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Chironomidae communities of the River Nida
and its tributaries

Ugrupowania *Chironomidae* rzeki Nidy i jej dopływów*

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Abstract — The subject of the work was *Chironomidae* fauna of the lowland River Nida. In the collected samples 148 taxonomic units were found. Using the domination index, three types of *Chironomidae* communities were differentiated in the longitudinal profile of the river. In addition, the distribution and structure of *Chironomidae* communities were investigated in four types of habitats: the sandy, sandy-silty and silty bottoms, and submersed vegetation.

The present work is part of complex hydrobiological investigations carried out by the Kraków Laboratory of Water Biology of the Polish Academy of Sciences in the River Nida catchment basin. The investigations were concerned with the type of the catchment area, chemical properties of water (Dumnicka, Pasternak 1978, Pasternak 1973), microbiology (Starzecka 1979), and the bottom fauna, *Oligochaeta* (Dumnicka 1978, Dumnicka, Pasternak 1978).

It should be stressed that in southern Poland such complex studies have only been carried out in streams (Sucha Woda and Rybi Potok) and in Carpathian rivers (Raba and San). The River Nida is a medium-sized lowland river of a type which has not been investigated so far.

The River Nida was included in the study owing to its varied hydrobiological character and the occurrence of both pure and polluted sectors and of self-purification zones. The river had to be, moreover, examined from a hydrochemical and hydrobiological point of view before the

* Praca wykonana w problemie węzłowym 10.2.

planned construction of a dam reservoir at Chęciny could be put into effect.

The aim of the work was to determine the variation in the qualitative composition of *Chironomidae*, its changes in the Nida river system, the spatial distribution of *Chironomidae* larvae communities, the domination system in the communities along the successive stations and along the most important types of river bottom and also to determine how *Chironomidae* communities changed in the polluted river sectors.

In a number of faunistic and ecological works on running waters in southern Poland, *Chironomidae* were taken into consideration. These studies, however, were chiefly carried out in the Carpathian streams and rivers (Draatnal 1965, 1976a, 1976b, Kownacki 1971, Sowa 1961, 1965, Szczęsny 1974, Zaćwilichowska 1969, 1970, Zięba 1968).

In central Poland the investigations on *Chironomidae* have for the most part been conducted in large lowland rivers, greatly slimed and to a considerable degree affected by pollution (Kajak 1958, 1959, 1960: discussed the dynamics of the number of *Chironomidae* in the Vistula's middle course; Rybak 1962, investigated the occurrence of *Chironomidae* in a sector of the River Wkra; Niedźwiecki 1970, 1974 reported on the dynamics of *Chironomidae* number in the River Supraśl and the distribution of *Chironomidae* larvae in the cross-sectors of the River Narew).

Finally, mention should be made of works on the bottom macrofauna of the River Warta at Poznań (Biesiadka, Kasprzak 1977) and on the zoobenthos structure (chiefly *Chironomidae*) in the fine-grained bottom of the River Łyna (northern Poland) (Wielgosz 1979). Up to the present the *Chironomidae* fauna has not been investigated in any medium sized lowland river of southern Poland.

Description of investigated area and stations

The River Nida drains an area lying between the Kraków—Częstochowa Lowland and the dismembered chain of the Świętokrzyskie Mountains. Its upper course is composed of the Belnianka and Lubrzanka streams which at their junction form the River Czarna Nida. The River Nida and some of its more important tributaries such as Lubrzanka, Bobrza, Mierzawa, and Biała Nida were included in the study (Table I).

The description of the catchment basin and water chemism, with special reference to microelements, was given by Dumnicka, Pasternak (1978), Pasternak (1973), and Pasternak, Starzecka (1979).

The stations distributed on the Belnianka and Czarna Nida rivers which were considered the main river course, as well as those on the

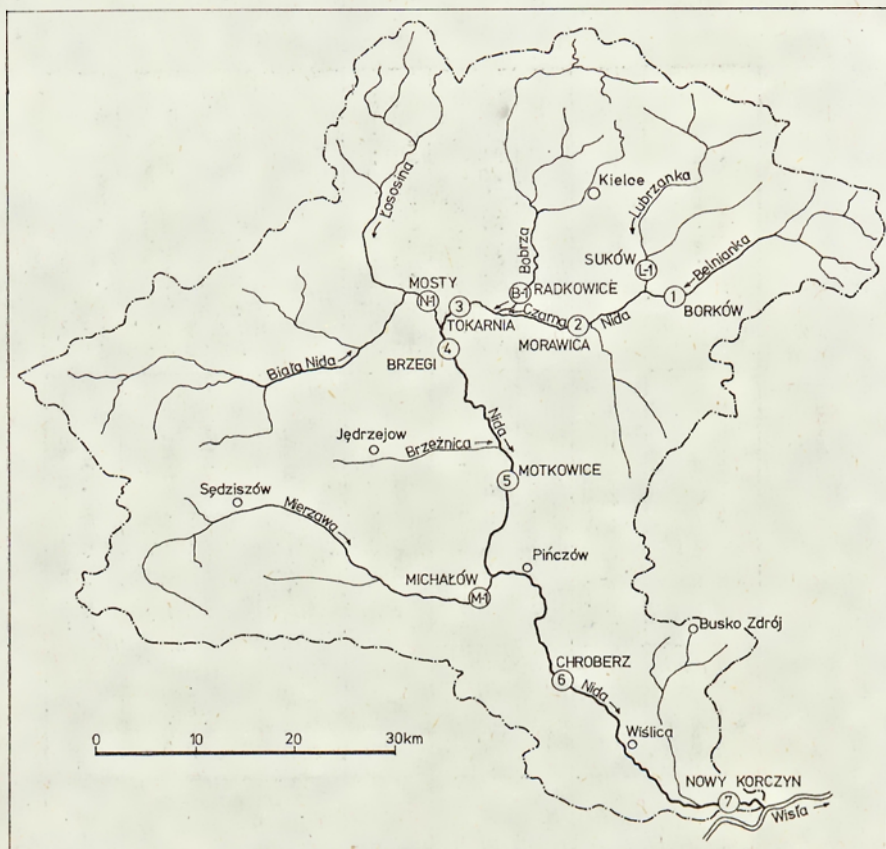


Fig. 1. Map of the River Nida and its tributaries with sampling stations

Ryc. 1. Mapa sieci rzecznej Nidy i jej dopływów z zaznaczonymi stanowiskami poboru prób

Nida, were given numbers from 1—7, beginning at the Belnianka and ending at the Nida outflow to the River Vistula (fig. 1). Stations on the affluents were given symbols composed of a letter and a figure, the letter denoting the name of the river, and the figure the number of the station on this river, e. g., L-1 Lubrzanka, station 1. A short description of the stations is given in Table II.

Method

Samples were collected on 17 dates: in 1973 on June 19, August 14, October 8, November 28; in 1974 on February 5, March 11, April 17, May 27, July 2, August 13, September 23, November 14; and in 1975 on January 13, February 19, April 8, May 20, and June 18. Three samples

Table I. Characteristic of the investigated rivers
(after - za Dumnicka 1978)

Tabela I. Charakterystyka badanych rzek

| River Rzeka | Altitude of the spring Wys. n.p.m. Zróżka m | Length Długość km | Drainage area Powierzchnia zlewni km ² | Gradient Spadek % | Tributaries Dopływy | Region of the river course Region geograficzny | Origin of pollution Zródło zanieczyszczeń |
|----------------|---|-------------------------|---|-------------------------|------------------------|--|---|
| Belianka | 490 | 46 | 279 | 6.9 | - | Range of the Kysogóry Mts Pasmo Kysogórskie | - |
| Lubrawka | 360 | 33 | 254 | 3.5 | Warkocz | Świętokrzyskie Mts Góry Świętokrzyskie | - |
| Czarna Nida | | 62 | 1 123 | 4 | Bobrza | Świętokrzyskie Mts Góry Świętokrzyskie | In the lower course polluted by waters of the River Bobrza W dolnym biegu zanieczyszczona wodami Bobrzy |
| Bobrza | 420 | 48 | 378 | 4 | Silnica | Świętokrzyskie Mts Góry Świętokrzyskie | Industrial and municipal sewage from the town Kielce Ścieki komunalne i przemysłowe z Kielc |
| Biała Nida | 270 | 72 | 1 033 | 1.1 | Lipnica Jasosina | West part of the Nida Syncline Zachodnia część Nisecki Niziałoskiej | - |
| Nida | | 107 | 3 862 | 1.8 | Mierzawa Maskalis | South-East part of the Nida Syncline Pa-wsch. część Nisecki Ni- działoskiej | Waters of the River Czarna Nida, industrial and municipal sewage from the town Pił- czów Wody Czarnej Nidy, ścieki ko- munalne i przemysłowe z Pił- czowa |
| Mierzawa | 280 | 65 | 562 | 1.4 | Mozżana | Plateau of Jędrzejów Płaskowyż Jędrzejowski | Sewage from the town Sędzi- szów Ścieki z Sędziszowa |

Table II. Short characteristic of the stations
(after - za Dumiłoka 1978)

Tabela II. Krótka charakterystyka stanowisk

| Station Stanowisko | River Rzeka | Depth Głębokość om | Current Prąd cm/s | Flow-Przepływ m ³ /s lowest najniższy | highest najwyższy | Width of the river- bed Szerokość koryta m | Higher plants Roślinność wyższa | Character of the bottom Charakter dna | Origin of pollution Źródło zanieczyszczeń |
|-----------------------|----------------|--------------------------|-------------------------|--|----------------------|---|--|---|--|
| 1 | Bełnianka | 5 - 60 | 40 - 60 | 0.48 | 5.83 | 3 - 5 | single tufts pojedyncze kępy | sand and gravel, in places mud piasek i żwir, miejscami muł | - |
| 2 | Czarna Nida | 40 - 100 | 10 - 40 | 0.94 | 11.5 | 4 - 6 | numerous tufts of Elodea canadensis liczne kępy Elodea canadensis | mud and muddy-sand muł i piasek zamulony | - |
| 3 | Czarna Nida | 20 - 100 | 10 - 60 | 2.57 | 17.0 | 15 | none brak | mud, sand in the current muł, w nurcie piasek | waters of the River Bobrza wody Bobrzy |
| 4 | Nida | 10 - 60 | 10 - 60 | 5.6 | 37.5 | 30 - 40 | none brak | sand, in places muddy-sand piasek, miejscami piasek za- mulony | waters of the River Czarna Nida wody Czarnej Nidy |
| 5 | Nida | 5 - 100 | 20 - 60 | 6.155 | | 30 | single tufts pojedyncze kępy | sand, in places muddy-sand piasek, miejscami piasek za- mulony | small alcohol distillery in the village Motkowice mała gorzelnia we wsi Motko- wice |
| 6 | Nida | 10 - 120 | 10 - 60 | 6.87 | 56.4 | 20 - 40 | not numerous tufts nieliczne kępy | mud and muddy-sand muł i piasek zamulony | - |
| 7 | Nida | 20 - 120 | 10 - 60 | 08.0 | 68.1 | 60 | not numerous tufts nieliczne kępy | sand and gravel, in places muł | - |
| L1 | Lubrzanka | 10 - 50 | 5 - 20 | 0.26 | 3.04 | 3 - 5 | not numerous tufts nieliczne kępy | sand and slightly muddy sand piasek i piasek lekko zamulony | - |
| N1 | Biała Nida | 10 - 100 | 20 - 60 | 2.29 | 14.9 | 8 - 10 | not numerous tufts nieliczne kępy | sand in places covered by detritus piasek miejscami pokryty de- tritusem | - |
| B1 | Bobrza | 10 - 50 | 10 - 60 | 0.12 | 4.96 | 8 - 10 | none brak | mud, in places sand muł, miejscami piasek | municipal sewage from the town Kielce ścieki komunalne i przemyślo- we z Kielca |
| M1 | Mierzawa | 5 - 40 | 10 - 60 | 1.54 | 5.93 | 4 - 6 | none brak | sand and slightly muddy sand piasek i piasek lekko zamulony | - |

from habitats characteristic of a given station were taken on each of these dates total of 561 quantitative and 46 qualitative samples having been collected. Four types of substrates were identified in the investigated rivers:

1. sandy or gravelly-sandy bottom, medium flow rate (40—60 cm/sec),
2. silted sand, weak or no current (0—40 cm/sec),
3. silt or detritus, very weak or no current (0—10 cm/sec),
4. submersed higher plants, weak current (0—20 cm/sec).

The above-mentioned habitats did not appear at the stations: both sand and silted sand were found at 11 stations while silt was observed at 9 of them. Higher plants were examined at 3 stations located in the upper river course.

Samples were collected from an area of 400 sq. cm. with a bottom sampler with a net of 0,3 mm mesh. They were fixed in 4% formalin and selected in the laboratory with the aid of a stereomicroscope (enl. 10×).

For precise identification of the collected specimens Chironomidae larvae were reared to pupa and imago stages. The following works were referred to in the identification of animals: Brundin 1949, 1956, Černovskí 1949, Fittkau 1962, Fittkau, Lehmann 1970, Goethgebuer 1914, 1932, 1937—1954, Geothgebuer et al. 1949, Hirvenoja 1962, 1973, Lehmann 1969, 1970 a, 1970 b, Pankratova 1970, 1977 Reiss, Fittkau 1971, Romaniszyn 1958, Saether 1969, 1976, 1977, Schlee 1968, Strenzke 1951, 1959, Šilova 1976, Thienemann 1944, 1952, Zavřel 1939, 1941.

The means for all samples from a given station and for all samples from a given habitat were computed from the numbers of animals per 1 sq. metre found in the samples.

In order to compare the *Chironomidae* fauna from various habitats and stations, Jaccard's coefficient of similarity was calculated, quantitative data for different species (mean numbers) instead of qualitative data (the presence or absence of a species) (see Dumnicka 1978) being substituted in the formula. The results of the comparison were graphically presented with the use of dendrites, in which the distances between circles denoting stations represent reverse values of the similarity coefficient.

Kownacki's coefficient of domination (1971) was used to determine the faunistic separateness of *Chironomidae* communities at the stations and at various bottoms. The domination coefficient for various taxons was in a range of 0—100; values of 10—100 denoted the dominants, 1.0—9.9 the sub-dominants, and 0—0.9 — a-dominants.

In discussing the domination structure of *Chironomidae* the percentage of both the different taxonomic units and the frequency of their occurrence in samples were also quoted.

| STANOWISKO- STATION | N1 | | L1 | | 1 | | 2 | | B1 | | 3 | | 4 | | 5 | | 6 | | 7 | | M1 | |
|---|-----|------|------|------|-------|-------|------|------|----|---|---|---|---|---|---|---|---|---|---|---|----|---|
| | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f |
| <i>Odontomesa fulva</i> | 4.5 | 305 | | | | | | | | | | | | | | | | | | | | |
| <i>Polypedium scalaeum</i> | 7.8 | 4.88 | 11.2 | 33.3 | | | | | | | | | | | | | | | | | | |
| <i>Cladotanytarsus spp.</i> | 5.8 | 352 | 15.6 | 1127 | 20.2 | 14.27 | 5.4 | 3.75 | | | | | | | | | | | | | | |
| <i>Stictochironomus pictulus</i> | 6.6 | 3.20 | 6.6 | 3.12 | 6.2 | 4.91 | | | | | | | | | | | | | | | | |
| <i>Polypedium nubeculosum</i> | | | 8.1 | 270 | | | | | | | | | | | | | | | | | | |
| <i>Tanytarsus gr. pallidicornis</i> | | | 4.1 | 170 | 6.5 | 192 | 6.5 | 2.96 | | | | | | | | | | | | | | |
| <i>Microtendipes pedellus</i> | | | 6.5 | 34.1 | 2.21 | 6.67 | 5.6 | 3.72 | | | | | | | | | | | | | | |
| <i>Micropsectra sp.1(gr.praecox)</i> | | | 5.0 | 20.4 | 1.97 | | | | | | | | | | | | | | | | | |
| <i>Paratendipes albimanus</i> | | | 10.3 | 15.3 | 1.64 | | | | | | | | | | | | | | | | | |
| <i>Tanytarsus sp.1(gr.gregarius)</i> | 7.0 | 120 | | | 7.0 | 2.24 | | | | | | | | | | | | | | | | |
| <i>Thienemannimyia "Reihe"</i> | | | 3.3 | 69.0 | 2.31 | | | | | | | | | | | | | | | | | |
| <i>Rheotanytarsus sp.</i> | | | 22.4 | 37.1 | 12.79 | 4.6 | 2.23 | | | | | | | | | | | | | | | |
| <i>Proladlus Skuze</i> | | | 8.4 | 85.2 | 8.03 | 14.1 | 1.51 | | | | | | | | | | | | | | | |
| <i>Chironomus fl. thummi</i> | | | 10.0 | 36.2 | 24 | 100 | | | | | | | | | | | | | | | | |
| <i>Orthocladius spp.</i> | 4.2 | 159 | 18.2 | 390 | 11.0 | 8.52 | 8.19 | | | | | | | | | | | | | | | |
| <i>Cricotopus spp.</i> | | | 37.1 | 67.2 | | 77.3 | | | | | | | | | | | | | | | | |
| <i>Nanocladius bicolor</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pseudosmittia gracilis</i> | | | | | | | | | | | | | | | | | | | | | | |
| " <i>Cryptochironomus</i> " <i>vytshegdae</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Paraccladius conversus</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cryptochironomus gr. defectus</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Prodiamesa olivacea</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Harnischia fuscimana</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Polypedium bicrenatum</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Paraccladoplima camptolabis</i> | | | | | | | | | | | | | | | | | | | | | | |

dominant

 subdominant

Fig. 2. *Chironomidae* communities at different stations on the investigated rivers. d — domination index, % — per cent of different *Chironomidae* taxons, f — frequency

Ryc. 2. Ugrupowania *Chironomidae* na poszczególnych stanowiskach w badanych rzekach (wg wskaźnika dominacji). d — wskaźnik dominacji, % — procentowy udział poszczególnych taksonów *Chironomidae*, f — frekwencja

Results

148 taxonomic units of *Chironomidae* of 3 sub-families were identified in the collected samples. *Orthoclaadiinae* and *Chironomidae* occurred most often, 68 taxons being determined there. *Tanypodinae* were represented by 12 taxon units. In the sub-family *Chironominae* 49 taxonomic units belonged to the *Chironomini* strain and 19 were of the *Tanytarsini* strain.

Table III contains a list of *Chironomidae* taxonomic units and their average densities per 1 sq. metre. Some of the species in the list were found in Poland for the first time (S r o k o s z 1980).

Distribution of *Chironomidae* communities in the Nida water system

Three zones (groups of stations) characterized by different *Chironomidae* communities can be differentiated as was indicated by the distribution of the taxons and the *Chironomidae* domination in the Nida river system (fig. 2):

- a. the upper sector of the Nida river system (stations N—1, L—1, 1 and 2)

The *Chironomidae* communities of this sector were characterized by a developed domination structure with dominating larvae of *Cladotanytarsus* spp. (stations L—1 and 1) and *Odontomesa fulva* (station N—1). The occurrence of numerous sub-dominants (fig. 2) was probably connected with the variability of habitats which at separate stations covered various percentages of the bottom area. In some places the bottom was covered with a layer of mud or overgrown with macrophytes. These communities developed in waters of high purity grade (Dumnicka, Pasternak 1978, Pasternak, Starzecka 1979, Starzecka 1979) of rivers with rather narrow beds and sandy bottoms (stations N—1 and L—1). At station 2, also lying in the upper river course, larvae of the genus *Rheotanytarsus* were found dominate with larvae of the genera *Thienemannimyia* and *Procladius* as sub-dominants. This type of *Chironomidae* community, differing from other stations of the investigated river sector, resulted from the occurrence of higher plants, and a slightly faster water current.

- b. The middle sector of the river (stations 3, 4 and 5)

As a result of the strong pollution of the rivers Czarna Nida and Nida with waters of the River Bobrza, changes of the environmental conditions

were noted in the middle course stations (3, 4 and 5) (Dumnicka, Pasternak 1978, Pasternak, Starzecka 1979, Starzecka 1979). These changes were detrimental to the *Chironomidae* fauna of this river sector. Throughout the investigation period a decrease was observed both in the number of taxonomic units appearing there and in the mean number of specimens, as compared with stations in the upper river course: from 17891 specimens/1 sq. metre at station 2, to 58 specimens/1 sq. metre, and 137 specimens/sq. metre (stations B—1 and 3 respectively) (fig. 3). At stations B—1 (sewage) and 3 (below the mouth of the sewage) the domination structure of *Chironomidae* did not develop. Taxonomic units noted there only reached the level of sub-dominants and

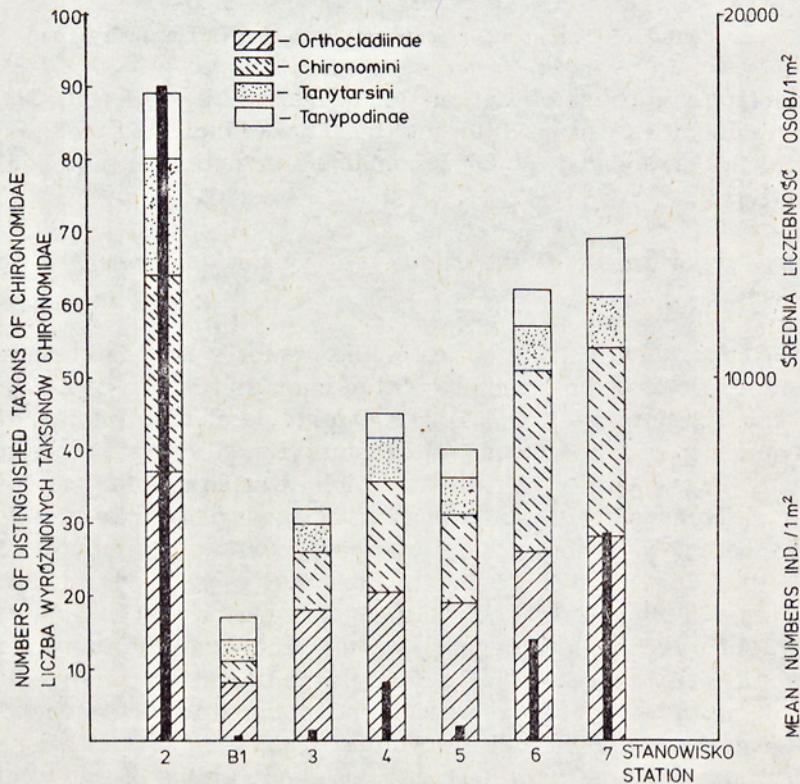


Fig. 3. Number of *Chironomidae* taxa and mean density (specimens/sq. metre) during the investigation period (1973—1975) for stations 2—7, and B1. Narrow black bars — mean number of specimens/sq. metre (right scale), wide bars — number of *Chironomidae* taxa (left scale)

Ryc. 3. Liczba wyróżnionych taksonów *Chironomidae* oraz średnie zagęszczenie osob./m² za okres badań (1973—1975) dla stanowisk 2 do 7 i B1. Wąskie czarne słupki — średnia liczebność osob./m² (prawa skala), szerokie słupki — ilość wyróżnionych taksonów *Chironomidae* (lewa skala)

the relatively low frequency of occurrence (fig. 2) indicates a marked fortuitousness for their occurrence.

With a growing distance from the pollution source the environmental conditions gradually improved (Dumnicka, Pasternak 1978, Pasternak, Starzecka 1979). At stations 4 and 5 the domination structure of *Chironomidae*, though poorly developed, appeared with *Orthocladius* spp. + *Cricotopus* spp. and *Nanocladius bicolor* larvae as dominants, accompanied by *Chironomus* fl. *thummi* larvae as sub-dominants.

c. The lower river sector

Owing to the self-purification processes, the lower Nida sector (stations 6 and 7) was characterized by a further improvement of environmental conditions (Dumnicka, Pasternak 1978, Pasternak, Starzecka 1979); what is more, the character of the river changes (width of the river bed, current rate etc.). In this sector the domination structures of *Chironomidae* communities were fully developed and similar to each other. At station 6 two dominants were found: „*Cryptochironomus*” *vytshedge* and *Paracladius conversus*, while at station 7 the dominating species were *Orthocladius* spp. + *Cricotopus* spp. larvae. Numerous accompanying species (sub-dominants) common for the two stations, were reported by many authors (Greze 1957, Jankovič 1975a, Pankratova 1964, 1968, Zvereva 1950, 1953, 1962) from middle and large rivers with sandy bottoms.

The similarity dendrite of *Chironomidae* communities at the investigated stations was presented at fig. 4.

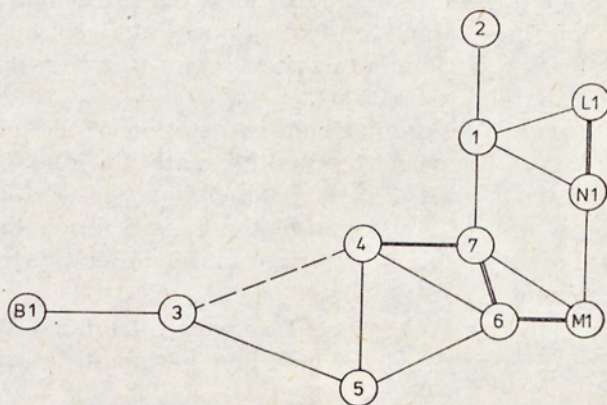


Fig. 4. Dendrite of chironomid communities of the investigated stations

Ryc. 4. Dendryt ugrupowań *Chironomidae* badanych stanowisk

Distribution of *Chironomidae* communities in various types of bottom

The type of bottom is an important ecological factor affecting the occurrence and distribution of the bottom fauna, of *Chironomidae* among other groups (Behning 1924, Berg 1948, Drahnal 1976a, Illies, Botosaneanu 1963, Kownacka 1971, Starmach 1959, Szczepański 1953, Szczęsny 1974, Žadin 1964).

In the River Nida four types of substratum were found to occur: sandy, sandy and silty silty, and submersed higher vegetation. The type of the substratum occurring is to a great extent related to the current rate, since when no current is observed or its rate is very low, sedimentation of mud or detritus takes place while at medium current rate sandy or gravelly-sandy bottoms are encountered.

a. *Chironomidae* communities of the sandy bottom

A sandy type of substratum prevailed in the investigated river and its tributaries. Many authors (Greze 1957, Konstantinov 1953, Pankratova 1964, 1968) regard a sandy bottom as a relatively poor habitat with respect to the number of species as well as specimens occurring there.

The *Chironomidae* communities at stations in the upper river course showed a similar domination structure. *Cladotanytarsus* spp. (stations L—1, 1 and 2) and *Odontomesa fulva* (station N—1) larvae predominated, with *Stictochironomus pictulus*, *Orthocladius* spp. + *Cricotopus* spp. larvae as sub-dominants. The occurrence of limno- and pelophilous *Poly-pedilum nubeculosum*, and *Chironomus* fl. *thummi* as sub-dominants at station L—1 resulted from the relatively slow current which favoured the sedimentation of fine-grained bottom deposits and an increase in the percentage of the silty bottom in this river sector (the possibility of larvae passing from one habitat to another).

In the *Chironomidae* group found at station 2 the occurrence of *Chironomidae* larvae bound with aquatic vegetation: *Rheotanytarsus* sp. (Berg 1948, Lehmann 1971), *Thienemannimyia-Reihe*, or *Microtendipes pedellus*, and of the larvae of the genera *Procladius* and *Tanytarsus* spp. (gr. *gregarius*), characteristic of silty habitats was observed among sub-dominants.

In the middle river sector affected by wastes (stations B—1, 3 and 4), no communities of normally developed domination structure were found (fig. 5).

The first *Chironomidae* community, with dominating *Orthocladius* spp. + *Cricotopus* spp. and with *Nanocladius bicolor* and *Prodiamesa olivacea* larvae as sub-dominants, was observed at station 5 (a still pollu-

| STANOWISKO- STATION | N1 | | L1 | | 1 | | 2 | | B1 | | 3 | | 4 | | 5 | | 6 | | 7 | | M1 | |
|---|------|-------|------|------|-------|-------|------|-------|----|---|---|---|---|---|---|---|---|---|---|---|------|-------|
| | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f |
| <i>Odontomesa fulva</i> | 29.5 | 17.51 | 2.9 | 5.2 | 1.31 | | | | | | | | | | | | | | | | 14.0 | 311 |
| <i>Polypedium scalgenum</i> | 10.5 | 54.6 | 23.9 | 46.7 | 111.4 | | | | | | | | | | | | | | | | 8.3 | 54.41 |
| <i>Ciادتanytarsus spp.</i> | 15.7 | 4.29 | 21.7 | 73.8 | 15.89 | 32.96 | 18.4 | 12.60 | | | | | | | | | | | | | 8.6 | 24.0 |
| <i>Stictochironomus pictulus</i> | 11.1 | 4.06 | 4.7 | 53.3 | 25.0 | 81.3 | 7.5 | 5.47 | | | | | | | | | | | | | | |
| <i>Orthocladius spp.+ Cricotopus spp.</i> | 8.4 | 31.8 | 24.4 | 46.7 | 111 | 6.98 | 5.3 | 4.32 | | | | | | | | | | | | | 13.2 | 18.9 |
| <i>Polypedium nubeculosum</i> | 10.6 | 33.3 | 3.52 | | | | | | | | | | | | | | | | | | 6.0 | 190 |
| <i>Chironomus fl. thummi</i> | 6.0 | 33.3 | 1.99 | | | | | | | | | | | | | | | | | | 14.2 | 14.2 |
| <i>Paratendipes albianus</i> | 7.5 | 33.3 | 1.51 | | | | | | | | | | | | | | | | | | 13.2 | 18.9 |
| <i>Cryptochironomus gr. defectus</i> | 2.2 | 1.03 | 46.7 | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Endochironomus gr. tendens</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Procladius Skuze</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Tanytarsus sp.1 (gregarius)</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Rheotanytarsus sp</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Microtendipes pedellus</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Thienemannimyia-"Reihe"</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Tanytarsus gr. pallidicornis</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Demicryptochironomus vulneratus</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Prodiamesa olivacea</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Nanocladius bicolor</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>"Cryptochironomus" vytshegdae</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Paracladius conversus</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Harnischia fuscimana</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Polypedium gr. convinctum</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Polypedium bicrenatum</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |
| <i>Paracladopelma camptolabis</i> | | | | | | | | | | | | | | | | | | | | | 21.7 | 3.0 |

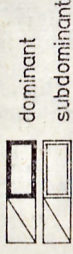


Fig. 5. *Chironomidae* communities in sandy bottom of the investigated rivers (according to the domination index), d — domination index, % — per cent of different *Chironomidae* taxons, f — frequency
 Ryc. 5. Ugrupowania *Chironomidae* w dnie piaszczystym badanych rzek (wg wskaźnika dominacji), d — wskaźnik dominacji, % — procentowy udział poszczególnych taksonów, f — frekwencja

ted one). K o w n a c k i (1977), pointed out the occurrence of the latter two species in polluted waters.

At stations 6 and 7 *Chironomidae* communities were similar to each other (fig. 5), although „*Cryptochironomus*” *vytshegdae*, a psammophilous species found in large sandy rivers P a n k r a t o v a 1964, 1968), dominated at station 6 while at station 7 *Orthocladius* spp. + *Cricotopus* spp. larvae predominated.

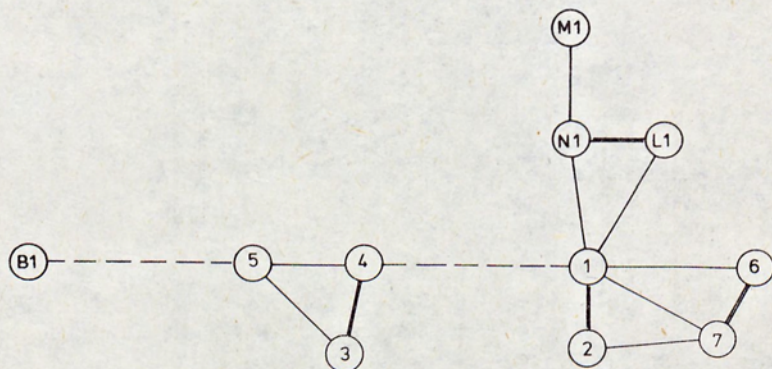


Fig. 6. Dendrite of *Chironomidae* communities from sandy bottom in the investigated stations

Ryc. 6. Dendryt ugrupowań *Chironomidae* dna piaszczystego na badanych stanowiskach

The similarity of *Chironomidae* fauna was shown in fig. 6. It is striking that in this habitat *Chironomidae* communities, being similar to each other, form 3 groups: stations in the upper river course, stations in the lower river course with slightly different fauna of sandy bottom, and stations of the middle river course, dissimilar to the other two.

b. *Chironomidae* communities of sandy-silty bottom

Silted sand is an unstable habitat, since the area of the river bottom covered by it changes along with a changing water level. At low water levels the deposition of silts occurs, favouring the development of limnophilous species, while at high water levels silt is washed out and the percent of rheophilous forms in the habitat increases (Ž a d i n 1964). Hence, *Chironomidae* communities developing in this habitat have a transitory character between communities of sandy and of silty bottoms (fig 7).

It was worth noting that at polluted stations (B—1, 3 and 4) *Chironomidae* communities with already developed domination structure occur, larvae of the genera *Procladius* and *Chironomus* fl. *thummi*, regarded as characteristic of polluted waters (H y n e s 1962, K o l k w i t z, M a r s o n 1909, S l a d e č e k 1973) predominating.

| STANOWISKO- STATION | N1 | | L1 | | 1 | | 2 | | B1 | | 3 | | 4 | | 5 | | 6 | | 7 | | M1 | |
|---|------|-------|------|-------|------|-------|------|------|----|---|---|---|---|---|---|---|---|---|---|---|----|---|
| | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f |
| <i>Odontomesa fulva</i> | 51.5 | 454.0 | | | | | | | | | | | | | | | | | | | | |
| <i>Cladotanytarsus</i> spp. | 7.8 | 6.21 | 19.2 | 12.76 | 3.5 | 2.35 | 6.4 | 7.03 | | | | | | | | | | | | | | |
| <i>Polypedilum scalaenum</i> | 5.7 | 5.11 | 4.3 | 1.42 | | | | | | | | | | | | | | | | | | |
| <i>Stictochironomus pictulus</i> | 10.0 | 4.76 | 14.6 | 6.68 | 4.9 | 4.06 | 4.3 | 1.42 | | | | | | | | | | | | | | |
| <i>Polypedilum nubeculosum</i> | 80.0 | | 9.4 | 2.35 | 4.5 | 2.97 | | | | | | | | | | | | | | | | |
| <i>Microtendipes pedellus</i> | | | | | 17.9 | 11.95 | 6.0 | 4.98 | | | | | | | | | | | | | | |
| <i>Tanytarsus</i> gr <i>pallidicornis</i> | | | | | 66.7 | | 83.3 | | | | | | | | | | | | | | | |
| <i>Paratendipes albimanus</i> | | | | | 19.7 | 5.24 | 10.0 | 6.47 | | | | | | | | | | | | | | |
| <i>Procladius</i> Skuze | | | | | 58.5 | 6.59 | | | | | | | | | | | | | | | | |
| <i>Thienemannimyia</i> - "Reihe" | | | | | | | | | | | | | | | | | | | | | | |
| <i>Rheotanytarsus</i> sp | | | | | | | | | | | | | | | | | | | | | | |
| <i>Parakieiriella bathophila</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Chironomus</i> fl <i>thummi</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Chironomus</i> (Isocladius) gr <i>silvestris</i> | | | 12.0 | 2.99 | | | | | | | | | | | | | | | | | | |
| <i>Oricotopus</i> (Isocladius) sp. + <i>Cricotopus</i> spp. | 3.9 | 2.36 | 2.8 | 1.64 | | | | | | | | | | | | | | | | | | |
| <i>Nanodotidius</i> bicolor | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pseudosmittia</i> gracilis | | | | | | | | | | | | | | | | | | | | | | |
| <i>Paraccladius</i> conversus | | | | | | | | | | | | | | | | | | | | | | |
| " <i>Cryptochironomus</i> " <i>vytshegdae</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Harnischia</i> fuscimana | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cryptochironomus</i> gr <i>defectus</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Paratendipes</i> gr <i>intermedius</i> | | | | | | | | | | | | | | | | | | | | | | |
| <i>Prodiamesa</i> olivacea | | | | | | | | | | | | | | | | | | | | | | |



 dominant
 subdominant

Fig. 7. *Chironomidae* communities in sandy-silty bottom of the investigated rivers (according to the domination index). d — domination index, % — per cent of different *Chironomidae* taxons, f — frequency

Ryc. 7. Ugrupowania *Chironomidae* w dnie piaszczysto-mulistym badanych rzek (wg wskaźnika dominacji). d — wskaźnik dominacji, % — procentowy udział poszczególnych taksonów *Chironomidae*, f — frekwencja

| STANOWISKO STATION | N1 | | L1 | | B1 | | 3 | | 4 | | 5 | | 6 | | 7 | |
|--|------|------|------|------|------|------|---|---|-----|-----|------|-------|------|------|---|---|
| | % | f | % | d | % | d | % | d | % | d | % | d | % | d | % | d |
| Procladius Skuze | 25.0 | 250 | 8.3 | 158 | 19.9 | 1386 | | | 5.3 | 282 | 12.3 | 10.75 | 22.1 | 1105 | | |
| Micropsectra sp1(gr. praecox) | 35.2 | 119 | 10.7 | 268 | | | | | | | | | | | | |
| Tanytarsus gr pallidicornis | 6.2 | 4.11 | 3.4 | 1.69 | | | | | | | | | | | | |
| Paratendipes gr intermedius | 11.2 | 373 | | | | | | | | | | | | | | |
| Odontomesa fulva | 3.9 | 2.49 | | | | | | | | | | | | | | |
| Paraccladius conversus | 3.4 | 224 | 15.4 | 4.05 | | | | | | | | | | | | |
| Cladotonytarsus spp. | 17.1 | 1712 | 24 | 1.58 | | | | | | | | | | | | |
| Chironomus fl thummi | 25.2 | 2.61 | | | | | | | | | | | | | | |
| Paracadopelma camptolabis | 7.2 | 3.60 | | | | | | | | | | | | | | |
| Polypedium nubeculosum | 7.2 | 3.60 | | | | | | | | | | | | | | |
| Paratendipes albianus | 8.1 | 2.03 | | | | | | | | | | | | | | |
| Microtendipes pedellus | 11.6 | 9.65 | | | | | | | | | | | | | | |
| Tanytarsus sp1(gr. gregarius) | 10.9 | 7.30 | | | | | | | | | | | | | | |
| Rheotonytarsus sp. | 8.15 | 4.09 | 8.6 | 3.45 | | | | | | | | | | | | |
| Thienemannimyia - "Reihe" | 4.0 | 2.01 | 10.9 | 1.28 | | | | | | | | | | | | |
| Ortociadius spp.+ Cricotopus spp. | 17.7 | 313 | | | | | | | | | | | | | | |
| Polypedium gr pedestre | | | | | | | | | | | | | | | | |
| Polypedium gr convictum | | | | | | | | | | | | | | | | |
| Zalutschia potamophilus | | | | | | | | | | | | | | | | |
| Nanocladius bicolor | | | | | | | | | | | | | | | | |
| Cricotopus (Isociadius) gr. silvestris | | | | | | | | | | | | | | | | |
| Prodiamesa olivacea | | | | | | | | | | | | | | | | |
| Harnischia fuscimana | | | | | | | | | | | | | | | | |
| Cryptochironomus gr defectus | | | | | | | | | | | | | | | | |

dominant

 subdominant

Fig. 8. Chironomidae communities in silty bottom of the investigated rivers (according to the domination index). d — domination index, % — per cen of different Chironomidae taxons, f — frequency

Ryc. 8. Ugrupowania Chironomidae w dnje mulistym badanych rzek (wg wskaźnika dominacji). d — wskaźnik dominacji, % — procentowy udział poszczególnych taksonów Chironomidae, f — frekwencja

c. *Chironomidae* communities of silty bottom

In the investigated station of the River Nida and its tributaries no typical stagnant silts, such as those encountered in large lowland rivers of slow current with *Chironomidae* communities of stable domination structure were differentiated. The investigated silts can be classified as „transitory” (Szczepański 1953), while the *Chironomidae* communities found there have a domination structure similar to those occurring in sandy-silty and partly sandy habitats (fig. 8).

Procladius was the characteristic taxon of *Chironomidae* communities developing there. It predominated at stations N—1, 2, 6, and 7, and appeared as sub-dominant at stations L—1 and 5. *Chironomus fl. thummi*, a typical pelophilous species, prevailed in silty bottom of station L—1, appearing as a sub-dominant at stations 3, 5, 6 and 7. *Orthocladius spp.* + *Cricotopus spp.* predominated in silt of polluted stations 3, 4 and 5, being noted as sub-dominants at stations 2, 6 and 7. Moreover, *Paracladius conversus* predominated at station 6 and *Nanocladius bicolor* at station 5.

The similarity dendrite of *Chironomidae* communities in the silty biotype of the investigated stations is presented in fig. 9. It suggests that only the *Chironomidae* fauna of strongly polluted stations, i.e., B—1 and 3, was of different character. At other stations the *Chironomidae* com-

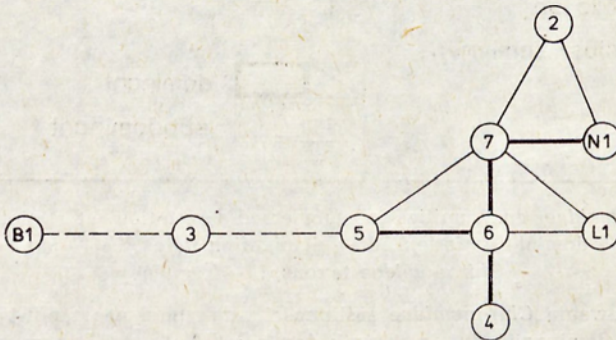


Fig. 9. Dendrite of *Chironomidae* communities from muddy bottom in the investigated stations

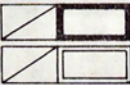
Ryc. 9. Dendryt ugrupowań *Chironomidae* dna mulistego na badanych stanowiskach

munities of silty bottom show greater similarity than the *Chironomidae* communities developing in sandy or sandy-silty bottoms.

d. *Chironomidae* communities of the vegetation habitat

Chironomidae communities of the vegetation habitat were only examined at stations L—1, 1 and 2, where greater amounts of submersed plants occurred during the investigation period. A similar domination

| GATUNKI-SPECIES | STANOWISKO-STATION | | L1 | | 1 | | 2 | |
|---|--------------------|-------|---------------|-------|---------------|-------|--------------|-------|
| | % | d | % | d | % | d | % | d |
| <i>Orthocladius</i> spp. + <i>Cricotopus</i> spp. | 2.62 40.0 | 10.46 | 16.3 100.0 | 16.28 | 17.0 100.0 | 17.02 | | |
| <i>Micropsectra</i> sp1(<i>gr. praecox</i>) | | | 24.2 42.9 | 10.38 | | | | |
| <i>Rheotanytarsus</i> sp | | | | | | | 35.0 84.6 | 29.84 |
| <i>Chironomus</i> fl <i>thummi</i> | 11.8 60.0 | 7.06 | 3.0 42.9 | 1.29 | | | | |
| <i>Tanytarsus</i> gr <i>pallidicornis</i> | 11.2 40.0 | 4.50 | 7.6 42.9 | 3.28 | 3.0 46.2 | 1.41 | | |
| <i>Limnochironomus</i> gr <i>nervosus</i> | 12.4 40.0 | 4.90 | | | | | 3.0 76.9 | 2.30 |
| <i>Procladius</i> Skuze | 10.1 80.0 | 8.05 | | | | | 4.0 84.6 | 3.36 |
| <i>Chironomus</i> fl <i>plumosus</i> | 9.9 20.0 | 1.98 | | | | | | |
| <i>Microtendipes</i> <i>pedellus</i> | 3.6 40.0 | 14.2 | 9.0 57.1 | 5.15 | 4.2 53.8 | 2.24 | | |
| <i>Paratendipes</i> <i>albimanus</i> | | | 12.2 42.9 | 5.21 | | | | |
| <i>Stictochironomus</i> <i>pictulus</i> | | | 2.7 42.9 | 1.15 | | | | |
| <i>Pothasttia</i> <i>longimana</i> | | | 2.1 57.1 | 1.17 | | | | |
| <i>Endochironomus</i> gr <i>tendens</i> | | | 2.0 57.1 | 1.16 | | | | |
| <i>Thienemannimyia</i> "Reihe" | | | 3.9 57.1 | 2.24 | 3.1 84.6 | 3.00 | | |
| <i>Thienemanniella</i> sp. | | | | | | | 3.8 69.2 | 2.66 |
| <i>Synorthocladius</i> <i>semivirens</i> | | | | | | | 1.6 76.9 | 1.21 |



dominant

subdominant

Fig. 10. *Chironomidae* communities in submersed vegetation at stations L1, 1 and 2 (according to the domination index). d — domination index, % — per cent of different *Chironomidae* taxons, f — frequency

Ryc. 10. Ugrupowania *Chironomidae* roślinności zanurzonej na stanowiskach L1, 1 i 2 (wg wskaźnika dominacji). d — wskaźnik dominacji, % — procentowy udział poszczególnych taksonów *Chironomidae*, f — frekwencja

structure with *Orthocladius* spp. + *Cricotopus* spp. and with *Rheotanytarsus* sp. larvae at station 2 and *Micropsectra* sp. 1 (*gr. praecox*) at station 1 (fig. 10) as dominants was observed.

A similar structure in *Chironomidae* communities of submersed vegetation was found in the River Danube (J a n k o v i č 1973, 1975 b) and in the rivers Thames and Kennet (M a c k e y 1976, 1977).

The analysis of *Chironomidae* fauna in the investigated area suggested a differentiation of species characterized by preferences for certain types of habitats (Table IV). Thus, *Stictochironomus pictulus*, *Polypedilum*

Table IV. Occurrence frequency of some Chironomidae in different types of the bottom of River Nida.

G - upper river course; S - middle river course; D - lower river course.
Scale: 5 - constant taxa (80-100 %); 4 - common taxa (60-80 %); 3 - mean common taxa (40-60 %)

Tabela IV. Częstość występowania wybranych Chironomidae w różnych rodzajach dna rzeki Nidy.

G - górny bieg rzeki; S - środkowy bieg rzeki; D - dolny bieg rzeki.
Skala: 5 - taksony stałe (80-100 %); 4 - taksony częste (60-80 %); 3 - taksony średnio częste (40-60 %)

| Taxon - Takson | Type of bottom - Rodzaj dna | | | | | | | | |
|---|-----------------------------|---|---|-------------------------------|---|---|-----------|---|---|
| | Sand-Piasek | | | Muddy sand Piasek samulony | | | Mud - Muł | | |
| | G | S | D | G | S | D | G | S | D |
| <i>Odontomesa fulva</i> | 3 | - | - | 5 | - | - | 4 | - | - |
| <i>Cladotanytarsus</i> spp. | 5 | - | - | 5 | - | - | 5 | - | - |
| <i>Stictochironomus pictulus</i> | 5 | - | - | 5 | - | - | - | - | - |
| <i>Microtendipes pedellus</i> | 3 | - | - | 5 | - | - | 5 | - | - |
| <i>Tanytarsus</i> sp. 1 gr. <i>gregarius</i> | 3 | - | - | - | - | - | 4 | - | - |
| <i>Thienemannimyia</i> - szereg | 3 | - | - | 4 | - | - | 3 | - | - |
| <i>Rheotanytarsus</i> sp. | - | - | - | 3 | - | - | 3 | - | - |
| <i>Tanytarsus</i> gr. <i>pallidicornis</i> | - | - | - | 3 | - | - | 4 | - | - |
| <i>Demicryptochironomus vulneratus</i> | 3 | - | - | - | - | - | - | - | - |
| <i>Polypedilum scalaenum</i> | 3 | - | 4 | 5 | - | - | - | - | - |
| <i>Cryptochironomus</i> gr. <i>defectus</i> | 5 | - | 4 | - | - | 3 | - | - | 3 |
| <i>Ortheoladius</i> spp. + <i>Cricotopus</i> spp. | 5 | 3 | - | 3 | 4 | 3 | 4 | 4 | 5 |
| <i>Procladius</i> Skuse | 5 | - | - | 5 | 4 | - | 5 | - | 5 |
| <i>Parakiefferiella bathophila</i> | - | - | - | 4 | - | - | - | - | - |
| <i>Micropsectra</i> sp. 1 gr. <i>praecox</i> | - | - | - | - | - | - | 4 | - | - |
| <i>Polypedilum nubeculosum</i> | - | - | - | - | - | - | 3 | - | - |
| <i>Chironomus</i> fl. <i>thummi</i> | - | - | - | - | 3 | 3 | 3 | 4 | 3 |
| <i>Nanocladius bicolor</i> | - | - | - | - | 4 | - | - | 3 | 3 |
| <i>Paracladius convexus</i> | - | - | 3 | - | - | 4 | 4 | - | 4 |
| " <i>Cryptochironomus</i> " <i>vytshegdae</i> | - | - | 4 | - | - | 4 | - | - | - |
| <i>Harnischia fuscimana</i> | - | - | 3 | - | - | 3 | - | - | 4 |
| <i>Prodiamesa olivacea</i> | - | - | - | - | - | - | - | 3 | 4 |
| <i>Polypedilum bicrenatum</i> | - | - | 3 | - | - | - | - | - | - |
| <i>Paratendipes</i> sp. gr. <i>intermedius</i> | - | - | - | - | - | 4 | - | - | - |

scalaenum, *Demicryptochironomus vulneratus*, „*Cryptochironomus*“ *vytshegdae*, and *Polypedilum bicrenatum* were among the species most frequently found on sandy bottoms. The species most often observed in silty bottoms were *Micropsectra* sp. 1 (gr. *praecox*), *Prodiamesa olivacea*, *Chironomus* fl. *thummi*, *Microtendipes*, *pedellus*, *Nanocladius bicolor*, *Polypedilum nubeculosum*, and *Tanytarsus* gr. *pallidicornis*, while *Parakiefferiella bathophila* and *Odontomesa fulva* were fairly numerous in sandy-silty bottoms.

It should be stressed that apart from an allegiance to a given type of habitat, some species had a tendency to occur in a particular river sector. Among the species occurring in the upper river sector and in a particular type of habitats were *Stictochironomus pictulus*, *Microtendipes pedellus*, *Odontomesa fulva*, *Tanytarsus* gr. *pallidicornis*, and *Micropsectra* sp. 1

(gr. *praecox*). *Cladotanytarsus* spp. and *Thienemannimyia*-Reihe larvae occurred in the upper river sector only, showing no definite preference to any type of habitats. Such species as „*Cryptochironomus*” *vytshegdae*, *Harnischia fuscimana* or *Polypedilum bicrenatum* (Table IV) were connected with the lower river sector.

Discussion

As compared with other water courses the *Chironomidae* fauna of the River Nida and its affluents is rich in both qualitative (148 differentiated taxons) and quantitative composition.

Thienemann (1945) compared several water courses, claiming that in mountainous streams *Orthoclaadiinae* constituted the greatest part (80%), while *Chironomidae* (chiefly *Chironomini*) amounted to only 10% of the total *Chironomidae* population. These relations gradually changed as the river flowed onto lowlands. In flowing waters *Chironomidae* (chiefly *Chironomini*) predominated in 55% while *Orthoclaadiinae* constituted 30%. Table V contains the numbers of taxons of *Chironomidae* sub-families, obtained in different investigations.

With respect to the occurrence of different *Chironomidae* families and

Table V. The number and percentage composition of species in the subfamilies of Chironomidae in some watercourses

Tabela V. Ilość i procentowy skład gatunków w podrodzinach Chironomidae w niektórych ciekach wodnych

| Investigated watercourses Badane ciek | Tanyptodinae | | Orthoclaadiinae | | Tanytarsini | | Chironomini | | Total Ogółem |
|---|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|
| | number ilość | % | number ilość | % | number ilość | % | number ilość | % | |
| The lower mountains (Mittelgebirge Thienemann 1954) | 8 | 9.0 | 62 | 70.0 | 10 | 11.0 | 9 | 10.0 | 89 |
| Susua (Berg 1948) | 15 | 18.0 | 36 | 43.0 | 13 | 15.0 | 20 | 24.0 | 84 |
| Linding A (Lindgaard-Petersen 1972) | 8 | 12.0 | 42 | 63.0 | 6 | 8.5 | 11 | 16.5 | 67 |
| Kossau (Nietzke 1938) | 11 | 16.0 | 29 | 39.0 | 21 | 28.0 | 13 | 18.0 | 74 |
| Odra (Harnisch 1922) | 9 | 15.0 | 18 | 30.0 | 6 | 10.0 | 27 | 45.0 | 60 |
| Soła (Zacwilichowska 1969) | 4 | 13.3 | 15 | 50.0 | 7 | 23.3 | 11 | 23.4 | 30 |
| San (Zacwilichowska 1970) | 4 | 11.1 | 13 | 36.0 | 7 | 19.4 | 12 | 33.4 | 36 |
| Supraśl (Niedźwiecki 1970) | 7 | 15.9 | 15 | 34.0 | 4 | 9.1 | 18 | 41.0 | 44 |
| Narew (Niedźwiecki 1974) | 4 | 10.3 | 8 | 20.5 | 5 | 12.8 | 22 | 56.4 | 39 |
| Kryniozanka (Szczepny 1974) | 8 | 15.4 | 30 | 57.7 | 6 | 11.5 | 8 | 15.4 | 52 |
| Frądnik (Drahtal 1976a) | 8 | 10.0 | 61 | 76.2 | 1 | 1.2 | 10 | 12.6 | 80 |
| Nida (present author's findings - dane autora) | 12 | 8.1 | 68 | 45.9 | 9 | 12.8 | 49 | 33.2 | 148 |

their respective percentage, the River Nida is more similar to lowland rivers of the Susa, Odra, Kossau, Supraśl, or Narew type, than to the Carpathian rivers Soła or San. A comparison on the basis of species is impossible because in numerous works the identification is incomplete.

In the River Nida a zonal distribution of the *Chironomidae* fauna is observed, although it is not so distinct as in Carpathian streams and rivers (Kownacki 1971, 1977, Zaćwilichowska 1969, 1970), where the changes in the domination structure of bottom fauna communities were noted in markedly shorter sectors. Changes in the domination structure of *Chironomidae* in the River Nida were observed in much longer sectors. The *Chironomidae* communities observed in the upper sector of the River Nida had a domination structure similar to that in the lower sector of the San (Zaćwilichowska 1970).

It can be assumed that the passage from the *Chironomidae* communities of the upper river course to those of the lower river course could occur more gradually but for the influence of wastes which to a great degree disturbed the domination structure in *Chironomidae* communities, changing both the qualitative composition and the number of specimens. Probably, *Chironomidae* communities with species of the lower and of the upper river courses would have been noted there.

The zonal distribution of the *Chironomidae* fauna along the river course was also manifested in the separate habitats though not uniformly in all of them. This was most striking in sandy bottom, where the *Chironomidae* communities of the upper, middle, and lower river sectors showed different domination structures. Since this type of bottom prevailed in the investigated river, its influence was visible in the domination structure of *Chironomidae* communities differentiated in the longitudinal river profile. The zonal distribution was less manifested in sandy-silty bottoms, where the *Chironomidae* communities were of transitory character between communities of sandy and of silty bottoms.

The poorest differentiation of *Chironomidae* fauna was observed in the silty bottom, the *Chironomidae* communities being similar and showing no zonal distribution there.

Szczęsny (1974) analysed the zonal distribution of the bottom fauna in the Kryniczanka stream, noting differences between communities of stony and fine-grained bottoms.

Wastes significantly change the qualitative and quantitative relationships of the *Chironomidae* fauna in the River Nida. They disturb the domination structure of *Chironomidae* communities and lead to a decrease in the numbers of specimens. At the polluted station of the River Nida no increase in the number of *Chironomus* fl. *thummi* larvae was observed, even though this species is regarded as a typical sewage form (Drañal 1976a, Szczęsny 1974, Wielgosz 1979, Zaćwilichowska 1970). It is probably due to the fact that the muddy habitat consti-

tutes just a small part of the investigated river bottom and also to the mixed composition of wastes (domestic and industrial).

Some *Chironomidae* species were connected to a given type of habitat, others were rather bound with the river zones (the upper or lower course), this being in contrast with the behaviour of *Oligochaeta* (Dumnicka 1978), for which the degree of water purity was decisive. Most species of the *Naididae* family occurred in markedly pure waters, while *Turbificidae* prevailed in polluted waters.

STRESZCZENIE

Celem pracy było określenie różnorodności gatunkowej *Chironomidae* i jej zmian w systemie rzeczonym Nidy, struktury przestrzennej ugrupowań larw ochotkowatych, układów dominacyjnych w ugrupowaniach wzdłuż kolejnych stanowisk oraz w najważniejszych rodzajach podłoża, a także określenie stopnia przekształcenia ugrupowań *Chironomidae* we fragmentach zanieczyszczonych ściekami.

Próby pobierano w okresie 2-letnim (1973—1975) z 11 stanowisk, w odstępach mniej więcej miesięcznych.

W rzece Nidzie i jej dopływach stwierdzono występowanie 148 jednostek taksonomicznych, należących do 3 podrodzin. Najliczniej reprezentowane były *Orthoclaadiinae* i *Chironominae*, w obrębie których wyróżniono po 68 jednostek taksonomicznych. *Tanytopodinae* reprezentowane były przez 12 taksonów. Na podstawie otrzymanych wyników można stwierdzić, że fauna *Chironomidae* rzeki Nidy i jej dopływów jest bogata zarówno pod względem jakościowym, jak i ilościowym.

Stwierdzono, że na rozmieszczenie i strukturę ugrupowań *Chironomidae* w podłużnym profilu rzeki wpływają takie czynniki, jak charakter hydrologiczny rzeki, udział i rodzaj siedliska w jej korycie, a głównie dopływające do rzeki zanieczyszczenia.

W podłużnym profilu rzeki Nidy wyróżniono 3 typy ugrupowań *Chironomidae* o odmiennej strukturze:

a. górnego odcinka rzeki — z dominacją *Cladotanytarsus spp.* i towarzyszącymi mu subdominantami: *Stictochironomus pictulus* oraz *Orthocladus spp.* + *Cricotopus spp.*

b. środkowego odcinka rzeki — z dominacją larw *Orthocladus spp.* + *Cricotopus spp.* i *Nanocladus bicolor* oraz towarzyszącymi im *Chironomus fl. thummi*.

c. dolnego biegu rzeki — z dominacją „*Cryptochironomus*” *vytshegdae*. *Paracladius conversus* i larw *Orthocladus spp.*, *Cricotopus spp.* oraz subdominantami: *Harnischia fuscimana*, *Cryptochironomus gr. defectus*, *Chironomus fl. thummi*, *Polypedilum scalae-num*, *P. bicrenatum* i *Prodiamesa olivacea*.

Przeanalizowano faunę *Chironomidae* występującą w obrębie wyróżnionych siedlisk. Stwierdzono, że ugrupowania *Chironomidae* dna piaszczystego górnego, środkowego i dolnego odcinka rzeki wykazywały odmienną strukturę, a ponieważ siedlisko to przeważało w badanej rzece uwidocznili się jego wpływ na ogólną strukturę ugrupowań *Chironomidae* w podłużnym profilu rzeki.

Ugrupowania *Chironomidae* w siedlisku piaszczysto-mulistym miały pośredni charakter między ugrupowaniami *Chironomidae* siedliska piaszczystego i mulistego.

Fauna *Chironomidae* siedliska mulistego była najslabiej zróżnicowana, ugrupowania *Chironomidae* były do siebie podobne w większym stopniu niż ugrupowania *Chironomidae* dna piaszczystego i piaszczysto-mulistego, wyróżnione dla poszczególnych stanowisk.

Ugrupowania *Chironomidae* stwierdzone wśród roślinności zanurzonej wykazywały podobną strukturę, oprócz typowych form fitofilnych występowały w nich także gatunki limno- i pelofilne.

Ponadto, stwierdzono, że niektóre gatunki preferują określony typ siedliska, inne z kolei związane są bardziej ze strefą rzeki (górny lub dolny bieg), a więc przeciwnie niż *Oligochaeta* (Dumnicka 1978), dla których większą rolę odgrywał stopień czystości wody.

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