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Taxocens of *Chironomidae (Diptera)* in some rivers and streams of the Adzhar ASSR (Little Caucasus Mts)

Taksoceny *Chironomidae (Diptera)* niektórych rzek i potoków Adżarskiej ASRR (Mały Kaukaz)

Wpłynęło 28 grudnia 1978 r.

A b s t r a c t — In the investigated rivers and streams of the Adzhar ASSR, flowing down the western slopes of the Little Caucasus Mts and feeding the Black Sea, 82 taxonomic units of *Chironomidae* were identified including a few species new to the fauna of the Caucasus. It was found that in these rivers the *Chironomidae* taxocens were similar to those found in the mountainous and submontane rivers of Europe and did not form a separate type. However, it is characteristic that most of them are typical of the rhithron throughout the course of the river. Only in te River Čoloki the rhithron and potamon taxocens could be differentiated. The variation in the composition, dominance structure, number and biomass of *Chironomidae* which were, observed in the different rivers did not coincide with altitude changes. Greater differences were frequently found between the individual rivers than between the upper and middle course of a river. It can be claimed that in this case the factors decisive for the distribution of *Chironomidae* taxocens are: the type of substratum, the chemism and turbidity of water, and the annual variation in water yields.

Notwithstanding the large number of research works carried out on *Chironomidae* fauna inhabiting the rivers and streams of the Caucasus Mts (K a k a u r i d z e 1946, K a s y m o v 1965, 1972, M u r v a n i d z e 1948, P a n k r a t o v a 1959), many regions have not been adequately investigated in this respect yet. One of them is the Adzhar ASSR. The object of this work has been to present the distribution of *Chironomidae* taxocens in the different streams and rivers of this region.

The work is a part of a comprehensive study on the bottom fauna of rivers and streams of the Adzhar ASSR (Z o s i d z e 1972). It was carried

out at the Department of Zoology of Invertebrates of the Tbilisi National University, at the Ichthyological and Hydrobiological Laboratory of the Zoology Institute of the Georgian Academy of Sciences, and at the Laboratory of Water Biology of the Polish Academy of Sciences.

The work is dedicated to the memory of dr O. I. Tskhomelidze, the late director of the Ichthyological and Hydrobiological Laboratory of the Zoology Institute of the Georgian Academy of Sciences, who initiated these investigations.

Investigation area and method

All the investigated rivers and streams belong to the Black Sea basin. The catchment area is 3000 square kilometres and the rivers drain the western slopes of the Little Caucasus Mts. Their springs are located in the zone of subalpine meadows. They cross all vegetation zones and flow into the sea in the subtropical zone.

The investigation was conducted in some rivers and their affluents in their median and lower course (fig. 1).

The River Čoroch begins its course in the territory of Turkey. In its lower course, in a 20-kilometre sector, it flows through the Adzhar ASSR

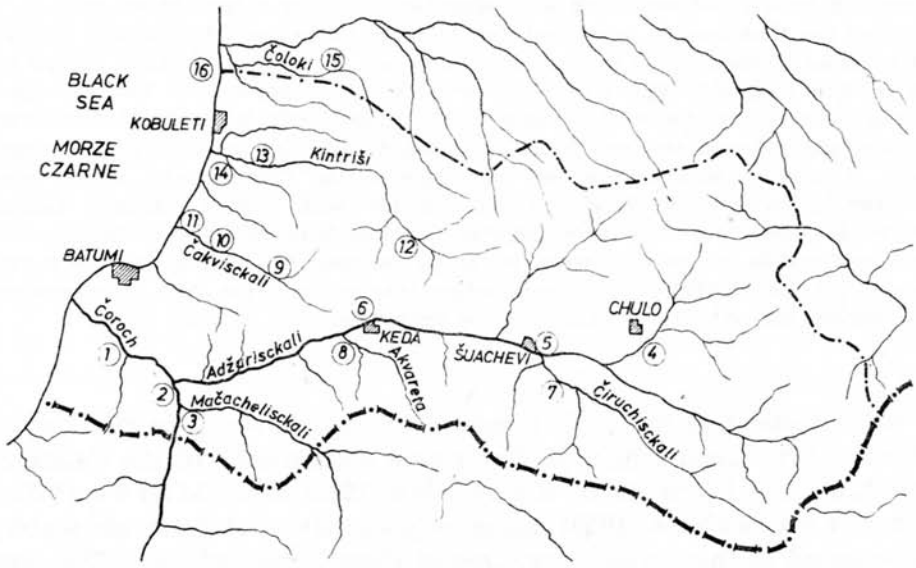

Fig. 1. Map of rivers and streams of the Adzhar ASSR, with the sampling stations marked down. 1—16 — stations

Ryc. 1. Mapa rzek i potoków Adżarskiej ASRR z zaznaczonymi stanowiskami poboru prób. 1—16 — stanowiska

and disgorges into the Black Sea. The mean annual water yield is 260 m^3/s, the maximal one being 4160 m^3/s, and minimal one 80 m^3/s. The means annual turbidity — 450 g/m^3, maximal 7114 g/m^3, minimal 8 g/m^3.

The Mačachiscchali stream, the right-side tributary of the River Čoroch, beings from the springs located on the north-west slope of the woody Šavšetski range at an altitude of 2375 m above sea level.

The River Adžarisckali is the longest right-side tributary of the River Čoroch, being also the longest river of the Adzhar ASSR; it is 138 km in length, its basin covers 1540 km^2. It begins from the springs located on woody north-west slopes of the Arsianski range at an altitude of 2375 m above sea level. The mean annual yield is 5.28 m^3/s, with 36 m^3/s as a maximum and 0.8 m^3/s as a minimum in the upper river sectors and with 32.9 m^3/s, 235 m^3/s, and 6.3 m^3/s respectively in the lower river course. In the upper river course the bottom is rocky or covered with large stones, in the lower course it is covered with small stones, gravel, and sand with mud.

The Čiruchisckali and Akvarieta streams, left-side tributaries of the River Adžarisckali, are typical montane streams, characterized by a rapid current, great water transparency and rocky or stony bottom.

The River Kintriši, 40 km in length, is a typical montane river of the Black Sea coast. Its springs are located on the north-west slopes of the Maschetski range, at an altitude of 2200 m above sea level. In its upper and middle course the river flows through a deep woody valley and as far as in the distance of 5 km from the outflow it flows on a wide plain, covered with tea and citrus crops plantations. The mean annual water yield is 9.02 m^3/s, with a maximum of 164 m^3/s and a minimum of 2.50 m^3/s.

The River Čakvisckali is similar to the River Kintriši.

The River Čoloki is 27,5 km in length and in its upper course has the characteristic features of a montane river; in its middle and lower course it is a lowland river with typical deep places and a weak current. It flows through the moorland areas of Colchis.

The specimens of the bottom fauna were collected at 16 stations. The detailed hydrochemical and hydrological characteristics of the different stations are given in Table I.

The samples were collected from July 1969 to May 1970 at 1-month intervals, using Sadovski's bathometer (S a d o v s k i 1948) of 0.09 m^2 surface. At each station 3 or 4 samples were taken from the cross-section of the river bed: in the weak current near the bank, in the medium current at a distance from the bank, and in the fastest current in the middle of the river, where the greatest depth was observed. The collected samples were joined together in order to obtain only one sample from one date and one station. The collected specimens were washed in bolting cloth of 0.4 mm mesh, and fixed in 4% formalin. The total number and biomass of *Chironomidae* were calculated by B o r u c k i j's method (B o r u c k i j 1934).

Table I. Hydrological and hydrochemical characteristics of stations in the investigated streams and rivers of the Adzhar ASSR (śl- trace)
Tabela I. Hydrologiczna i hydrochemiczna charakterystyka stanowisk w badanych potokach i rzekach Adżarskiej ASRR (śl- ślad)

River Rzeka (length in km) (długość w km)	Number of station Numer stanowiska	Locality where the sampling station was appointed Miejscowość gdzie wyznaczono stanowisko	Altitude above sea level Wysokość n.p.m.	Water transparency (range) Przezroczystość wody (zakres) m	Water temperature Temperatura wody (range) (zakres) °C	Annual mean - Średnia roczna						
						pH	O_2 mg/dcm^3	CO_2 mg/dcm^3	Oxidability Utlenialność O_2 mg/dcm^3	NO_2 mg/dcm^3	NO_3 mg/dcm^3	$PO_4 + P_2O_5$ mg/dcm^3
Čoroch (438)	1	Mirveti	44	0.1 - 0.5	4.4 - 20.4	7.5	9.9	2.7	3.9	0.01	0.7	0.04
	2	Erge	30	0.1 - 0.5	4.4 - 20.5	7.5	9.1	2.7	4.4	0.1	0.7	0.04
Mačchelischali	3	Sindveti	62.8	0.9 - 2.0	5.1 - 17.1	7.3	11.1	2.9	4.3	0.03	0.5	0.03
Adžarischali (183)	4	Chalo	940	0.5 - 1.0	2.1 - 18.4	7.4	10.2	2.5	3.9	śl	0.4	0.04
	5	Šuachevi	650	0.4 - 0.7	2.5 - 19.0	7.5	9.9	3.7	3.8	0.01	0.4	0.04
	6	Keda	257	0.4 - 0.7	3.6 - 20.3	7.7	9.8	3.9	3.6	0.01	0.3	0.04
Čiruchischali (37)	7	Okropilauri	665	0.7 - 1.0	2.2 - 17.5	7.5	10.8	3.7	3.4	0.02	0.4	0.03
Akvareta (17)	8	Sichalizadeebi	342	0.9 - 1.5	2.5 - 15.2	7.6	10.9	2.8	3.3	0.01	0.4	0.04
Čakvischali (22)	9	Čakvistavi	715	1.25	3.1 - 17.0	7.4	10.9	0.7	1.9	śl	0.2	0.03
	10	Chala	115	1.2	4.8 - 18.0	7.5	9.9	0.9	2.0	śl	0.4	0.03
	11	Čakva	4	0.9 - 1.5	5.1 - 24.0	7.6	9.6	1.6	2.6	0.04	0.8	0.04
Kintriši (40)	12	Čachati	850	1.2	3.1 - 16.0	7.5	10.9	1.7	3.3	0.1	0.3	0.03
	13	Kochi	112	1.2	4.3 - 17.8	7.5	9.8	1.8	3.1	0.1	0.3	0.03
	14	Kobuleti	4	0.9 - 1.5	5.2 - 24.0	7.6	9.6	2.6	2.9	0.2	0.3	0.04
Čoloki (27.5)	15	Kakuti	645	1.0 - 1.5	4.1 - 26.0	7.3	10.5	4.1	2.9	0.01	0.4	0.04
	16	Kobuleti (Piovinari)	3	0.6 - 1.0	6.0 - 28.0	7.8	9.5	3.4	2.8	śl	0.4	0.05

Table II. Distribution of Chironomidae at different stations in the selected rivers and streams of the Adzhar ASSR

Tabela II. Rozmieszczenie Chironomidae na stanowiskach w wybranych rzekach i potokach Adżarskiej ASRR

I - Čoroch; II - Mačachelischali; III - Adžarischali; IV - Čiruchischali; V - Akvareta; VI - Čakvischali; VII - Kintriši; VIII - Čoloki;

l - larvae, larwy; p - pupae, poczwarki; ♂ - imago prepared from the pupae, imago wypreparowane z poczwarki

Taxons - Taksony / River - Stream, Rzeka - Potok	I		II	III			IV	V	VI			VII			VIII	
Station - Stanowisko	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Thienemannimyia - Reihe (l)		+		+	+	+			+	+	+	+	+	+	+	+
- (?) carnea (FABR.) (n)										+						
Rheocelopia maculipennis (ZETT.) (p)															+	
Conchapelopia pallidula (MEIG.) (p)				+		+				+			+		+	
Nilotanypus dubius (MEIG.) (l,p)					+				+	+			+			
Procladius sp. (n)																+
Tanypodinae (juv.) (l)			+										+			
Boreohentagyia sp. (l)				+	+					+	+	+				
Diamesa gr. cinerella (l)	+	+	+	+	+	+	+	+	+	+	+		+		+	
- thienemanni KIEFF. (p,♂)			+	+	+	+	+	+	+			+			+	
- gr. latitarsis I (l)				+			+	+			+					
- gr. latitarsis II (l)				+			+									
- caucasica KOWN., KOWN. (p)							+									
- bertrami EDW. (p,♂)							+									
- gr. aberrata (l)															+	
Diamesa sp. I (l)	+		+	+	+	+	+	+	+		+	+	+		+	
Diamesa sp. II (l)							+									
Diamesa sp. (juv.) (l)		+		+	+	+		+				+		+		
Potthastia gaedii (MEIG.) (l,p)						+			+	+	+			+		
- longimana KIEFF. (l,p)									+	+	+			+		
Pseudodiamesa branickii (NOW.) (l)							+									
Prodiamesa olivacea (MEIG.)																+
Brillia modesta MEIG.	+	+	+	+		+	+	+	+		+	+	+	+	+	
- longifurca KIEFF.		+	+		+	+	+	+	+		+	+	+	+		
Symbiocladius rhitrogene KIEFF., ZAVREL (l,p,♂)	+		+			+		+								+
Cardiocladius sp. (l,p)			+	+	+	+	+	+	+	+	+	+	+	+	+	
Eukiefferiella gr. bavarica (l)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
- discoloripes GOETGH. (p,♂)										+			+			
- minor EDW. (l,p)						+	+	+								
- cyanea THIEN. (l,p,♂)		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
- ilkleyensis (EDW.) (l,p,♂)			+	+	+	+	+		+	+	+	+	+	+	+	
- gr. coerulescens (l)							+				+					
- clypeata (KIEFF.) (l,p)	+		+	+	+	+		+	+	+	+	+	+	+	+	
- gr. brevicalcar (l)	+					+		+	+	+	+	+		+	+	
- brevicalcar (KIEFF.) (p,♂)			+	+	+			+					+		+	+
- cfr. lobifera GOETGH. (p,♂)			+												+	
- cfr. claripennis LUNDB. (p,♂)														+	+	
Eukiefferiella sp. (juv.) (l)		+				+		+	+	+			+		+	
Synorthocladius semivirens (KIEFF.) (l,p,♂)			+	+	+	+			+	+	+	+	+	+	+	
Parorthocladius nudipennis (KIEFF.) (l)			+					+				+				
Orthocladius (Euorthocladius) rivicola (KIEFF.) (l,p,♂)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
- (-) rivulorum (KIEFF.) (l,p,♂)							+	+		+		+	+			
- (-) saxosus (TOK.) (l,p,♂)							+	+	+			+	+			
- (Orthocladius) frigidus (ZETT.) (l,p,♂)			+			+	+		+	+	+		+	+		
Orthocladius spp. + Cricotopus spp. (l)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
- (Orthocladius) saxicola KIEFF. (p,♂)						+	+	+		+	+	+		+	+	
- (-) cfr. excavatus BRUNDIN (p,♂)													+	+		
- (-) gr. rhyacobius (p)					+				+	+	+	+	+	+	+	+
Cricotopus (Cricotopus) bicinctus (MEIG.) (p,♂)					+						+			+	+	
- (-) vierriensis (GOETGH.) (p,♂)														+		+
- (-) tremulus (L.) (p,♂)									+	+	+		+		+	
- (-) cfr. triannulatus (MACG.) (p,♂)																+
- (-) gr. fuscus (p,♂)					+						+			+		+
- (-) similis GOETGH. (p,♂)				+	+		•					+		+		
- (Isocladius) gr. sylvestris (p,♂)										+					+	+
Cricotopus spp. (n)									+							+
Paratrichocladius sp. (l)			+				+			+			+			
Rheocricotopus chalybeatus (EDW.) (l,p,♂)				+	+						+			+	+	
- gr. fuscipes (p)					+	+							+	+	+	
Rheocricotopus sp. (l)			+	+	+						+		+			+
Paracricotopus niger (KIEFF.) (p)			+						+	+						
Limnophyes sp. (l,p)		+			+		+	+			+		+			
Metriocnemus sp. (l,p)									+	+		+				
Parametriocnemus stylatus adsharicus KOWN., ZOSIDZE (l,p,♂)			+		+	+			+	+		+	+	+	+	
Paraphaenocladius sp. (l)								+				+				
Heleniella cfr. ornaticollis (EDW.) (l)					+				+			+				
Smittia sp.				+												
Parakiefferiella cfr. dentifera WÜLK. (p)					+		+									
Krenosmittia sp. (l)										+						
- camptophlebs (EDW.) (p)				+												
Rheosmittia sp. (l)									+							
Mesosmittia sp. (l)							+									
Pseudosmittia gr. trilobata (l)					+											
Pseudosmittia sp. (l)					+											
Thienemanniella sp. (l)															+	+
Corynoneura sp. (l)						+					+		+			
Orthocladiinae (juv.) (l)		+			+	+	+			+				+		
Cryptochironomus sp. (gr. defectus) (l)														+		
Pentapedilum exsectum KIEFF. (l)																+
Polypedilum sp. (gr. nubeculosum) (l)							+		+							+
Polypedilum sp. (gr. nedestre) (l)				+	+	+	+	+	+	+	+	+	+	+		
Polypedilum sp. (? bicrenatum KIEFF.) (l)						+										
Polypedilum sp. (? scalaenum SCHR.) (l)				+	+										+	+
Polypedilum convictum (WALK.) (l,p,♂)													+	+		+
Polypedilum sp. (genuine III) (l)					+					+		+				
Polypedilum sp. I (P,♂)																+
Polypedilum sp. (juv.) (l)	+				+	+				+		+	+	+		
Limnochironomus sp. (gr. nervosus) (l)						+							+			
Microtendipes sp. (? pedellus (de GEER.)) (l)										+			+	+		+
Microtendipes sp. (gr. tarsalis) (l)										+	•	+	+		+	
Chironomini (juv.) (l)								+		+						+
Cladotanytarsus sp. (l)														+		+
Paratanytarsus sp. (l,p)														+		
Tanytarsus gr. pallidicornis (l)									+	+		+		+	+	+
Tanytarsus sp. (l)												+				+
- brundini LIND. (p,♂)											+		+	+		
Tanytarsus sp. I (p,♂)														+	+	
Rheotanytarsus sp. III (p,♂)										+						
Rheotanytarsus sp. I (l)				+	+	+			+	+	+	+	+			
Rheotanytarsus sp. II (l)		+	+		+		+	+	+	+		+	+	+	+	
Rheotanytarsus distinctissimus BRUNDIN (p,♂)						+				+	+					
- muscicola KIEFF. (p,♂)					+	+					+					
Micropsectra sp. I (l)			+	+	+	+		+		+		+	+		+	+
Micropsectra sp. II (l)						+								+		+
Micropsectra sp. (juv.)						+			+				+			
Stempellinella (?) brevis EDW. (l)													+			
Tanytarsini (juv.) (l)	+								+		+		+		+	
Annual mean number of Chironomidae (specimens/m²) / Średnia roczna liczebność Chironomidae (osobniki/m²)	51	118	321	356	365	221	852	196	264	148	502	312	318	869	781	1662
Maximal and minimal number of Chironomidae (specimens/m²) / Maksymalna i minimalna liczebność Chironomidae (osobniki/m²)	111 -6	222 -8	600 -11	660 -18	825 -4	726 -15	2980 -17	687 - 0	1795 -28	463 -26	3584 -0	742 -8	836 -116	2542 -45	2794 -37	3096 -275
Percent of Chironomidae in the total bottom fauna number / Chironomidae jako procent liczebności całej fauny dennej	11.55	21.83	15.6	21.3	16.0	12.82	34.06	10.27	9.77	8.3	39.6	10.8	14.95	49.38	20.84	13.64
Annual mean of Chironomidae biomass (g/m²) / Średnia roczna biomasa Chironomidae	0.04	0.1	00.35	0.4	0.26	0.14	1.45	0.24	0.15	0.1	0.37	0.38	0.33	0.59	0.69	1.08
Percent of Chironomidae in the total bottom fauna biomass / Chironomidae jako procent biomasy całej fauny dennej	1.27	3.1	2.8	5.5	2.13	1.3	12.7	1.9	1.01	1.0	19.67	2.34	1.79	13.44	7.26	68.36

The data obtained on the number and biomass were calculated per one square metre area. Besides, in each sample larvae and pupae were identified, the number of specimens being counted within the different taxonomic units. Then, on the basis of all samples collected at a station throughout a year, the „mean annual sample" was calculated. This „mean annual sample" was used as an initial value in the calculation of the domination structure of *Chironomidae* taxocens. It was calculated on the basis of the percent of different species. The species whose percent in a taxocen was higher than 10 were regarded as dominants. The subdominants reached 1—9.9 percent and the adominants below 1 percent. On the basis of the percent value of prevailing species the similarity of taxocens from the different stations was calculated. The value of this similarity was calculated by means of the modified distance coefficient of two taxocens (modified by Mr Andrzej Filipek, M. Sc., unpublished data):

$$d_{jk} = \sum_{i=1}^{n} |x_{ij} - x_{ik}|^{*}$$

where: n = number of species at two comparable stations;
x_{ij} = percent value of an „i" species at a „j" station;
x_{ik} = percent value of an „i" species at a „k" station;
the number of species varies from i to n, the number of stations from j to k.

The matrix of distance thus obtained (Table IV) was used in plotting a dendrite (fig. 2).

Survey of *Chironomidae* taxonomic units found in the investigation area

In the investigated rivers and streams of the Adzhar ASSR 105 taxonomic units of *Chironomidae* were observed (Table II). While deducting the larval stages (quoted in the list), which were identified as to genus or even to subfamily, and the hardly determinable larvae (among which the species were determined on the basis of pupae or adult forms prepared from the pupae), we obtain only 82 taxonomic units. They constitute about 50% of all *Chironomidae* taxons reported for the Caucasus up to

* Coefficient of distance most frequently used (Sokal 1961):

$$d_{jk} = \sqrt{\sum_{i=1}^{n} (x_{ij} - x_{ik})^2}$$

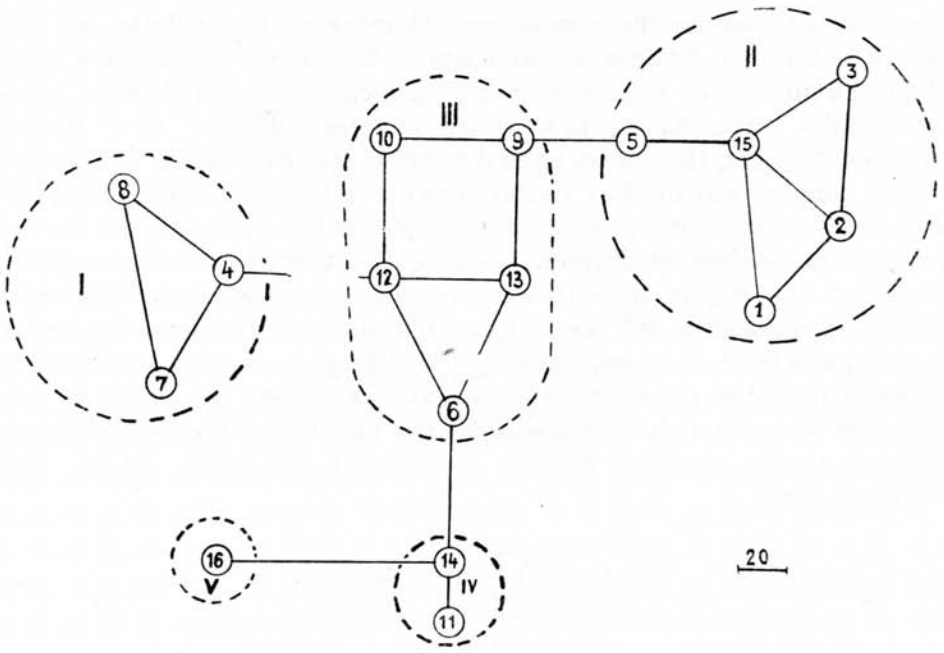

Fig. 2. Dendrite of *Chironomidae* taxocenes of the investigated stations. The broken line denotes the distinguished types of *Chironomidae* taxocenes (I—V)

Ryc. 2. Dendryt taksocenów *Chironomidae* badanych stanowisk. Linią przerywaną ograniczono wyróżnione typy taksocenów *Chironomidae* (I—V)

1972 (K a s y m o v 1972). It can be assumed that the present list of *Chironomidae* from the rivers and streams of the Adzhar ASSR is still incomplete. The basis of the work were collections of larvae and, to a lesser degree, of pupae which were found during hydrobiological investigations. As it is known, the knowledge of these stages is not satisfactory. Therefore, in the present list larvae were identified as to groups of species, genera, or to special units of a higher order which included several genera, e.g., *Cricotopus* spp. + *Orthocladius* spp. Further studies, especially of imago stages should yield new data concerning the qualitative composition.

In checking the *Tanytarsini* preparations from the Adzhar waters, Dr. F. R e i s s found that two species probably are new to science *(Tanytarsus* sp. I and *Rheotanytarsus* sp. III). The Adzhar population of *Parametriocnemus stylatus* showed so many differing features that it was decided to separate it in a subspecies *P. stylatus adzharicus* (K o w n a c k i, Z o s i d z e 1973). Also from other regions of the Caucasus some species new to science were described (K o w n a c k i, K o w n a c k a 1973a, b, Š i l o v a, D ž v a r š e i š v i l i 1974) or found in this area for the first time (K o w n a c k a, K o w n a c k i 1972, K o w n a c k i, K o w n a c k a

1974, Šilova 1978). In the elaborated samples some species new to the fauna of the Caucasus were found among the species identified on the basis of pupae or adult forms.

Rheopelopia maculipennis (Zett.): 2 pupae were found in the River Čeloki at station 15: September 6, 1969. This species has been reported for the USSR only from the region of the Rybinski impoundment (Šilova 1976). In Europe it is known from rivers of central and northern areas (Fittkau, Reiss 1978).

Conchapelopia pallidula (Meig.): pupae were encountered in the River Adžarisckali at stations 4 and 6: August 20, 1969, in the Čakvisckali at station 10: May 25, 1970, in the Kintriši at station 13: August 9, and September 7, 1969, and in the Čoloki at station 15: September 6, 1969. In the USSR it is reported from the River Volga (Šilova 1978). It is common in submontane rivers of all Europe (Fittkau, Reiss 1978).

Nilotanypus dubius (Meig.): single larvae and pupae were found in the River Kintriši at station 13: May 27, 1970, in the Čakvisckali at stations 9 and 10: May 25, 1970, and in the Adžarisckali at station 6: June 18, 1970. It has not been found in the USSR so far (Pankratova 1977). In Europe it is encountered in montane and submontane rivers and streams (Fittkau, Reiss 1978).

Eukiefferiella ilkleyensis (Edw.) (= *E. lutethorax* Geotgh): the species is common in the streams and rivers of the Adzar ASSR. Its larvae were observed at stations 3—7 and 9—15. Pupae were found in the River Adžarisckali at stations 4 and 5: August 20, 1969, in the Čakvisckali at station 10: August 24, 1969, May 25 and June 19, 1970, and in the Čoloki at station 15, December 10, 1969. Probably this species was wrongly identified as *Eukiefferiella quadridenta* Tshern. in the Caucasus (Kasymov 1972). The species is noted in the upper course of rivers, in mosses and algae attached to stones in the Alps and in the mountains of Central Europe (Lehmann 1972).

E. clypeata (Kieff.): the species is frequent in streams and rivers of the Adzhar ASSR. Larvae were found at stations 1, 3—6, 8—15. The pupae were noted in the Mačachela stream: August 25, 1969, March 27, 1970, in the Adžarisckali at stations 5 and 6: August 20, 1969, in the Čakvisckali at station 11: July 24, 1969, August 24, 1969, in the Kintriši at station 13: May 27, 1970 and at station 14: October 11, 1969, and in the Čoloki at station 15: September 6, 1969. The species occurs in the USSR (Pankratova 1970) being also common in the streams and small rivers of Central Europe, on stones and in mosses (Lehmann 1972).

Cricotopus (C.) vierrensis (Geotgh.), adult males were prepared from pupae found in the River Kintriši at station 14: September 7, 1969, and in the River Čoloki at station 16: November 4, 1969. It has not been

noted in the USSR so far. It is known from central and southern Europe, Israel, and Afghanistan (Hirvenoja 1973).

C. (C.) tremulus (L.): pupae of this species were found in the River Čakvisckali at every station: May 25, 1970. From the USSR it has been reported from eastern Karelia and Sakhalin (Hirvenoja 1973). Widely spred in Europe, it lives in mosses and on stones in streams (Hirvenoja 1973).

C. (C.) similis (Goetgh.): several pupae (from which adult males were (obtained) and a few pupal exuviae were found in the River Adžarisckali at station 4: September 30, 1969, at station 5: August 20, 1969, in the Kintriši at station 12: September 7, 1969, and at station 14: September 7, 1969 and October 10, 1969. The pupae and males prepared from pupae in the River Kintriši were identical with those found in the Carpathian rivers (Białka Tatrzańska, Dunajec, Skawa) and surely belong to the species *C. (C.) similis*. On the other hand, the pupae from the River Adžarisckali have a number of transitory features between *C. (C.) similis* and *C. (C.) trifascia*. Since we do not so far know the range of variability of the features, the specimens from the River Adžarisckali are provisionally classified to this species. In the USSR it is reported from the River Volga (Behning 1928). It is common in the rivers of central and northern Europe (Hirvenoja 1973).

Rheocricotopus chalybeatus (Edw.): numerous larvae and pupae (from which adult males were prepared) were found in the River Adžarisckali at station 4: August 20, 1969 and at station 5: August 20, 1969, in the Čaviscckali at station 11: August 24, 1960 and June 19, 1970, in the Kintriši at station 14: August 9, 1969, and in the Čoloki at station 15: August 7, and September 6, 1969. The Caucasian population of this species slightly differs from the populations of central Europe. Differences were observed, especially in the structure of pupae (fig. 3). However, it is probable that these differences are within the range of variability of this species. The species has not been reported from the USSR and is not mentioned in Pankratova's key (1970). It is common in Europe, in lowland and submontane rivers (Fittkau, Reiss 1978, Lehmann 1969).

Paracricotopus niger (Kieff.): single pupae were found in the Mačachela stream: August 25, 1969, and in the River Čakvisckali at station 9: June 19, 1970 and at station 10: May 25, 1970. In has not been so far reported from the USSR and is not mentioned in Pankratova's key (1970). It is common in the rivers and streams of the Alps, Pyrenees, in the mountains of central Europe and of the Balkans; found in North Africa (Fittkau, Reiss 1978).

Parakiefferiella cfr. *dentifera* Wülk.: only one pupa was found in the Čiruchisckali stream, May 6, 1970. The pupae of this species have a thoratic horn of a very characteristic structure distinguishing them from other species of the genus (Wülker 1957). The structure of the pupa agreed

with the description given by Wülker, hence it can be assumed that we had to do with this species. In has not been reported from the USSR and is not mentioned in Pankratova's key (1970). In Europe it is so far known from the Lunzer Untersee (Wülker 1957).

Tanytarsus brundini Lindeb.: pupae were found in the River Čakviscкali at station 11: August 24, 1969 and in the River Kintriši at station 14: September 7, 1969 and May 7, 1970 (males were obtained from the former). The identification was checked by Dr. F. Reiss. In the USSR the species has not been reported. In Europe it is common in streams, rivers, and lakes (Fittkau, Reiss 1978).

Rheotanytarsus distinctissimus Brundin: pupae (from which adult males were obtained) were found in the River Adžariscкali at station 4, August 20, 1969 and in the River Čakviscкali at station 10, August 24, 1969. The identification was checked by Dr. F. Reiss. The species has not been so far reported from the USSR. It is known from streams and rivers in Germany, Sweden, and Finland (Lehmann 1970).

R. muscicola Kieff.: pupae (from which adult males were obtained) were differentiated on the basis of the domination structure (Table III), and in the River Čakviscкali at station 11: April 11, 1970. The species was identified by Dr. F. Reiss. It was not reported from the USSR. The species is widely distributed in Europe; known from North Africa and Mongolia (Lehmann 1970).

Apart from the species mentioned above, particular attention should be paid to *Heleniella* cfr. *ornaticolis* (Edw.) and *Rheosmittia* sp., the forms which were determined as to genus on the basis of larvae or whose identification as to species was not sure but which are new to the fauna of the Caucasus.

Distribution of *Chironomidae* taxocens in the investigated rivers and streams

In the investigated streams five basic types of *Chironomidae* taxocens were differentiated on the basis of the domination structure (Table III), matrix of distance (Table IV), and the plotted dendrite (fig. 2).

Type I occurred at stations 4, 7, and 8. At all these stations the first dominant were *Diamesa* gr. *cinerella* larvae (probably *D. thienemanni*). At stations 7 and 4 the second dominant were *Cricotopus* spp. + *Orthocladius* spp. larvae, and at station 8 *Eukiefferiella cyanea* larvae, while the larvae of *Cricotopus* spp. + *Orthocladius* spp. were only among the less numerous subdominants here. The first subdominants or the third dominants were: *Orthocladius rivicola* and *Diamesa* sp. I.

Type II was most frequent, being noted at five stations: 1, 2, 3, 5, and 15. At all stations the first dominant were *Orthocladius (E.) rivicola* larvae.

Table III. Distribution and domination structure of Chironomidae taxocenes in the investigated rivers and streams of the Adzhar ASSR. Only the predominating species were included. [■] - first dominant; [□] - dominant; + - adominant

Tabela III. Rozmieszczenie i struktura dominacji Chironomidae w badanych potokach i rzekach Adżarskiej ASRR. Uwzględniono tylko gatunki dominujące. [■] - pierwszy dominant; [□] - dominant; + - adominant

Station - Stanowisko	7	4	8	1	2	3	15	5	11	14	6	13	12	10	9	16
Diamesa gr. cinerella	[62.41]	[34.40]	[37.54]	7.44	1.64	1.64	5.41	2.48			2.49		5.18		+	
Orthocladius (E.) rivicola	3.32	8.50	[17.81]	[57.21]	[54.10]	[24.19]	[31.28]	[20.71]	[21.85]	[10.00]	[14.65]	7.66	3.96	2.27	6.68	1.17
Cricotopus spp. + Orthocladius spp.	[13.28]	[13.78]	+	6.04	1.64	2.15	[12.40]	[12.03]	[51.58]	[42.94]	[22.85]	[10.91]	[14.30]	3.12	6.53	[26.85]
Eukiefferiella gr. bavarica		2.02	1.82	4.65	1.64	3.76	1.72	2.49	+	+	5.84	[20.20]	4.86		+	
Polypedilum sp (gr. pedestre)		2.84						2.91			2.42	6.90	[15.81]	[15.70]		
Rheotanytarsus sp. II	+		+		4.92	1.08		5.93		+		1.62		[30.85]	[15.24]	2.05
Limnochironomus sp. (gr. nervosus)								+								[36.12]
Diamesa sp. I	[10.21]	7.70	9.40	[13.96]		+	+		+	+	+	+	+		+	
Eukiefferiella cyanea	1.27	2.43	19.62		[16.39]	[18.26]	7.26	3.11	3.10	5.77	+	2.42	3.55	1.42	5.43	
Orthocladius (O.) frygidus	1.36					[18.26]			+	+	1.47	1.42		1.69	+	
Eukiefferiella ilkleyensis	+	4.48				1.08	+	[10.37]	2.47	3.38		+	+	1.69	8.37	
Cardiocladius sp.	+	+	2.09			6.99	5.94	[10.37]	1.59	1.46	2.42	2.62	3.64	4.51	9.20	
Rheotanytarsus sp. I	+	2.49						5.17	+		[17.08]	1.22	2.43	3.66	2.05	
Polypedilum sp. (gr. nubeculosum)	+														+	[23.29]

Table IV. Diagram of distance between the Chironomidae taxocenes at different stations in the rivers of the Adzhar ASSR
Tabela IV. Diagram odległości pomiędzy taksocenami Chironomidae na poszczególnych stanowiskach w rzekach Adżarskiej ASRR

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	51.58	103.29	104.85	103.58	103.87	127.12	104.64	121.02	139.22	134.55	103.16	103.28	131.86	69.86	164.35
2	-	62.65	124.73	90.71	105.91	156.44	93.63	106.17	126.56	128.16	104.44	98.06	120.16	53.96	165.02
3		-	120.80	76.72	93.83	149.85	82.47	89.54	113.66	118.89	94.01	85.89	111.15	52.29	163.48
4			-	78.81	82.98	50.49	57.56	90.62	120.77	105.18	67.21	75.95	86.31	85.21	138.54
5				-	59.61	128.68	108.76	48.05	93.50	75.81	62.46	61.18	73.28	45.22	134.01
6					-	121.14	110.61	82.80	98.75	70.60	58.01	58.05	63.11	65.83	112.28
7						-	77.08	136.09	145.82	136.69	99.28	108.82	119.64	116.22	154.43
8							-	122.71	143.10	123.87	109.02	111.00	117.36	90.18	166.03
9								-	53.13	106.32	58.14	56.67	82.99	74.73	136.46
10									-	133.79	56.66	74.50	117.00	104.78	146.81
11										-	88.21	85.55	24.21	65.65	114.02
12											-	47.00	70.92	59.74	112.07
13												-	69.32	61.24	112.77
14													-	67.22	96.97
15														-	119.89

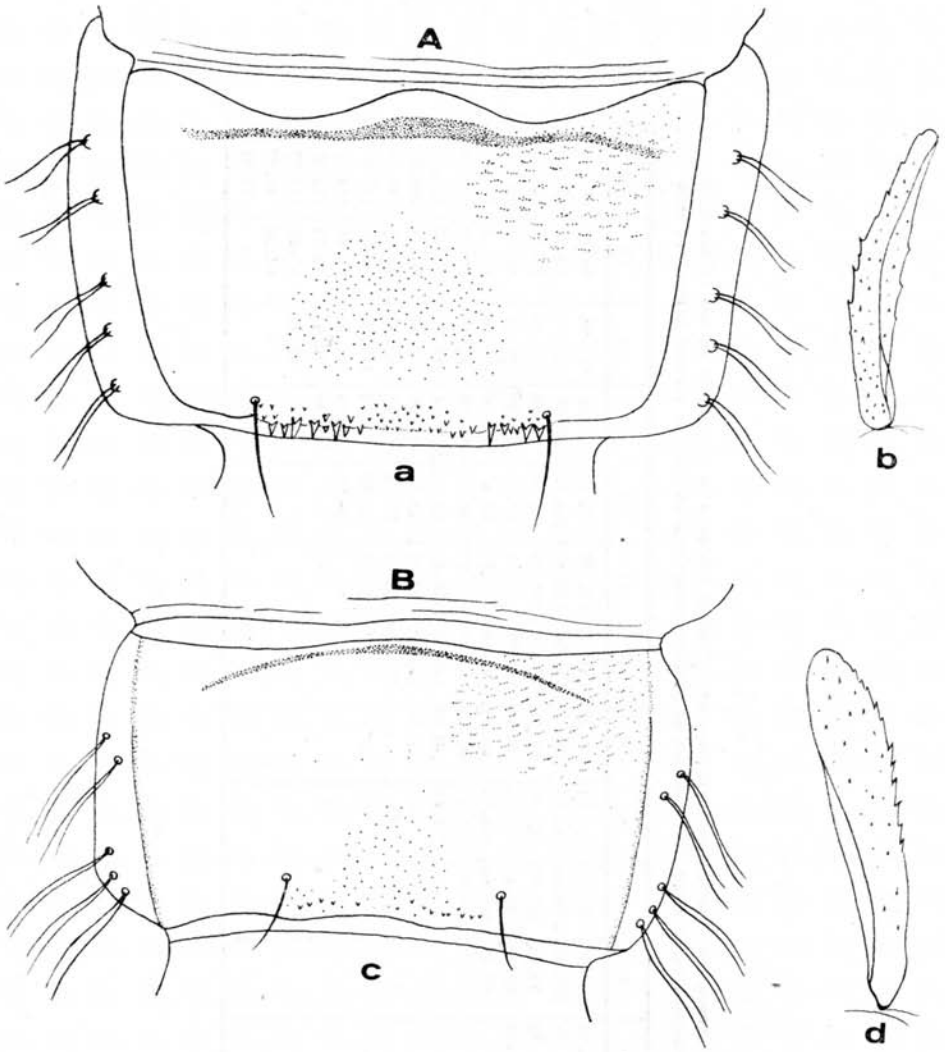

Fig. 3. *Rheocricotopus chalybeatus* (E d w.): A — pupa from the River Wełna (Poland). a — tergite of the VIII abdominal segment; b — thoratci horn. B — pupa from the River Adżarisckali (Adzhar ASSR). c — tergite of the VIII abdominal segment; d — thoratic horn

Ryc. 3. *Rheocricotopus chalybeatus* (E d w.): A — poczwarka z rzeki Wełny (Polska). a — tergit VIII segmentu abdominalnego; b — róg oddechowy. B — poczwarka z rzeki Adżarisckali Adżarska ASRR). c — tergit VIII segmentu abdominalnego; d — róg oddechowy

At stations 5 and 15 the second dominant were the larvae of *Cricotopus* spp. + *Orthocladius* spp., accompanied by *Cardiocladius* sp., *Synorthocladius semivirens, Eukiefferiella ilkleyensis, E. cyanea,* and *E. clypeata* larvae. At stations 2 and 3 the second dominant were the larvae of *Eukiefferiella cyanea.* Station 1 most distinctly differed from the remaining

stations. The larvae of genus *Diamesa* (*D.* gr. *cinerella* and *Diamesa* sp. I), which were less important subdominants at the stations mentioned above, predominated there.

Type III: *Chironomidae* taxocens found at stations 6, 9, 10, 12, and 13 were classified. Although these stations are grouped all together on the dendrite, several *Chironomidae* communities can be differentiated according to the domination structure within this type. At stations 9 and 10 the larvae of *Rheotanytarsus* sp. were the first dominants and at station 10 *Polypedilum* gr. *pedestre* additionally were the second dominant. The accompanying forms were *Cardiocladius* sp., *Eukiefferiella* gr. *bavarica, E. ilkleyensis, Orthocladius rivicola,* and *Cricotopus* spp. + *Orthocladius* spp. At station 12 *Polypedilum* gr. *pedestre* larvae were the first dominant and at station 13 *Eukiefferiella* gr. *bavarica* larvae prevailed. At the two stations the larvae of *Cricotopus* spp. + *Orthocladius* spp. were the second dominants while *Orthocladius rivicola, Eukiefferiella cyanea, Cardiocladius* sp. and *Rheotanytarsus II* were accompanying forms. However, the station 6 taxocen which was included in this type has numerous features connecting it with type IV of the taxocen. The first dominants were the larvae of *Cricotopus* spp. + *Orthocladius* spp. and the second — those of *Orthocladius rivicola.* This domination structure made it similar to the *Chironomidae* taxocen which developed at stations 11 and 14, while it differed from them by the occurrence of the third dominant *Cardiocladius* sp. and of a number of accompanying species: *Diamesa* gr. *cinerella, Eukiefferiella* gr. *bavarica, Orthocladius (O.) frigidus,* and *Polypedilum* gr. *pedestre.*

Type IV was characteristic only of two stations: 11 and 14. The first dominant were the larvae of *Cricotopus* spp. + *Orthocladius* spp., the second one the larvae of *Orthocladius (E.) rivicola,* accompanied by *Eukiefferiella cyanea, E. ilkleyensis, E. clypeata, Cardiocladius* sp. and *Synorthocladius semivirens.* This great similarity of the domination structure was reflected in a very low value of the coefficient of distance.

Type V was only encountered at station 16. The first dominant were *Limnochironomus* gr. *nervosus* larvae, the next ones being *Cricotopus* spp. + *Orthocladius* spp. and *Polypedilum* gr. *nubeculosum.* Apart from *Orthocladius rivicola* and *Rheotanytarsus* sp. II larvae, a great number of forms which played a significant role at other stations were not noted at this station. This taxocen also showed the highest distance coefficient, distinctly, distinguishing it from other taxocens.

However, in comparing the number and biomass of *Chironomidae* and their ratio to the whole fauna, we obtain a different distribution (Table II). Station 16 definitely differs from the other ones. The largest number (1662 specimens/m^2) and biomass (1.08 g/m^2) of *Chironomidae* which constituted the most important part of the bottom fauna, were noted there. This differentiation of station 16 coincides with the classification based on the

domination structure of the taxocen. Stations 11 and 14 can also be distinguished because of a very high percent of the number and biomass of *Chironomidae* in the whole fauna. However, at the remaining stations the classification based on the domination structure did not agree with the numbers and biomass of *Chironomidae*. The smallest number (51 specimens/m²) and biomass (0.04 g/m²) were noted at station 1 (the second type of the *Chironomidae* taxocen). The two successive stations: 2 and 10 showed an identical biomass (0.1 g/m²) and similar number (station 2—118 specimens/m², station 10—148 specimens/m²). These stations were previously classified to types II (station 2) and III (station 10) of the *Chironomidae* taxocen. Another group includes stations 6, 8 and 9 (196—264 specimens/m², 0.14—0.24 g/m²). Stations 3, 4, 5, 12, and 13 with 312—365 specimens/m² and 0.26—0.4 g/m² biomass constitute the next group. Station 7 is interesting because of its large numbers (852 specimens/m²) and great biomass (1.45 g/m²). On the basis of the domination structure these stations were classified to type I of the Chironomidae taxocen. The obtained results concerning the number and biomass of *Chironomidae* suggest that only station 16 and, to a lesser degree, stations 11 and 14 can form separate groups. The remaining stations, except for 1 and 7, form one group.

An analysis of the qualitative composition showed that most streams and rivers of the Adzhar ASSR had a fairly similar *Chironomidae* fauna. Apart from *Cricotopus* spp. + *Orthocladius* spp. larvae which form a taxonomic unit composed of numerous species, also the larvae and pupae of the species *Orthocladius rivicola* were noted at all stations. At every station except for 16, *Eukiefferiella* gr. *bavarica* larvae were encounterod; *E. cyanea* was not found at stations 1 and 16 only, *E. ilkleyensis*, and *Cardiocladius* sp. being not noted at stations 1, 2 and 16. At most stations the larvae of *Diamesa* gr. *cinerella*, *Brilla modesta*, *Eukiefferiella clypeata*, *Synorthocladius semivirens*, and *Rheotanytarsus* sp. II were encountered while the larvae of *Limnochironomus* gr. *nervosus* and *Polypedilum* gr. *nubeculosum* were virtually limited to station 16.

The *Chironomidae* taxocens discussed above were elaborated for the middle and lower course of the Adzhar ASSR rivers. The spring parts or the highest parts of streams where most probably different taxocens occurred, were not taken into consideration.

Altitudinal distribution of *Chironomidae* taxocens in the different rivers and streams

In the investigation on the altitudinal distribution of *Chironomidae* in different rivers it was found that only in the largest river of the Adzhar ASSR, the River Adžariscкali, three types of *Chironomidae* taxocens

were encountered. In the upper course at an altitude of 940 m above sea level the type I of *Chironomidae* taxocen with *Diamesa* gr. *cinerella* (chiefly *D. thienemannui*) and *Cricotopus* spp. + *Orthocladius* spp. as dominants, was observed. The number of specimens was 365 per 1 square metre, and the biomass was 0.4 g/m². In the middle course, at an altitude of 650 m above sea level the first dominants were *Orthocladius rivicola* larvae, and the second one those of *Cricotopus* spp. + *Orthocladius* spp., accompanied by less numerous *Eukiefferiella ilkleyensis* and *Cardiocladius* sp. (type II of the *Chironomidae* taxocen). The number of *Chironomidae* was identical with that at the former station (365 specimens/m²) but the biomass was lower almost by a half (0.26 g/m²). At an altitude of 257 m above sea level the domination structure slightly changed. The first dominants were the larvae of *Cricotopus* spp. + *Orthocladius* spp., the second — those of *Rheotanytarsus* sp. II, *Orthocladius rivicola* appearing as the third (type II of the *Chironomidae* taxocen). Here the lowest number and the least biomass of *Chironomidae* as compared to the whole river length (221 specimens/m² and 0.14 g/m²) were observed.

The two investigated affluents: Čiruchiskali (665 m above sea level) and Akvarieta (342 m above sea level) are classifiable to type I of the *Chironomidae* taxocen, similarly as the upper sector of the Adžarisckali in spite of the fact that they lie at a lower altitude. Nevertheless, *Chironomidae* biomase and number greatly differed in this two affluents. In the Čiruchiskali stream, a very large number (852 specimens/m²) and the greatest biomass (1.45 g/m²) of all the investigated streams were noted. In the Akvarieta stream, a markedly smaller number and biomass (196 specimens/m² and 0.24 g/m²) occurred.

In the lower course of the River Čoroch at an altitude of 30—44 m above sea level, type II of the *Chironomidae* taxocen again appeared, i.e. the same as in the River Adžarisckali at an altitude of 650 m above sea level. Yet, the biomass and number were quite different. At an altitude of 44 m above sea level the lowest number (51 specimens/m²) and biomass (0.04 g/m²) as compared to other streams and rivers were noted. At an altitude of 30 m above sea level the number (118 specimens/m²) and biomass (0.1 g/m²) lightly grew but they were still low as compared with other rivers.

In the right-side tributary of the River Čoroch, the Mačacheliskali stream, at an altitude of 62.8 m above sea level, type II of the *Chironomidae* taxocen also developed its number (321 specimens/m²) and biomass (0.35 g/m²) being typical for most streams and rivers of the Adzhar ASSR.

A different taxocen developed in the upper (715 m above sea level) and middle (115 m above sea level) course of the River Čakviscali. The first dominants were the larvae of *Rheotanytarsus* sp. II (a part of type III of the *Chironomidae* taxocen). Here, the number and biomass were relatively low: 264 specimens/m² and 0.15 g/m², 148 specimens/m² and

0.15 g/m², 148 specimens/m² and 0.1 g/m² being noted in the middle course. In the lower course of the river, at an altitude of 4 m above sea level, the type IV of the *Chironomidae*, characterized with large numbers (502 specimens/m²) and great biomass (0.37 g/m²) occurred.

In the River Kintriši, at an altitude of 850 m above sea level the larvae of *Polypedilum sp.* (gr. *pedestre*) and *Cricotopus* spp. + *Orthocladius* spp. and at an altitude of 112 m above sea level, *Eukiefferiella* gr. *bavarica* and *Cricotopus* spp. + *Orthocladius* spp. predominated in the taxocen. Both taxocens were classified to type III. Their number (312 and 318 specimens/m²) and biomass (0.38 and 0.33 g/m²) were typical of most streams and rivers at this altitude. In the lower river course at an altitude of 4 m above sea level, the type IV of the *Chironomidae* taxocen, similarly as in the lower course of the River Čakviskali, was noted. The number (869 specimens/m²) and biomass (0.59 g/m²) of *Chironomidae* were very high.

In the River Čoloki, at an altitude of 645 m above sea level, type II of the *Chironomidae* taxocen was found. However, the number (782 specimens/m²) and biomass (0.69 g/m²) were much greater here than at other stations where this type of taxocen was developed. A quite different taxocen was found in the sector near the river mouth. It distinctly differed from other types so far discussed. Large *Chironomini* larve: *Limnochironomus* sp. (gr. *nervosus*) and *Polypedilum* sp. (gr. *nubeculosum*), typical pelophilous forms, dominated here (type V of the *Chironomidae* taxocen). Both, the number (1662 specimens/m²) and biomass (1.08 g/m²) were very high. This is a taxocen typical of muddy lowland rivers.

Discussion

Potamon, the taxocen typical of lowland rivers developed only at station 16 in the Čoloki River, while the taxocens of most streams and rivers of the Adzhar ASSR show montane characteristics and should be classified as the rhithron. The mountainous character of taxocens is maintained in the whole length of the investigated rivers, up to their mouths at the sea, although the climate and vegetation horizons change along with changing altitudes. Differences between the taxocens of stations 11 and 14 (4 m above sea level) and stations 5 and 15 (650 m above sea level) are not so great as it might be suggested by altitude differences. Simultaneously, the type I of *Chironomidae* taxocen which occurs at an altitude of 940 m above sea level in the River Adžarisckali, is noted in its affluent the River Akvareta at an altitude of 342 m above sea level. It seems that the character of the substratum and not the height is decisive for the development of the discussed types of *Chironomidae* taxocens. All the investigated streams had a stony substratum. It was

only in the River Čoloki that the taxocen of station 16, developing in a muddy-sandy substratum, markedly differed from the remaining taxocens.

In spite of the fact that most taxocens of the investigated rivers were classified to the rhithron, the taxocens in the Little Caucasus were greatly differentiated. Differences were observed between the catchment areas of the individual rivers, both with regard to the taxocen type, numbers and biomass. The taxocen developing in the River Čorochi at stations 1 and 2 had the domination structure typical of type II of *Chironomidae* taxocen, yet it had the smallest numbers of all the stations. It should be remembered, though, that the River Čorochi is the largest river of the Adzhar ASSR and is noted for its rapid current, great annual variation in water yields and outstandingly high turbidity. These factors are responsible for the poor development of the algal cover on the substratum. A reduction of the bottom fauna, especially of *Chironomidae* which do not find beneficial development conditions here, must follow. This type of the fauna characterized by a markedly reduced qualitative and quantitative development is typical of large Caucasian rivers which were classified as a separate group by Ž a d i n (1950).

The *Chironomidae* taxocen in the River Čakviscкali at stations 9 and 10 is very interesting, as it has a peculiar domination structure (the first dominant: *Rheotanytarsus* sp. II) with low numbers and biomass. A similar community in which *Rheotanytarsus* larvae *(R. nigricauda)* dominated was found in zone 2 (epirhitral) in the River Fulda in 1952. The view has been adopted that this species was distinctive for this zone. In the following years it was not observed in such numbers there. L e h m a n n (1971) suggested that a change in the *Chironomidae* community resulted from increased pollution of the River Fulda. In the Čakviscкali stream the chemical composition of water at stations 9 and 10 (Table I) shows that these streams are very poor, with trace amounts of nitrites, very low oxidability, and low content of dissolved CO_2 as compared with other Adzhar streams. In this case the chemism of water could be responsible for the formation of a different *Chironomidae* taxocen.

No major differences between the *Chironomidae* taxocens from streams and rivers of the Little Caucasus and the taxocens developing in European mountainous and submontane rivers were observed (D r a t n a l et al. 1979, K o w n a c k i 1971, R i n g e 1974, T h i e n e m a n n 1954). Type I of the *Chironomidae* taxocen developing in the upper course of the Adzhar streams is similar to that found in European submontane streams and rivers in winter and early spring season. Types II and IV of the Chironomidae taxocen are characteristic of most streams and rivers of the Adzhar ASSR. A similar community was observed in Western Carpathians ,in the lower course of the River Białka (K o w n a c k i 1971) and in the middle course of the Dunajec (D r a t n a l et al. 1979).

To sum up it can be claimed on the basis of the *Chironomidae* taxocens here distinguished that investigated rivers and streams of the Little Caucasus, feeding the Black Sea, did not form a separate type of rivers. They are similar to other mountainous and submontane rivers of Europe. However, it is characteristic that in most of them only a rhithron taxocen is developed in the whole length. A rhithron and potamon taxocen can be distinguished only in the River Čoloki. The zonal distribution of *Chironomidae* taxocens, observed in the different streams and rivers did not agree with altitudinal changes. Sometimes greater differences could be observed between the taxocens of different rivers than between the upper and middle course of one river. The factors which determine the distribution of Chironomidae taxocens are: the type of the substratum, water chemism, turbidity, and variation in water yields.

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STRESZCZENIE

Badania larw i poczwarek *Chironomidae* były częścią ogólnego opracowania fauny dennej rzek i potoków Adżarskiej ASRR (Zosidze 1972). Materiały do badań zbierano na 16 stanowiskach (ryc. 1) usytuowanych na wysokości od 3 do 940 m n.p.m. w różnych piętrach klimatycznych i roślinnych (tabela I). Wyróżniono 82 jednostki taksonomiczne *Chironomidae* (tabela II), wśród których kilka było nowych dla fauny Kaukazu: *Macropelopia maculipennis* (Zett.), *Conchapelopia pallidula* (Meig.), *Nilotanypus dubius* (Meig.), *Eukiefferiella ilkleyensis* (Edw.), *E. clypeata* (Kieff.), *Cricotopus* (C.) *vierrensis* (Goetgh.), *C.* (C.) *tremulus* (L.), *C.* (C.) *similis* Goetgh., *Rheocricotopus chalybaetus* (Edw.), *Paracricotopus niger* (Kieff.), *Parakiefferiella* cfr. *dentifera* Wülk., *Heleniella* cfr. *ornaticolis* (Edw.), *Tanytarsus brundini* Lindeb., *Rheotanytarsus distinctissimus* Brundin, *Rh. muscicola* Kieff. oraz rodzaj *Rheosmittia*.

W badanych potokach wyróżniono pięć typów taksocenów *Chironomidae* (ryc. 3, tabele III i IV). Najbardziej charakterystyczny dla badanych potoków był II typ taksocenu *Chironomidae*, w którym dominowały larwy *Orthocladius* (E.) *rivicola*. Rozwijał się w środkowym biegu badanych rzek na wysokości 30—655 m n.p.m. Bardzo podobny był IV typ taksocenu *Chironomidae*, który spotykano w przyujściowym biegu rzeki na wysokości 4 m n.p.m. Pierwszym dominantem były larwy *Cricotopus* spp. + *Orthocladius* spp., drugim — *Orthocladius* (E.) *rivicola*. W górnych odcinkach rzek i potoków rozwinął się I typ taksocenu *Chironomidae*, w którym dominowały larwy *Diamesa* gr. *cinerella*. Do III typu taksocenów *Chironomidae* zaliczono kilka ugrupowań o dość zróżnicowanej strukturze dominacji. W górnym i środkowym biegu rzeki Čakviscкali pierwszym dominantem były larwy *Rheotanytarsus* sp. II. W rzece Kintriši w górnym biegu dominowały larwy *Polypedilum* sp. (gr. *pedestre*) i *Cricotopus* spp. + *Orthocladius* spp., a w środkowym *Eukiefferiella* gr. *bavarica* i również *Cricotopus* spp. + *Orthocladius* spp. Typ V spotykano tylko w przyujściowym odcinku rzeki Čoloki (sta-

nowisko 16), na wysokości 3 m n.p.m. Rozwijający się tu taksocen *Chironomidae* zdecydowanie odbiegał od pozostałych typów. Dominowały tu pelofilne formy *Limnochironomus* sp. (gr. *nervosus*) i *Polypedilum* sp. (gr. *nubeculosum*). Również na tym stanowisku zanotowano największą liczebność (1662 osobniki/m²) i biomasę (1,08 g/m²) *Chironomidae* w porównaniu z innymi stanowiskami. Natomiast na pozostałych stanowiskach podział przeprowadzony na podstawie struktury dominacji nie pokrywa się z liczebnością i biomasą *Chironomidae*. Jedynie w pewnym stopniu na tej podstawie da się wyróżnić stanowiska 11 i 14 (IV typ taksocenów *Chironomidae*), na których procent liczebności i biomasy *Chironomidae* w stosunku do całości fauny jest bardzo wysoki. Na pozostałych stanowiskach uzyskane wyniki wskazywały, że większość taksocenów *Chironomidae* ma bardzo podobną liczebność (118—265 osobników/m²) i biomasę (0,1—0,4 g/m²), z wyjątkiem stanowiska 1 (51 osobników/m², 0,04 g/²) i stanowiska 7 (852 osobniki/m², 1,45 g/m²).

Biorąc pod uwagę skład gatunkowy, strukturę dominacji, liczebność i biomasę *Chironomidae*, można przyjąć, że są to taksoceny charakterystyczne dla rzek i potoków górskich — rhitronu. Tylko w przyujściowym odcinku rzeki Coloki rozwinął się taksocen charakterystyczny dla rzek nizinnych — potamonu. Tak więc, z wyjątkiem rzeki Coloki, w której występuje strefa rhitronu i potamonu, pozostałe rzeki Adżarskiej ASRR mają tylko strefę rhitronu na całej swej długości. Wydaje się, że czynnikiem mającym decydujące znaczenie dla omawianych typów taksocenów *Chironomidae* jest charakter podłoża. Wszystkie badane potoki i rzeki mają podłoże kamieniste, jedynie na stanowisku 16 jest dno muliste.

Pomimo tego, że większość badanych rzek zaliczono do rhitronu, to strefa ta jest bardzo niejednorodna. Znaczne różnice zaobserwowano pomiędzy zlewniami poszczególnych rzek zarówno jeśli chodzi o typ taksocenu, jak i liczebność oraz biomasę. Prawdopodobnie jest to spowodowane przez różnice w chemizmie wody, mętności i wahaniach rocznych przepływu wody w poszczególnych rzekach.

Na podstawie wyróżnionych taksocenów *Chironomidae* stwierdzono, że badane potoki i rzeki Małego Kaukazu wpadające do Morza Czarnego nie tworzą odrębnego typu i są podobne do innych rzek górskich i podgórskich Europy.

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