundzha (11), Maritsa (12), Arda (13), Mesta (14) and Struma (15). Various stagnant water bodies (16)

Catchment area	I								II		III					
Taxon \ River basin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Aeolosoma hemprichi EHRENBERG														+	+	+
Aeolosoma quaternarium EHRENBERG																
Aeolosoma variegatum VEJDOVSKY																
Allolobophora sp.																
Allolobophora caliginosa (SAVIGNY)																
Allolobophora rosea (EISEN)																
Amphichaeta leydigi TAUBER																
Aulodrilus limnobius BRETSCHER											+					
Aulodrilus pectinatus AIYER											+					
Aulodrilus pigueti KOWALEWSKI											+					
Aulodrilus pluriseta PIGUET								+			+	+				
Aulophorus furcatus (MÜLLER)											+	+				
Bothrioneurum vejdovskyanum STOLC **																
Branchiura sowerbyi BEDDARD																
Chaetogaster crystallinus VEJDOVSKY																
Chaetogaster diaphanus (GRUITHUISEN)																
Chaetogaster diastrophus (GRUITHUISEN)																
Clitelio arenarius (MÜLLER)																
Criodrilus lacuum HOFFMEISTER							+									
Dendrobaena sp.																
Dendrobaena octaedra (SAVIGNY)																
Dendrobaena platyura (FITZINGER)																
Dero sp.																
Dero digitata (MÜLLER)																
Dero dorsalis FERRONIERE																
Dero nivea AIYER																

Catchment area	I		
Taxon \ River basin	1	2	3
Dero obtusa D'UDEKEM			
Eisenia foetida (SAVIGNY)			
Eiseniella oltenica POP			
Eiseniella tetraedra (SAVIGNY)			
Enchytraeus albidus HENLE			
Fridericia cf. perrieri VEJDOVSKY			
Haplotaxis gordioides HARTMANN			
Heterochaeta costata CLAPAREDE			
Histricosoma chappuisi MICHAELSEN			
Homochaeta sp.			
Homochaeta naidina BRETSCHER			
Ilyodrilus templetoni (SOUTHERN)			
Isochaetides michaelseni (LASTCHOKIN)			
Limnodrilus claparedeanus RATZEL			
Limnodrilus hoffmeisteri CLAPAREDE			
Limnodrilus profundicola (VERRIL)			
Limnodrilus udekemianus CLAPAREDE			
Lumbriculus variegatus MÜLLER			
Lumbricus rubellus HOFFMEISTER			
Marionina cf.argentea (MICHAELSEN)			
Mesenchytraeus armatus (LEVINSEN)			
Nais alpina SPERBER			
Nais barbata MÜLLER			
Nais behningi MICHAELSEN			
Nais bretscheri MICHAELSEN			
Nais communis PIGUET			
Nais elinguis MÜLLER			
Nais pardalis PIGUET			
Nais pseudobtusa PIGUET			
Nais simplex PIGUET			
Nais variabilis PIGUET			
Octolasion transpadanum (ROSA)			
Ophidonais serpentina (MÜLLER)			
Paranais frici HRABE			

					II		III					
4	5	6	7	8	9	10	11	12	13	14	15	16
*				*	*	*						

Catchment area	I	
Taxon \ River basin	1	2
Paranais litoralis (MÜLLER)		
Paranais simplex HRABE		
Potamothrix bavaricus (OERSTED)		
Potamothrix bedoti (PIGUET)		
Potamothrix danubialis (HRABE)	+	
Potamothrix grimmi (HRABE)	*	
Potamothrix hammoniensis (MICHAELSEN)	+	
Potamothrix heuscheri (BRETSCHER)	+	
Potamothrix moldaviensis VEJDOVSKY & MRAZEK	+	
Potamothrix mrazeki (HRABE)	+	
Potamothrix vejdovskyi (Hrabe)	+	
Pristina aequiseta BOURNE	+	
Pristina longiseta EHRENBERG	+	
Pristinella amphibiotica (LASTCHOKIN)		
Pristinella bilobata (BRETSCHER)		
Pristinella menoni (AIYER)		
Pristinella rosea (PIGUET)		
Propappus volki MICHAELSEN		
Psammoryctides sp.		
Psammoryctides albicola (MICHAELSEN	+	
Psammoryctides barbatus (GRUBE)	+	
Psammoryctides moravicus HRABE	+	
Rhyacodrilus sp.		
Rhyacodrilus coccineus (VEJDOVSKY)		
Rhyacodrilus eckmani PIGUET		
Rhyacodrilus falciformis BRETSCHER		
Rhynchelmis sp.		
Rhynchelmis limosella HOFFMEISTER		
Rhynchelmis tetratheca MICHAELSEN		
Slavina appendiculata (D'UDEKEM)		
Specaria josinae (VEJDOVSKY)		
Spirosperma sp.		
Spirosperma ferox EISEN		
Spirosperma velutina (GRUBE)		

						II		III					
3	4	5	6	7	8	9	10	11	12	13	14	15	16
									+				+
		+									+		+
		*									+		+
		+									+		+
		+									+		+
											+		+
											+		+
											+		+
											+		
											*		
								+	+		+		+
											+		+
													+

Catchment area	I								II		III					
Taxon \ River basin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stylaria fossularis LEIDY	+			*												
Stylaria lacustris (LINNAEUS)	+		+	+												
Stylodrilus sp.				*												
Stylodrilus heringianus CLAPAREDE				+												
Stylodrilus parvus HRABE & CERNOSVITOV				*												
Tubifex sp.																
Tubifex ignotus (STOLC)																
Tubifex nerthus MICHAELSEN																
Tubifex newaensis (MICHAELSEN)																
Tubifex tubifex (MÜLLER)														+		
Uncinais uncinata (OERSTED)														+		
Vejdovskyella comata (VEJDOVSKY)	+													+		
Total number of species	59	29	41	41	50	41	23	34	22	37	47	54	27	59	50	65
Newly registered of them	2	8	7	23	10	9	3	11	20	31	8	5	11	12	-	1
Total number of samplings	86	43	109	98	63	126	95	63	39	102	108	223	47	305	279	89

However, the ecological conditions within the respective river basins are to be taken into account when their species variety is assessed. For example, the poor species variety of aquatic oligochetes in the Russenski Lom basin is due to the pessimal ecological situation there (RUSSEV & al. 1987, 1988). The same applies to other Danubian tributaries like Ogosta (JANEVA 1991), Iskar (JANEVA & RUSSEV 1989), Yantra (according to authors' unpublished data). Conversely, the Danube (RUSSEV & UZUNOV 1991) and many stagnant water bodies (UZUNOV 1983, KOVACHEV & UZUNOV 1987 and some more results, achieved by the authors) are remarkable for their greater biotopic diversity and wider spectrum of ecological conditions. This refers to the rivers Vit (JANEVA 1987, 1988), Mesta (KOVACHEV & UZUNOV 1986) or Strouma (UZUNOV & KOVACHEV 1987) as well.

Probably the differences in the prevailing ecological situation are important for the degree of species similarity of the individual river basins (Tab. 2). With slight exceptions Sörensen's similarity index is comparatively high - about 63.4 % on the average. This species communality should be ascribed chiefly to the commonest aquatic oligichets such as *L. hoffmeisteri, L. udekemianus, N. bretscheri, N. elinguis, N. pardalis, O. serpentina, T. tubifex* (registered in all 16 columns of Table 1) and also to *D. obtusa, E. tetraedra, L. claparedeanus, N. communis, N. variabilis, S. lacustris* (15), *C. diaphanus, N. barbata, P. albicola* (14), etc. A total of 26 taxa (24.5 % of the whole species list) are found in more than 12 river basins and 41 taxa (38.7 %) in over half of the river basins. Further faunistic investigations, confined specifically to aquatic oligochetes, are believed to be helpful for finding out the above mentioned commonest species in all main river basins. A general overview on their significance as indicators implies that most frequent are the true poly- and α-mesosaprobic or tolerant eurybionts. Unfortunately this fact only confirms UZUNOV's earlier inference (1980) that the species composition indicates aggravated qualitative characteristics and instability of the water quality parameters for most of the Bulgarian inland rivers.

In our opinion there are not good reasons to conclude that on a larger regional scale oligochete fauna will acquire a marked specificity. The number of taxa, recorded in the Danubian catchment area (i. e. the Danube and its tributaries) is 84, in the river basins, belonging to the Aegean region - 77 and in those of the Black Sea region s. str. - 42 from the total of 96 taxa (column 16 in table 1 is excluded). The species similarity between the Danubian and Aegean regions goes up to 83.2 % and between each of these two and the Black Sea region it reaches 55.6 % and 62.6 % respectively because the latter is inadequately studied with regard to its river basins.

To sum up, proceeding from the aforesaid information, we may say that Oligochaeta limicola from the macrozoobenthos of the major river basins is a relatively well examined group of the Bulgarian limnofauna. Substantial role in enlarging the knowledge about their species richness will have the future systematic investigations on oligochetes in stagnant water bodies and in the marine-brackish complex together with the special taxonomic studies of the both families Enchytraeidae and Lumbriculidae.

Tab. 2: Degree of species similarity (Sörensen's index, %) of the aquatic oligochets from studied river basi NR - newly registered after 1980 (per cent of total number)

River basin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	NR
Danube river	**1**	55.2	54.5	62.6	63.0	62.6	42.0	60.9	45.0	50.5	62.9	67.9	54.1	63.2	66.7	65.6	5.1
Ogosta river		**2**	67.6	60.0	60.6	68.6	61.5	60.3	62.7	63.6	65.8	57.8	78.6	54.5	63.3	55.9	27.6
Iskar river			**3**	69.9	67.4	63.4	53.1	72.0	60.3	64.1	78.6	72.9	70.6	69.3	80.4	64.1	17.1
Ossam river				**4**	72.5	73.2	59.4	69.3	60.3	64.1	72.7	71.6	61.8	68.0	72.5	64.8	56.1
Vit river					**5**	68.1	49.3	61.9	50.0	59.8	74.2	76.9	67.5	73.4	76.0	75.4	20.0
Jantra river						**6**	62.5	69.3	60.3	64.1	70.4	69.5	61.8	68.0	74.7	64.7	21.9
Russenski Lom river							**7**	45.6	62.2	50.0	51.4	51.9	60.0	48.8	52.1	50.6	13.0
Smaller Danube tributaries								**8**	60.7	59.2	64.2	65.9	59.0	64.5	69.0	53.1	32.4
Kamtchija river									**9**	51.6	60.9	55.3	69.4	49.4	50.0	46.5	90.9
Smaller Black Sea tributaries										**10**	66.7	65.9	62.5	58.3	62.1	55.4	83.8
Tundzha river											**11**	81.2	83.2	67.9	76.3	72.1	17.0
Maritsa River												**12**	61.7	76.1	76.9	76.3	9.3
Arda river													**13**	55.8	62.3	54.9	40.7
Mesta river														**14**	80.7	66.7	20.3
Struma river															**15**	77.2	-
Various stagnant water bodies																**16**	1.5

Acknowledgements

The authors are thankful to Prof. Dr. B. Russev and his team from the Institute of Zoology for the abundant oligochete samples and data they could provide and for their investigations, carried out in numerous Bulgarian rivers, particulary in the Danube and its tributaries.

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Anschrift der Verfasser: Assoc. Prof. Y. Uzunov, PhD, and Dr. L. Kapustina, Dept. Ecological Monitoring & Modelling, Institute of Ecology, Bulgarian Academy of Sciences, 1113 Sofia, 2 Gagarin Str., Bulgaria

Manuskripteingang: 04.12.1992