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Water bugs (*Heteroptera*) of Neman River, some of its tributaries and riverine reservoirs

Abstract: In the middle flow region of Neman River, Belarus, 34 species of water bugs have been found to occur. The commonest species observed is *Micronecta griseola* HORV., followed by *Gerris lacustris* (L.), *Ilycoris cimicoides* (L.) and *Sigara falleni* (FIEB.). Five species have been recorded as new to Belarus: *Micronecta griseola*, *Sigara fallenoidea* HUNG., *Notonecta maculata* FABR., *Velia saulii* TAM. and *Gerris thoracicus* SCHUMM. From the River Neman proper, 24 water bug species have been reported, 25 in old river beds, 23 in larger tributaries, 12 in small tributaries and 8 in each type of water body, intermittent and others. Strong relations between the faunas of *Heteroptera* of Neman River and its old river beds as well as larger tributaries are emphasized.

Key words: Belarus, water bugs, species diversity

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INTRODUCTION

The water bug fauna of Belarus has hitherto remained poorly-known. Only 40 species have been recorded there so far (LUKASHUK 1997), of which 10 are known solely from older publications. The studies conducted in Belarus after World War II focused mainly on the problem of eco-physiology of selected species (MOROZ 1989a, 1989b, 1989c, 1989d, 1989e), whereas very few papers dealt with faunistic issues (MOROZ 1989f, 1991, 1995, MOROZ, MUKHIN 1994, LUKASHUK 1991, ROZENZWEIG 1995). Therefore, the water bug fauna of Belarus is still rather poorly-known.

No information concerning the water bugs of Neman River or its catchment area has been available in the literature. The objective of the present study is to provide the results of a study on the water bugs of this region. The natural conditions as well as

the specificity of this river against a background of other lowland rivers were decisive in choosing this study area. Since this is the first region in Belarus where complex investigations of the fauna of *Heteroptera* have ever been conducted, the results can prove important enough as a starting point for future studies.

STUDY AREA

The research was carried out in the middle flow region of Neman River, from Sjalec near Lida up to the Lithuanian border, together with the flood-lands and lower parts of the tributaries. The area under study is situated in Hrodna District. According to KONDRACKI's (1998) geographical zonation, the area belongs to two subprovinces of the East Baltic-Belorussian Lowland: East Baltic Lakeland and Podlasie-Belorussian Plateau. Most of the study region is situated on the Neman Plain. Only the area north of Suchaja Dolina lies in the northeastern part of North Podlasie Lowland and in the northern patch of Marečanka-Kotra-Čornaja Han'cza Plain (KONDRACKI 1992).

In the study area, 38 sampling sites were designated (Fig.1).

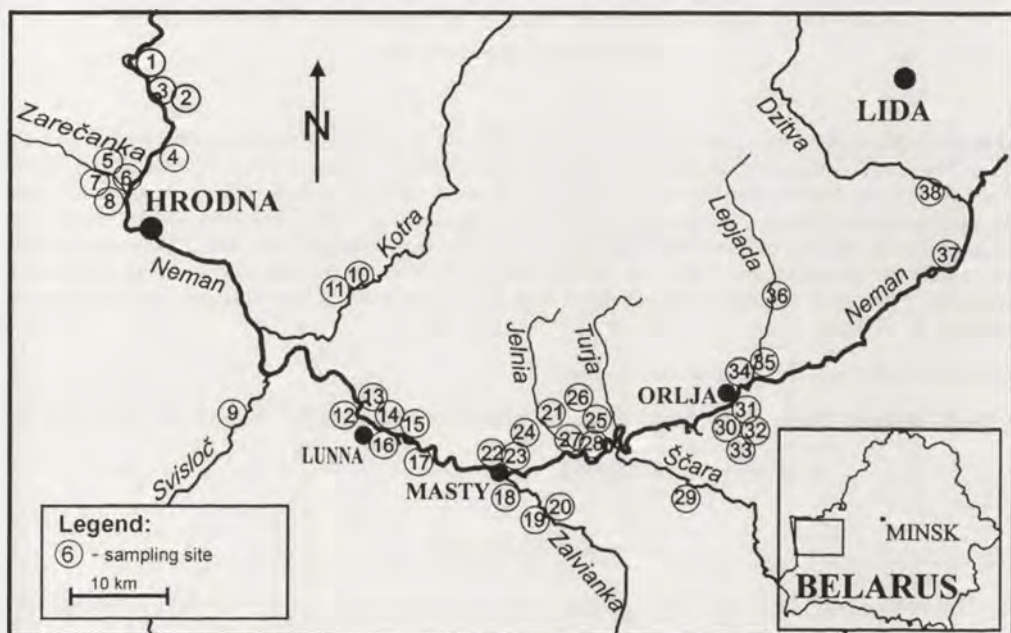


Fig. 1. Study area.

Review of sampling sites

1. The Neman at Lukavica. River width about 80 m, a high bank, water coffee-brown in colour, a sandy and stony-sandy bottom with a silt deposit. River bank with a wide belt of *Glyceria maxima*, in places *Butomus umbellatus*, *Equisetum limosum* and *Heleocharis* sp. Samples were taken at a depth of about 20 cm.

2. An old river bed of the Neman between Polanica and Hoža. A sandy bottom, bare or with a belt of near-shore vegetation of *Glyceria maxima*, *Acorus calamus* and *Butomus umbellatus*. Samples were taken at a depth of 80 cm.
3. A 1.5-m wide stream, a tributary to the Neman, which flows through the old river bed (Site 2). A stony and gravelly bottom, only in places sandy, a fast current, down to 20 cm deep, with *Elodea canadensis*, *Veronica beccabunga* and *Glyceria maxima* in the near-shore zone.
4. The Neman at Zaryca (right bank). River width about 80 m, low bank, sandy or gravelly bottom covered with a layer of loose sediment. Immersed grasses near the bank, with concentrations of *Potamogeton pectinatus* in the water. Samples were taken at 15–40 cm depths.
5. The River Zarečanka at Zarečanka, a left tributary to the Neman, about 1 m wide, with the sampling site situated about 60 m upstream from the outlet. A sandy-stony bottom, a well-developed current zone and muddy marginal lakes with a thin layer of sediment. Sampling from a depth of 10 cm.
6. The Neman at Bala Solnaja. Conditions similar to those at Site 4. In the current zone a stony bottom in places covered with sponges and *Hildenbrandia rivularis*. Near the river bank with concentrations of *Glyceria maxima*, marginal lakes with a layer of mud, overgrown with *Myriophyllum* sp. and *Potamogeton pectinatus*. Samples were taken at 15–20 cm depths.
7. The River Puškarka at Puškary, a left tributary to the Neman. The river bed is 0.5–1 m wide. A stony-gravelly bottom with sparse patches of moss and organic debris sediment. Marginal lakes overgrown with grasses and *Glyceria fluitans*.
8. The water body about 200 x 80 m in area in a limestone quarry at Puškary. The water is emerald-green in colour. The banks are sparsely vegetated, the helophyte zone is composed of loose *Typha latifolia* and *Phragmites australis*. *Potamogeton filiformis* and *P. lucens* are the most abundant elodeids. Leaves covered with limestone sediment. Depths in the sampling zone down to 40 cm.
9. The River Svisloč in Suchaja Dolina, a left tributary to the Neman. The river bed is about 30 m wide, the current is relatively fast, a sandy bottom with concentrations of tape-like forms of *Sparganium ramosum*, filiform algae and sponges. Large concentrations of *Myriophyllum* sp., *Potamogeton crispus* and *P. pectinatus* in the current zone, with riverine bushes of *Glyceria maxima*, *Butomus umbellatus*, *Typha latifolia*, *Phragmites australis* with some marshland vegetation close to the bank. Samples were taken at 10–60 cm depths.
10. An old river bed of the River Kotra at Kotra. An elongated water body about 10 m wide and 60 m long, strongly silted and shallow, overgrown almost entirely with *Glyceria maxima*.
11. The River Kotra, a right tributary to the Neman, at Kotra. The river width varies between 10 and 15 m. A fast current, a sandy bottom silted in an overgrown near-shore zone. Large concentrations of *Sagittaria sagittifolia*, *Potamogeton lucens* and *P. fluitans* in the current zone. Banks overgrown with *Glyceria maxima*. Samples were taken at 15–80 cm depths.
12. An old river bed on the left-bank of the Neman at Lunna, a country pond-like water body 10 x 20 m in area, down to 0.5 m deep, strongly degraded. The water is rusty in colour, stinking of liquid manure, with great numbers of *Tubificidae* worms at the bottom.

13. An old river bed on the right-bank of the Neman at Lunna, near the junction site with the river, 15 m wide, with a clayey floor, the water is brown-rusty in colour. A belt of *Glyceria maxima* with *Mentha aquatica* near the bank. Depth in the sampling zone ca. 20 cm.
14. The Neman at Lunna, left bank with a wide flood-plain terrace. A sandy silted bottom, with riverine bush of *Glyceria maxima* and sedges close to the bank. Sampling at 5–40 cm depths.
15. An old river bed of the Neman, right-bank, close to Lunna. About 8 m wide, down to 50 cm deep, a clayey silted bottom with *Nuphar luteum*, *Ceratophyllum* sp., *Elodea canadensis*, *Spirodela polyrrhiza*, *Lemna triscula*, filiform algae and *Potamogeton* sp. in the water. Concentrations of *Glyceria maxima*, *Carex* sp. and *Schoenoplectus lacustris* near the bank.
16. The Neman at Lunna, left bank. A hard, sandy or gravelly bottom, a belt of *Glyceria maxima*, *Acorus calamus* and *Schoenoplectus lacustris* near the bank.
17. An old river bed, the left-bank of the Neman at Jablonovo, with a wide outlet to the river. The water body is about 1.5 m long and on the average 30 m wide. A gravelly and stony bottom, sandy and clayey in places, in some places also silted. The water is transparent. A highly diverse vascular vegetation. In the nymphaeid zone, *Nuphar luteum* and *Nymphaea alba* with *Hydrocharis morsus-ranae* are dominants. Among the helophytes, *Glyceria maxima*, *Acorus calamus*, *Carex* sp. and *Hippuris vulgaris* are the most abundant. The elodeid zone is composed of *Myriophyllum* sp., *Potamogeton lucens*, *Ceratophyllum* sp. and *Elodea canadensis*. Sampling from a depth less than 1 m.
18. The River Zalvianka, a left tributary to the Neman, close to its outlet, near Masty. A stony bottom in the current zone. The near-shore zone is overgrown with *Glyceria maxima*. Depths in the sampling zone, 15–40 cm.
19. The River Zalvianka at Peski, up to 15 m wide. Above the artificial water lifting site, the bottom is strongly silted, the flow is very slow, the banks are overgrown with *Glyceria maxima* and *Sagittaria sagittifolia*. A well-developed nymphaeid zone is with *Nuphar luteum*. Immersed vegetation is mainly composed of *Elodea canadensis*. Below the water lifting site, the bottom is sandy and the flow is very fast. No macrophytes, only sporadic grasses flooded near the shore. Samples were taken to a depth of 50 cm.
20. An old river bed of Zalvianka River at Peski. 4 x 50 m in area, a muddy bottom, a rust-coloured, slightly opalescent water. In the bank zone, with concentrations of *Glyceria maxima* with admixture of *Potamogeton obtusifolius*, *Ceratophyllum submersum* and *Myriophyllum* sp. Samples down to a depth of 50 cm.
21. The River Jelnia near Masty, a right tributary to the Neman, 4–5 m wide, a sandy and stony bottom. In the current zone, with visible concentrations of *Sagittaria sagittifolia* as well as stones and logs overgrown with moss and bryozoans. Close to the bank with visible patches of *Marchantia* sp. The maximum depths ca. 60 cm.
22. The Neman near Masty, right bank. A rather wide flood-plain terrace, the river is about 70 m wide. A sandy, slightly silted bottom, at a depth of about 1 m gravelly type. The bank zone is overgrown with *Acorus calamus*, *Butomus umbellatus*, *Glyceria maxima*, and *Carex* sp., with *Potamogeton perfoliatus* in the water. Samples from 15–60 cm depths.
23. An intermittent water body on the right bank of the Neman, about 5 x 20 m in area, down to 50 cm deep. Densely overgrown with aquatic-marshland vegetation (*Sagittaria sagittifolia*, *Glyceria maxima*).

24. An intermittent water body in a meadow on the right bank of the Neman, close to Site 23. The area is about 20 x 30 m, depth 15–20 cm, strongly silted, with large amounts of *Glyceria maxima*.
25. The River Turja close to Zaborje, a right tributary to the Neman, 3–4 m wide, down to 70 cm deep. The current zone is strongly overgrown, mainly with *Potamogeton* sp.
26. The River Zazulanka near Zaborje, a right tributary to the Neman, about 4–5 m wide and down to 1 m deep. In the bank zone with *Carex* sp. and *Phragmites australis*, in the water with *Potamogeton* sp.
27. The Neman close to Zaborje, with a high, strongly water-undermined right bank and a sandy bottom. The river is ca. 50 m wide. Samples were taken near the bank in the current zone as well as in a marginal lake with *Ceratophyllum* sp., *Spirodela polyrrhiza* and *Glyceria maxima*.
28. An old river bed at Daškovec, fed by the River Zazulanka. A sandy bottom with a muddy sediment, down to 40 cm deep. In the water, there are *Sagittaria sagittifolia*, *Stratiotes aloides*, *Hydrocharis morsus-ranae*, *Nuphar luteum*, on the river-bank a wide belt of sedges (*Glyceria maxima*, *Acorus calamus* and *Schoenoplectus lacustris*).
29. The River Ščara, a left tributary to the Neman, near Pjasčanka. The width of the river bed is 30–40 m, with a sandy, slightly silted bottom. Near the bank, with a wide belt of *Glyceria maxima*. The sampling depths, 20–50 cm.
30. An old river bed on the left-bank of the Neman close to Orlja, separated from the river. The area is about 15 x 50 m, the maximum depth 2 m. Vegetation varied: *Sagittaria sagittifolia*, *Comarum palustre*, *Nuphar luteum*, *Stratiotes aloides* and *Potamogeton natans*. Numerous occurrences of very large sponges (*Spongilla lacustris*) were observed. Samples taken from a depth of 50 cm.
31. An old river bed on the left-bank of the Neman near Orlja, with a wide outlet to the river. The area is 10 x 50 m, with concentrations of *Glyceria maxima*. Samples were taken down to a depth of 50 cm.
32. An intermittent water body on the left bank of the Neman near the village of Orlja, overgrown with *Glyceria maxima* and *Hydrocharis morsus-ranae*, 15–20 cm deep.
33. An intermittent water body situated in an alder carr, about 0.5 km south of the old river beds, near the village of Orlja. Water surface ca. 10 x 20 m, maximum depth 50 cm. A silted bottom covered with a thick layer of decaying leaves.
34. The Neman near Orlja, right bank. A vast river valley, the river proper is 80 m wide. A sandy bottom, in places stones covered with periphyton, water coffee-coloured, current quite fast. Near the bank, a belt of *Glyceria maxima* and *Acorus calamus*. In the water, sporadic *Elodea canadensis* and *Potamogeton perfoliatus*. The sampling depths, 20–40 cm.
35. A right-bank old river bed of the Neman near Orlja. A permanent water body about 20 x 50 m in area, a sandy-clayey bottom, in the water with sporadic *Elodea canadensis*, *Potamogeton perfoliatus* and *Heleocharis* sp. Banks overgrown with *Glyceria maxima*. Samples taken from a depth less than 50 cm.
36. The River Lepjada, a right tributary to the Neman, near the village of Chodaraŭcy. The stream is about 10 m in width, a fast current, a sandy, slightly silted bottom, in places with big stones and concrete slabs overgrown with moss. The current zone is with *Elodea canadensis* and *Potamogeton perfoliatus*. Marginal lakes with *Sium latifolium* and *Phalaris arundinacea*. Sampling depths not greater than 40 cm.

37. The Neman at Sjalec, right bank. A wide flood-plain valley. The river forms two branches separated by an island. Samples were taken in the smaller one of a width of about 30 m. A sandy bottom with sporadic stones with a muddy sediment, sparsely overgrown with *Potamogeton perfoliatus*, *P. pectinatus* and *Elodea canadensis*. Current fast. In the bank zone, with *Glyceria maxima* and *G. fluitans*. Samples taken at 10–50 cm depths.

38. The River Dzitva, a right tributary to the Neman, south of Minojty, close to the Lida-Belica road. The river is about 15 m wide. A sandy, in places stony bottom, the water is more transparent than in the Neman. Marginal lakes with flooded grasses and *Glyceria maxima*.

MATERIAL AND METHODS

Field work was conducted in 1997 and 1998 during six expeditions organised in spring, summer and autumn. Samples were taken by means of a sweep net mesh, size 20 cm in diameter. The material was collected in the Neman and nearby waters, which belong to the Neman hydrological system. Highly varied old river beds and intermittent water bodies situated in flood-plain terraces, lower parts of the smaller and larger tributaries to the Neman as well as other water bodies were taken into account. Samples were taken in all habitats where the occurrence of water bugs could be expected.

Only at two sites (9 and 32), no *Heteroptera* were recorded. Altogether, 275 samples were taken, 190 out of which contained water bugs. The material collected comprised 8,051 specimens, both adults and nymphs, including 1,918 juveniles whose species identity remained undetermined and which were omitted from some analyses. Considering the amount of the material amassed, the diversity of the sampling sites and the fact that different seasons were covered by sampling, the collection could justly be regarded as fully representative of the water bug fauna of the entire prospected area as well as of individual kinds of water.

Simple indices, such as domination and frequency, were used to analyse the material. Domination classes were chosen following BIESIADKA & KOWALIK (1980). The "BioDiversity" software with the Jaccard similarity index was used in the analyses of faunal similarities between the sites and habitats. The results were presented as clustered dendrograms.

RESULTS

General description of the collected material

The rate of occurrence of water bugs (*Heteroptera*) in the River Neman and its catchment area proves to be very high. *Heteroptera* have been found at 95% sites and in 69% samples.

In the area under study, 34 *Heteroptera* species belonging to 10 families have been recorded (Table I). In terms of species diversity, the richest families are *Corixidae* (15 species) and *Gerridae* (12 species). These two families also dominate in terms of the number of specimens captured: *Corixidae* account for more than 67%, and *Gerridae* for more than 18%, of the total collection. Only 15% of the whole material are represented by the remaining eight families.

Table I. Quantitative characteristic of the collected material.

No.	Species	Number of specimens	Domination (%)	Number of samples	Frequency in samples (%)	Number of sites	Frequency at sites (%)
1	<i>Micronecta griseola</i> HORV.	3515	43.66	60	31.58	23	63.89
2	<i>Micronecta minutissima</i> (L.)	27	0.34	6	3.16	5	13.89
3	<i>Cymatia coleoprata</i> (FABR.)	33	0.41	6	3.16	4	11.11
4	<i>Callicorixa praeusta</i> (FIEB.)	14	0.17	12	6.32	9	25
5	<i>Corixa dentipes</i> (THOMS.)	2	0.02	2	1.05	2	5.56
6	<i>Hesperocorixa linnaei</i> (FIEB.)	7	0.09	4	2.11	4	11.11
7	<i>Hesperocorixa sahlbergi</i> (FIEB.)	11	0.14	8	4.21	7	19.44
8	<i>Paracorixa concinna</i> (FIEB.)	3	0.04	3	1.58	3	8.33
9	<i>Sigara distincta</i> (FIEB.)	8	0.10	6	3.16	5	13.89
10	<i>Sigara falleni</i> (FIEB.)	308	3.83	56	29.47	20	55.56
11	<i>Sigara fallenoidea</i> (HUNG.)	3	0.04	2	1.05	2	5.56
12	<i>Sigara fossarum</i> (LEACH)	14	0.17	8	4.21	5	13.89
13	<i>Sigara limitata</i> (FIEB.)	2	0.02	2	1.05	2	5.56
14	<i>Sigara semistriata</i> (FIEB.)	7	0.09	7	3.68	6	16.67
15	<i>Sigara striata</i> (L.)	176	2.19	51	26.84	21	58.33
16	<i>Notonecta glauca</i> L.	66	0.82	32	16.84	16	44.44
17	<i>Notonecta maculata</i> FABR.	1	0.01	1	0.53	1	2.78
18	<i>Plea minutissima</i> LEACH	108	1.34	22	11.58	10	27.78
19	<i>Ilyocoris cimicoides</i> (L.)	325	4.04	48	25.26	19	52.78
20	<i>Aphelocheirus aestivalis</i> (FABR.)	109	1.35	14	7.37	9	25
21	<i>Nepa cinerea</i> L.	199	2.47	59	31.05	28	77.78
22	<i>Ranatra linearis</i> (L.)	26	0,32	17	8.95	8	22.22
23	<i>Mesovelgia furcata</i> MULS. ET REY	84	1.04	14	7.37	8	22.22
24	<i>Microvelia reticulata</i> (BURM.)	77	0.96	9	4.74	7	19.44
25	<i>Microvelia buenoi</i> DRAKE	7	0.09	2	1.05	2	5.56
26	<i>Velia saulii</i> TAM.	1	0.01	1	0.53	1	2.78
27	<i>Gerris argentatus</i> SCHUMM.	4	0.05	3	1.58	3	8.33
28	<i>Gerris lacustris</i> (L.)	676	8.40	81	42.63	28	77.78
29	<i>Gerris najas</i> (DE GEER)	129	1.60	16	8.42	8	22.22
30	<i>Gerris odontogaster</i> (ZETT.)	33	0.41	20	10.53	13	36.11
31	<i>Gerris paludum</i> (FABR.)	125	1.55	30	15.79	15	41.67
32	<i>Gerris rufosculellatus</i> (LATR.)	16	0.20	11	5.79	7	19.44
33	<i>Gerris thoracicus</i> SCHUMM.	3	0.04	2	1.05	2	5.56
34	<i>Hydrometra gracilenta</i> HORV.	14	0.17	4	2.11	3	8.33
-	<i>Micronecta</i> sp. larvae	1040	12.92	36	18.95	19	52.78
-	<i>Corixinae</i> ind. larvae	238	2.95	51	26.84	23	63.89
-	<i>Gerris</i> sp. larvae	469	5.83	58	30.53	29	80.56
-	<i>Notonecta</i> sp. larvae	171	2.12	40	21.05	21	58.33
	Total	8051	100.00				

As many as five species new to Belarus here been recorded: *Micronecta griseola*, *Sigara fallenoidea*, *Notonecta maculata*, *Velia saulii*, and *Gerris thoracicus*. This enriches the faunal list of this country to 45 species. Further three species, *Hesperocorixa linnaei*, *Sigara limitata*, and *Aphelocheirus aestivalis*, have been reported from Belarus for the first time since World War II.

Occurrence of Heteroptera in the main kinds of water

The Neman. In the Neman proper, a total of 55 samples containing 3,776 specimens of 24 species (Table II) were taken. The group *Nepomorpha* accounts for 15 species and ca. 88% of all the water bugs taken, whereas the *Gerromorpha* for 9 species and 12%, respectively. The family *Corixidae* (9 species) provides more than 81% of the entire material, with *Micronecta griseola* being an unquestioned superdominant that makes up more than 87% of all the collected *Corixidae*. *Gerridae* family, being also rich in species as it is (6 species), constitutes almost 12% of the total number.

Micronecta griseola, eudominant, more than 74% of the total catch, is the species occurring most frequently in the Neman. *Gerris lacustris* and *Sigara falleni*, both dominants, as well as *S. striata* and *Nepa cinerea*, both subdominants, are also relatively frequent. The remaining 19 species belong to the recedent group, their total number amounting to 7%.

The following species showed the greatest frequencies of occurrence in the samples from the Neman: *Gerris lacustris* and *Micronecta griseola* (more than 47%) as well as *Sigara falleni*, *Nepa cinerea* and *Sigara striata*.

In Neman River, nine sampling sites were distinguished. Most samples came from Site 37 (Sjalec), with 15 samples taken. Both Site 22 (Masty) and Site 34 (Orlja) contained nine samples each, and both Site 6 (Bala Solnaja) and Site 14 (Lunna) six samples each. At the remaining sites, 1 to 4 samples were taken. Depending on site, 3–15 species of water bugs were collected at each (Table II).

At all sites, *Micronecta griseola* was the dominant species, being eudominant everywhere. At some of the sites, it occurred in great numbers; e.g. at Site 27 in one sampling as many as 565 individuals of this species were captured, and at Station 34, more than 1,000. Among the remaining *Corixidae*, the following species were also abundant: *Sigara falleni* (eudominant at sites 6 and 37, dominant at Site 14 and subdominant at sites 1 and 4) and *S. striata* (eudominant at Site 4, dominant at sites 14 and 37 and subdominant at Site 6). At Site 22, even though nine samples were taken, only one specimen of *S. striata* was caught. The rheobiotic species, *Aphelocheirus aestivalis* was only found at four sites (1, 6, 34, and 37), being more numerous at Site 37 (dominant) and Site 6 (subdominant). Among the remaining *Nepomorpha* species, the following water bugs associated with overgrown and shallow environments dominated: the ubiquitous *Nepa cinerea* (at most sites eudominant or subdominant) and *Ilycoris cimicoides* (dominant at sites 14 and 22, subdominant at Site 4), which was not recorded only at the stations where a small number of samples were taken. Among *Gerromorpha* species, representatives of the family *Gerridae* were found in the Neman. *Gerris lacustris* unquestionably dominated there (at most sites subdominant or eudominant), but also *G. paludum*, a species abundant almost everywhere, was very often recorded, although, due to its skittishness, it was difficult to catch. Due to this, the number of the collected individuals of *G. paludum* was not proportionate to the real abundance of this species. The numbers of *G. odontogaster*, which was subdominant at sites 22 and 37, were also substantial. This water boatman occurred more often among helophytes.

Table II. The fauna of water *Heteroptera* of the Neman (1, 4, 6, 14, 16, 22, 27, 34, 37 – sampling site number; N – number of specimens ; D – domination, %).

No.	Species	1		4		6		14		16		22		27		34		37		Total	
		N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D
1	<i>Micronecta griseola</i>	93	56.71	19	30.16	5	2.69	26	29.21	70	84.34	14	14.74	565	97.75	1112	95.53	241	51.50	2145	74.22
2	<i>Micronecta minutissima</i>			2	3.17	2	1.08					7	7.37			3	0.26	13	2.78	27	0.93
3	<i>Cymatia coleoptrata</i>															1	0.09			1	0.03
4	<i>Callicorixa praeusta</i>					1	0.54											4	0.85	5	0.17
5	<i>Paracorixa concinna</i>			1	1.59							1	1.05							2	0.07
6	<i>Sigara falleni</i>	8	4.88	3	4.76	82	44.09	6	6.74							16	1.37	58	12.39	173	5.99
7	<i>Sigara fossarum</i>			3	4.76													5	1.07	8	0.28
8	<i>Sigara semistriata</i>																	1	0.21	1	0.03
9	<i>Sigara striata</i>	1	0.61	17	26.98	8	4.30	6	6.74			1	1.05			17	1.46	35	7.48	85	2.94
10	<i>Notonecta glauca</i>	5	3.05											1	0.17			9	1.92	15	0.52
11	<i>Plea minutissima</i>	5	3.05					1	1.12											6	0.21
12	<i>Ilyocoris cimicoides</i>			3	4.76	2	1.08	8	8.99			7	7.37			3	0.26	5	1.07	28	0.97
13	<i>Aphelocheirus aestivalis</i>	2	1.22			8	4.30									4	0.34	37	7.91	51	1.76
14	<i>Nepa cinerea</i>	4	2.44	1	1.59	6	3.23	16	17.98	4	4.82	27	28.42	2	0.35	2	0.17	10	2.14	72	2.49
15	<i>Ranatra linearis</i>					1	0.54	3	3.37							1	0.09	2	0.43	7	0.24
16	<i>Mesovelvia furcata</i>			1	1.59	1	0.54													2	0.07
17	<i>Microvelia reticulata</i>															1	0.09			1	0.03
18	<i>Gerris argentatus</i>					1	0.54													1	0.03
19	<i>Gerris lacustris</i>	39	23.78	8	12.70	56	30.11	5	5.62	9	10.84	31	32.63	10	1.73	3	0.26	32	6.84	193	6.68
20	<i>Gerris odontogaster</i>	2	1.22	1	1.59	2	1.08	1	1.12			3	3.16					11	2.35	20	0.69
21	<i>Gerris paludum</i>	5	3.05	2	3.17	10	5.38	17	19.10			4	4.21							38	1.31
22	<i>Gerris rufosculellatus</i>			2	3.17													5	1.07	7	0.24
23	<i>Gerris thoracicus</i>					1	0.54													1	0.03
24	<i>Hydrometra gracilentia</i>															1	0.09			1	0.03
	<i>Micronecta</i> sp. larvae	8				132		36		3		225				47		66		517	
	<i>Corixinae</i> ind. larvae	2		13		7		6				2		2		15		72		119	
	<i>Gerris</i> sp. larvae	12		48		65		10		3		15		25		1		9		188	
	<i>Notonecta</i> sp. larvae			1				25				1		1		11		23		62	

Old river beds. From the old river beds, 54 samples containing 1,357 specimens belonging to 25 species were taken (Table III). From the *Nepomorpha* group (16 species) that accounted for 76% of the total material coming from the old river beds, 11 species belonged to the family *Corixidae* (36% of this material). In the *Gerromorpha* group (9 species), the family *Gerridae* dominated, being represented by five species and ca. 11% catches.

On the old river beds, *Ilyocoris cimicoides* (ca. 27%) and *Micronecta griseola* (ca. 11%) belong to eudominants. The group of dominants was composed of *Plea minutissima*, *Mesovelvia furcata*, *Gerris lacustris*, *Sigara falleni* and *Microvelia reticulata*. On the other hand, the subdominant group consisted of *Nepa cinerea*, *Sigara striata* and *Notonecta glauca*. The remaining 14 species belonged to the recedent group and totalled about 7% of the material.

Ilyocoris cimicoides, *Nepa cinerea* and *Plea minutissima* were distinguished by the greatest frequency in the samples (Table III).

In all ten old river beds inspected, 2–20 water bug species per site were taken (Table III). The old river beds of the Neman were characterised by the highest species diversity, with the exception of the one at the village of Lunna (Site 12) which, as a result of strong anthropogenic degradation, showed an extremely poor fauna. Most samples came from Site 17 (Jablonovo), with 11 species involved, as well as Site 35 (Orlja), with 12 species revealed. At these sites, the richest faunistic material was collected. On the old river bed at Site 17, 253 water bugs representing 13 species were caught, whereas Site 35 supported as many as 20 species. Since the old river bed at Jablonovo is one of the river arms of the Neman, *Micronecta griseola* (eudominant) occurred in great numbers there, too. On the Orlja river bed (Site 35), which is isolated from the river, only two individuals of this species were recorded. However, *Sigara falleni* (eudominant at Site 17, subdominant at Site 35) as well as *S. striata* (dominant at Site 17, subdominant at Site 35) were abundant on both river beds. On the old river bed at Jablonovo, the family *Corixidae* accounted for about 23% of all species (63% of the entire material), while at Orlja for 45% (17% of the total catch). Among the remaining *Nepomorpha* species, *Ilyocoris cimicoides* (eudominant at both sites) and *Ranatra linearis* (subdominant at both sites) are clearly more numerous. In addition, at Site 17, *Nepa cinerea* (subdominant) occurred in greater numbers while *Plea minutissima* (eudominant) was only found at Site 35.

There are substantial differences among the species in the *Gerromorpha* group. At site 35, *Microvelia reticulata* (eudominant) and *Hydrometra gracilentata* (subdominant) represented unquestioned dominants. Usually the water boatmen were not so numerous there. At site 17, however, they dominated, with *Gerris lacustris* being dominant while *G. paludum* subdominant there.

At the remaining sites, the faunal structure was more varied. The old river beds which are river arms of the Neman at the same time are generally characterised by great numbers of *Micronecta griseola*. At two sites (28 and 30), numerous individuals of *Cymatia coleoptrata*, which is known to prefer deeper waters with rich immersed vegetation, were recorded. *Stratiotes aloides* or nymphs formed perfect habitats for abundant *Mesovelvia furcata* (eudominant at sites 2 and 30) and *Microvelia reticulata* (eudominant at Site 35, dominant at sites 2, 28 and 30).

Table III. The fauna of water *Heteroptera* of old river beds (2, 12, 13, 15, 17, 20, 28, 30, 31, 35 – sampling site number; N – number of specimens; D – domination, %).

No.	Species	2		12		13		15		17		20		28		30		31		35		Total	
		N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D
1	<i>Micronecta griseola</i>	41	40.59			8	18.60	23	37.70	36	20.00									2	0.50	115	11.27
2	<i>Cymatia coleoptrata</i>													7	20.59	24	16.22			1	0.25	32	3.14
3	<i>Callicorixa praeusta</i>															1	0.68			2	0.50	3	0.29
4	<i>Corixa dentipes</i>																			2	0.50	2	0.20
5	<i>Hesperocorixa linnaei</i>															1	0.68					1	0.10
6	<i>Hesperocorixa sahlbergi</i>											1	2.94							1	0.25	2	0.20
7	<i>Sigara distincta</i>																			1	0.25	1	0.10
8	<i>Sigara falleni</i>	1	0.99			4	9.30	1	1.64	50	27.78					2	1.35			19	4.73	77	7.55
9	<i>Sigara fossarum</i>																			2	0.50	2	0.20
10	<i>Sigara semistriata</i>			1	50.00									1	2.94							2	0.20
11	<i>Sigara striata</i>					1	2.33	3	4.92	15	8.33			1	2.94	3	2.03			18	4.48	41	4.02
12	<i>Notonecta glauca</i>					2	4.65	5	8.20	2	1.11	1	2.94			8	5.41			5	1.24	23	2.26
13	<i>Plea minutissima</i>	3	2.97			1	2.33			1	0.56			16	47.06	21	14.19			58	14.43	100	9.80
14	<i>Ilyocoris cimicoides</i>	18	17.82			2	4.65	1	1.64	42	23.33			2	5.88	13	8.78	1	10.00	197	49.00	276	27.06
15	<i>Nepa cinerea</i>	1	0.99			3	6.98	20	32.79	5	2.78			2	5.88	7	4.73	4	40.00	2	0.50	44	4.31
16	<i>Ranatra linearis</i>									4	2.22			3	8.82	3	2.03			9	2.24	19	1.86
17	<i>Mesovelia furcata</i>	23	22.77							3	1.67					45	30.41			9	2.24	80	7.84
18	<i>Microvelia reticulata</i>	8	7.92											2	5.88	12	8.11			54	13.43	76	7.45
19	<i>Microvelia umbricola</i>															3	2.03			4	1.00	7	0.69
20	<i>Gerris argentatus</i>	1	0.99															2	20.00			3	0.29
21	<i>Gerris lacustris</i>	1	0.99			21	48.84	7	11.48	11	6.11	32	94.12			2	1.35	3	30.00	2	0.50	79	7.75
22	<i>Gerris odontogaster</i>			1	50.00					3	1.67									5	1.24	9	0.88
23	<i>Gerris paludum</i>					1	2.33	1	1.64	7	3.89					2	1.35					11	1.08
24	<i>Gerris rufosculellatus</i>									1	0.56					1	0.68					2	0.20
25	<i>Hydrometra gracilentata</i>	4	3.96								23									9	2.24	13	1.28
-	<i>Micronecta sp. larvae</i>	94																				117	
-	<i>Corixinae ind. larvae</i>					12		4		35		2				1		1		33		88	
-	<i>Gerris sp. larvae</i>	1		1		6		3		12		7		4		1				10		45	
-	<i>Notonecta sp. larvae</i>					20		18		3		11		3		6		1		25		87	

Larger tributaries. As many as 56 samples containing 2,555 specimens representing 23 species (Table IV) were collected from the larger tributaries to the Neman. The *Nepomorpha* group contained 17 species, with ca. 74% of the total catch there. *Gerromorpha* were represented by six species which amounted to 6% of the material. *Corixidae*, which was the richest family in terms of species diversity (11), accounted for almost 68% of the total collection, whereas *Gerridae* (5) for more than 26%. Like in the Neman, *Micronecta griseola* (61%) and *Gerris lacustris* (eudominants) composed the majority there. The following species occurred relatively frequently in the larger tributaries: *Gerris najas*, *Nepa cinerea*, *Aphelocheirus aestivalis*, *Sigara falleni* and *S. striata* (subdominants). The remaining 15 species belonged to recedents, amounting to about 4% of the total catch.

Table IV. The fauna of water *Heteroptera* of larger tributaries of the Neman (9, 11, 18, 19, 29, 36, 38 – sampling site number; N – number of specimens; D – domination, %).

No.	Species	9		11		18		19		29		36		38		Total	
		N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D
1	<i>Micronecta griseola</i>	763	83.75	333	74.00			62	24.51	61	34.86	21	20.00	7	11.11	1247	61.10
2	<i>Callicorixa praeusta</i>	2	0.22	1	0.22							1	0.95			4	0.20
3	<i>Hesperocorixa linnaei</i>	2	0.22	3	0.67							1	0.95			6	0.29
4	<i>Hesperocorixa sahlbergi</i>	3	0.33	1	0.22											4	0.20
5	<i>Paracorixa concinna</i>									1	0.57					1	0.05
6	<i>Sigara distincta</i>			3	0.67			1	0.40			2	1.90	1	1.59	7	0.34
7	<i>Sigara falleni</i>	24	2.63	9	2.00			7	2.77	3	1.71	2	1.90			45	2.21
8	<i>Sigara fossarium</i>			2	0.44											2	0.10
9	<i>Sigara limitata</i>			1	0.22											1	0.05
10	<i>Sigara semistriata</i>	2	0.22	1	0.22									1	1.59	4	0.20
11	<i>Sigara striata</i>	14	1.54	8	1.78	1	0.85	1	0.40	3	1.71	13	12.38	1	1.59	41	2.01
12	<i>Notonecta glauca</i>	7	0.77	7	1.56	1	0.85	5	1.98	1	0.57	3	2.86			24	1.18
13	<i>Notonecta maculata</i>			1	0.22											1	0.05
14	<i>Plea minutissima</i>							1	0.40					1	1.59	2	0.10
15	<i>Ilyocoris cimicoides</i>			2	0.44	1	0.85	8	3.16			3	2.86	6	9.52	20	1.00
16	<i>Aphelocheirus aestivalis</i>	5	0.55			27	23.08					13	12.38			45	2.21
17	<i>Nepa cinerea</i>	3	0.33	5	1.11	2	1.71	22	8.70	13	7.43	2	1.90	1	1.59	48	2.35
18	<i>Mesovelia furcata</i>	1	0.11					1	0.40							2	0.10
19	<i>Gerris lacustris</i>	77	8.45	28	6.22	79	67.52	54	21.34	72	41.14	37	35.24	18	28.57	365	17.88
20	<i>Gerris najas</i>			36	8.00	6	5.13	54	21.34	7	4.00					103	5.05
21	<i>Gerris odontogaster</i>							1	0.40					1	1.59	2	0.10
22	<i>Gerris paludum</i>	5	0.55	8	1.78			36	14.23	14	8.00					63	3.09
23	<i>Gerris rufosculellatus</i>	3	0.33	1	0.22											4	0.20
-	<i>Micronecta</i> sp. larvae	59		235		7		26		1		5		3		336	
-	<i>Corixinae</i> ind. larvae	13		8				1		2		2		3		29	
-	<i>Gerris</i> sp. larvae	39		17				27		29				18		130	
-	<i>Notonecta</i> sp. larvae			1				7		5				2		15	

The highest frequencies of occurrence in the larger tributaries were observed in *Gerris lacustris* (more than 64%), *Micronecta griseola* (around 42%) as well as *Sigara striata*, *Nepa cinerea* and *Sigara falleni*.

In six larger tributaries to the Neman, seven sampling sites were distinguished. Most samples (15) were taken from the River Kotra (Site 11), whereas the fewest (4) from the River Zalvianka (Site 18). The richest fauna came from the rivers Svisloč (14

species, 1,026 individuals) and Kotra (18 and 724, respectively). An impoverished fauna was observed in the River Lepjada (site 36) where, although as many as nine samples were taken, only 107 specimens belonging to 11 species were captured.

In all larger tributaries to the Neman, the species *Micronecta griseola* was particularly abundant (eudominant everywhere). In the River Zalvianka (Site 18), very numerous nymphs of *Micronecta*, all in the dominant class, were yielded. Among the remaining *Corixidae*, the species *Sigara falleni* was recorded almost everywhere (more numerous in the Svisloč, Site 9, and the Zalvianka, Site 19, where it was subdominant). In addition, there was the ubiquitous *S. striata* – eudominant in the Lepjada (Site 36) and subdominant in the Dzitva (Site 38). The other members of *Corixidae* were revealed in small numbers only. The greatest species diversity of this family was observed in the Svisloč (7 species) and the Kotra (10 species). One of the *Nepomorpha* species, *Aphelocheirus aestivalis*, eudominant in the Zalvianka (Site 18) and the Lepjada (Site 36), occurred in all larger tributaries. Both *Nepa cinerea* (highly numerous in the Zalvianka, Site 19, and the Ščara, Site 29) and the sporadic *Notonecta glauca* were recorded everywhere. Three species of water boatmen were the most abundant in the *Gerromorpha* group: *Gerris lacustris* (eudominant at sites: 18, 19, 29, 36 and 38, dominant at 9 and 11), *G. najas* (eudominant at site 19, dominant at 11 and 18, subdominant at site 29) as well as *G. paludum* which was recorded in many rivers, apparently being the most abundant in the Zalvianka and the Ščara.

Smaller tributaries. In the smaller tributaries to the Neman, only 16 samples were taken at six sites. They contained 260 specimens of water bugs and represented 12 species (Table V). Seven species, or about 40% of the collected material, ranked among species of the *Nepomorpha* group. The remaining 60% of the material encompassed five *Gerromorpha* species. The family *Corixidae* was poor in terms of both species diversity (4) and percentage (ca. 32%). The family *Gerridae* was not too species-rich either (4), although it accounted for about 60% of the total catch.

Table V. The fauna of water *Heteroptera* of smaller tributaries of the Neman (3, 5, 7, 21, 25, 26 – sampling site number; N – number of specimens; D – domination, %).

No.	Species	3		5		21		25		26		Total			
		N	D	N	D	N	D	N	D	N	D	N	D		
1	<i>Micronecta griseola</i>	3	11.54					2	13.33					5	5.26
2	<i>Callicorixa praeusta</i>					1	25.00							1	1.05
3	<i>Hesperocorixa sahlbergi</i>					2	50.00							2	2.11
4	<i>Sigara falleni</i>	5	19.23					1	6.67					6	6.32
5	<i>Notonecta glauca</i>	3	11.54											3	3.16
6	<i>Aphelocheirus aestivalis</i>	7	26.92					6	40.00					13	13.68
7	<i>Nepa cinerea</i>	4	15.38									1	7.69	5	5.26
8	<i>Velia saulii</i>					1	25.00							1	1.05
9	<i>Gerris lacustris</i>			18	51.43					2	100.00			20	21.05
10	<i>Gerris najas</i>	1	3.85	17	48.57			6	40.00			2	15.38	26	27.37
11	<i>Gerris paludum</i>											10	76.92	10	10.53
12	<i>Gerris rufosculellatus</i>	3	11.54											3	3.16
-	<i>Micronecta</i> sp. larvae	68				1								69	
-	<i>Gerris</i> sp. larvae			2				88		2		3		95	
-	<i>Notonecta</i> sp. larvae											1		1	

Analysis of such a limited faunistic material as regards the domination structure as well as the frequency of occurrence at the sampling sites does not seem to be justified. Nonetheless, *Micronecta griseola* (with nymphs accounting for more than 28% of the total catch), *Aphelocheirus aestivalis* and three other water boatman species (*Gerris najas*, *G. lacustris*, and *G. paludum*) clearly represented the vast majority of material.

In the smaller tributaries, *G. najas* showed the greatest frequency of occurrence.

Intermittent water bodies. Five samples were taken, in which 71 individuals were recorded. They represented eight *Heteroptera* species (Table VI) from three families: *Corixidae* (4), *Gerridae* (3), and *Nepidae* (1). The faunistic material was likewise too poor to make any meaningful ecological analysis. Yet *Nepa cinerea* and *Gerris lacustris* composed the bulk of material.

Table VI. The fauna of water *Heteroptera* of intermittent water bodies and other kinds of water in the study area (N – number of specimens; D – domination, %).

No.	Species	Intermittent water bodies		Other kinds of water	
		N	D	N	D
1	<i>Micronecta griseola</i>	3	5.77		
2	<i>Callicorixa praeusta</i>	1	1.92		
3	<i>Hesperocorixa sahlbergi</i>	3	5.77		
4	<i>Sigara falleni</i>			7	20.00
5	<i>Sigara fallenoidea</i>			3	8.57
6	<i>Sigara fossarum</i>			2	5.71
7	<i>Sigara limitata</i>	1	1.92		
8	<i>Sigara striata</i>			9	25.71
9	<i>Notonecta glauca</i>			1	2.86
10	<i>Ilyocoris cimicoides</i>			1	2.86
11	<i>Nepa cinerea</i>	20	38.46	10	28.57
12	<i>Gerris lacustris</i>	19	36.54		
13	<i>Gerris odontogaster</i>	2	3.85		
14	<i>Gerris paludum</i>	3	5.77		
15	<i>Gerris thoracicus</i>			2	5.71
	<i>Micronecta</i> sp. larvae	1			
	<i>Corixinae</i> ind. larvae	1		1	
	<i>Gerris</i> sp. larvae	11			
	<i>Notonecta</i> sp. larvae	6			

Other kinds of water. Four samples were taken in other water body types, three in a pond in a quarry, and one in a drainage ditch. They contained 36 individuals which belonged to eight *Heteroptera* species (Table VI). Four of them were *Corixidae* and they all accounted for 61% of the material amassed there. The material was likewise not representative enough for attempting a sound analysis. The following species were relatively numerous: *Nepa cinerea*, *Sigara striata* and *S. falleni*. In the water body in the quarry, a rare species of *Corixidae* was taken, *S. fallenoidea*.

Analysis of faunal affinities between the sites and the types of water body

Analysis of the faunal relations between the sampling sites shows that most of the fauna is highly uniform (Fig. 2). There are four groups of sites at a level of over 50% of

affinity. A large group/cluster (17 sites) embodies six sites in the Neman, five old river beds and six larger tributaries. One of the small groups encompasses two sites of Neman, the second two small tributaries, and the third an old river bed and an intermittent water body.

Analysis of the faunal affinities between individual types of water (Fig. 3) reveals great affinity between the water bug faunas of the Neman, the old river beds and the larger tributaries (over 60%). All these habitats are characterised by the environmental features that appear decisive in supporting similar faunas of water *Heteroptera*. These traits are first of all the near-shore zones overgrown with macrophytes and marginal lakes with a very slow current. Considerable faunal affinities are also evident between smaller and larger tributaries (46%), as well as between intermittent water bodies and smaller tributaries (43%). The strong affinity between the faunas of both latter types of water seems to be purely accidental, apparently being due to the too scarce material.

DISCUSSION

This study has yielded 34 species of water *Heteroptera* in the Neman catchment area. This number seems high when one takes into account the species diversity of the sampling sites. Since no such systematic studies on water bugs have ever been carried out in Belarus, it appears impossible to compare our results with local literature data. However, the considerably richer Polish literature provides enough material for such comparisons.

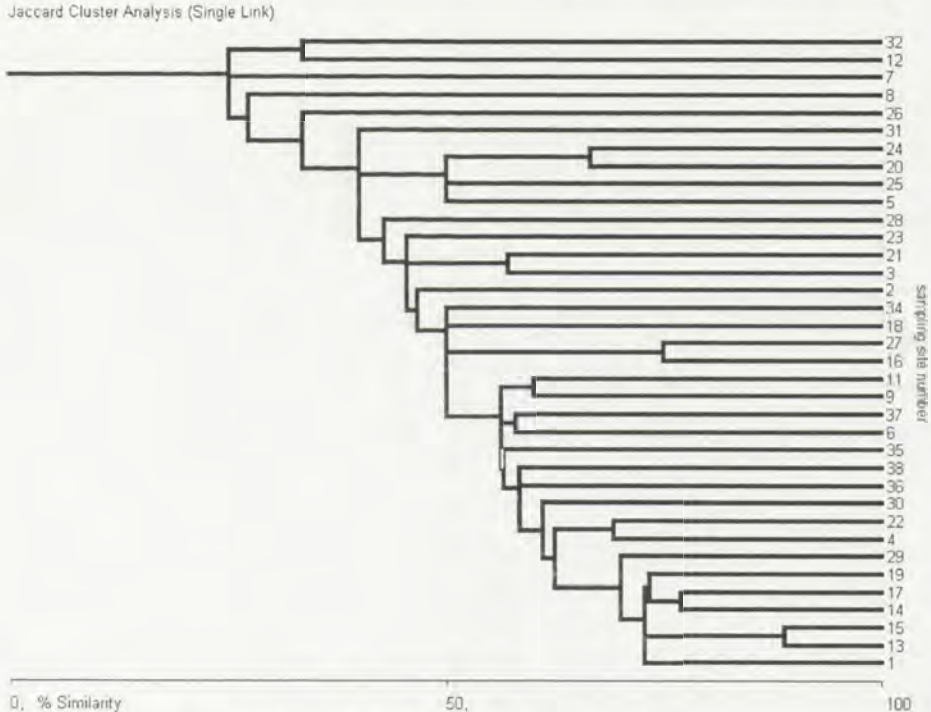


Fig. 2. Faunal affinities between study sites based on Jaccard's similarity index.

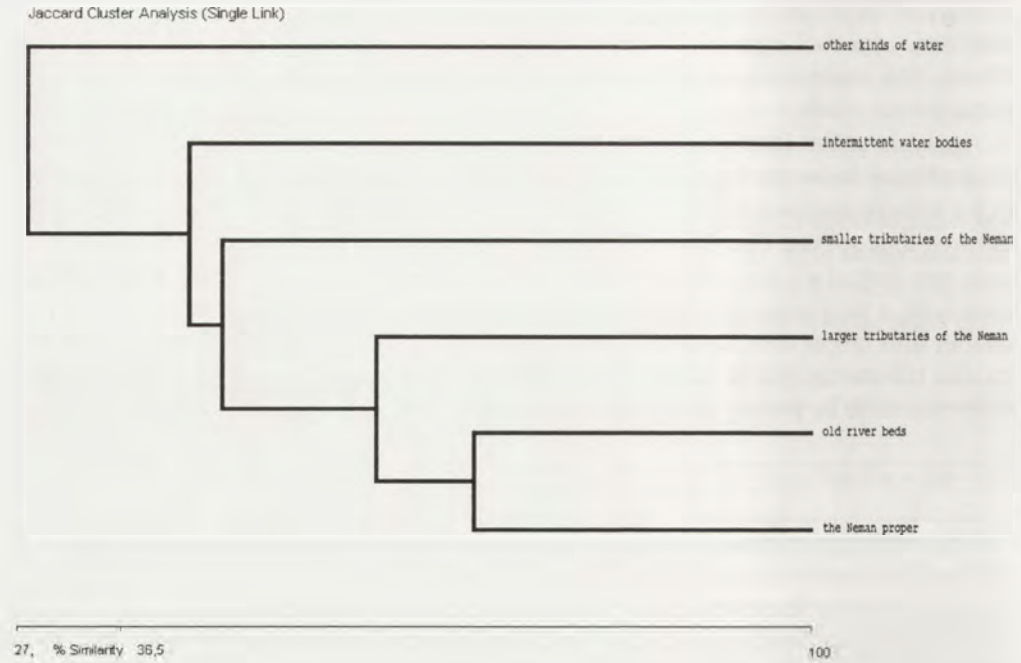


Fig. 3. Faunal affinities between types of water body based on Jaccard's similarity index.

In the water system of the lowland River Grabia and its flood-plain areas, KRAJEWSKI (1969) revealed as many as 50 species of water bugs, i.e. 42 species in the River Grabia proper, 36 in its tributaries and 40 in the water bodies of the flood-plain terrace. So the Neman fauna of *Heteroptera* is much poorer, even though there are some common features of in the analysed fauna. The number of species recorded in the river, which is the axis of the hydrographical system, in its tributaries, as well as in valley water bodies is very similar and amounts to 70–84% of species diversity found in both systems under study. The conclusion is, that there is a kind of uniform fauna of *Heteroptera* of the river system and that the specificity of individual types of water is low.

Following this train of thought, one can distinguish some ecological elements in the water bug fauna which integrate or differentiate individual types of water of the river system in terms of its fauna:

- rheobiotic element,
- rheophilic element,
- stagnobiotic element.

The rheobiotic element encompasses the water bugs occurring solely in rivers in places with a stronger water current. In the fauna under study, these characteristics can be ascribed to four species only: *Aphelocheirus aestivalis*, *Notonecta maculata*, *Velia saulii*, and *Gerris najas*. In the Grabia river system, there are slightly more rheobionts (7 species), but in both regions *Aphelocheirus aestivalis* is dominant.

The rheophilic element embodies the species lake and river in character, which occur in typical river environments as well as in lakes and other lake-like water bodies. In the area under study, these are the following species: *Micronecta griseola*, *M. minutissima*, *Gerris paludum* and *Hydrometra gracilentia*. In the area examined by KRAJEWSKI (1969), there is only one more species, namely *Micronecta poweri* (DGL. et KIRK.). This explains a very similar number of rheophilic species in both regions compared. In the Neman hydrographical system, rheophiles account for almost half of the water bug fauna, whereas in the Graba hydrographical system their percentage is lower than 10%. Species of the genus *Micronecta* KIRK. in KRAJEWSKI's (1969) studies occurred only in running waters, with the exception of *M. minutissima*, which was once found on an old river bed temporarily connected with the river. The situation is different in the Neman water system, where the occurrences of *Micronecta* on old river beds are common. A similar situation has been observed in the Raba and near-river water bodies (MIELEWCZYK 1973) as well as in the Pieniny hydrographical system (MIELEWCZYK 1978).

The species associated with stagnant waters form a stagnobiotic element. If these species occur in rivers, this generally takes place under the conditions similar to stagnant waters. This element is highly varied ecologically. One can distinguish species whose populations are associated with rivers, further forms that hibernate on the ground, as well as species which overwinter in near-river water bodies. In the Neman hydrographical system, stagnobionts constitute nearly half of the fauna of *Heteroptera*, while in the Grabia water system they amount to over 80%. Our analysis shows certain peculiarities in the water bug faunal structure in the area under study.

A large number of species (26) in the percentage group below 2% and a relatively small number of species (2) over 10% is also a characteristic feature of the fauna of the area concerned. Such a strongly polarised abundance structure is characteristic of the River Neman and its larger tributaries as well. The abundance structure in the smaller tributaries and on old river beds is less polarised. The specificity of the water bug fauna of the Neman and its flood-plain terrace results from the great domination of *Micronecta griseola*, a species that prefers pure and oxygen-rich waters, and that tends to abundantly occur there. Its nymphs have been found even in an intermittent water body, this confirming the exceptional purity of the waters in this area.

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STRESZCZENIE

[Tytuł: Pluskwiaki wodne (*Heteroptera*) rzeki Niemen, niektórych jego dopływów i zbiorników przyrzecznych]

Badania nad fauną pluskwiaków wodnych systemu hydrograficznego rzeki Niemen prowadzono w latach 1997–1998. Materiał zbierano w środkowym biegu Niemna, w przyujściowych odcinkach ważniejszych dopływów i w zbiornikach przyrzecznych, głównie starorzeczach. Próby pobierano na 38 stanowiskach, wśród których tylko na dwóch nie stwierdzono występowania *Heteroptera*. Łącznie pobrano 275 prób, z czego 190 zawierało przedstawicieli heteropterofauny. Zebrany materiał obejmuje ponad 8000 osobników, w tym około 2000 larw.

W faunie badanego terenu stwierdzono występowanie 34 gatunków pluskwiaków wodnych. Gatunkami najliczniejszymi były *Micronecta griseola* i *Gerris lacustris*. Do gatunków licznie występujących należały także: *Ilyocoris cimicoides*, *Sigara falleni*, *S. striata*, *Nepa cinerea*, *Gerris najas* i *G. paludum*. Wykazano 5 gatunków nowych dla Białorusi: *Micronecta griseola*, *Sigara fallenoidea*, *Notonecta maculata*, *Velia saulii* i *Gerris thoracicus*.

Przeprowadzono analizę występowania pluskwiaków wodnych w głównych rodzajach wód: rzecze Niemen, starorzeczach, dużych dopływach, małych dopływach, zbiornikach okresowych i pozostałych, sztucznych zbiornikach. Najliczniejszą i najbardziej zróżnicowaną faunę pluskwiaków stwierdzono w Niemnie, starorzeczach i dużych dopływach tej rzeki.

W Niemnie na 9 stanowiskach zebrano ponad 3700 osobników należących do 24 gatunków. Zdecydowanym dominantem była *Micronecta griseola*. Licznie występowały także: *Gerris lacustris*, *Sigara falleni*, *S. striata* i *Nepa cinerea*. W 10 badanych starorzeczach zebrano ponad 1300 osobników należących do 25 gatunków. Najliczniejsze były: *Ilyocoris cimicoides*, *Micronecta griseola*, *Plea minutissima*, *Mesovelina furcata*, *Gerris lacustris*, *Sigara falleni* i *Microvelia reticulata*. Wysoką liczebność *Micronecta griseola* stwierdzono w starorzeczach połączonych z Niemnem. W dużych dopływach zebrano ponad 2500 osobników należących do 23 gatunków. Fauna pluskwiaków wodnych była tu bardzo podobna jak w Niemnie. Najbogatszy materiał faunistyczny pochodzi z rzeki Svisloč. W małych dopływach zebrano zaledwie 260 osobników należących do 12 gatunków. Podobnie jak w innych wodach bieżących, do gatunków najliczniejszych należały: *Micronecta griseola*, *Aphelocheirus aestivalis*, *Gerris najas*, *G. lacustris* i *G. paludum*. Pozostałe rodzaje zbiorników charakteryzowały się bardzo nieliczną i gatunkowo zubożałą fauną pluskwiaków. Na uwagę zasługuje znalezienie rzadkiego gatunku *Sigara fallenoidea*, w zbiorniku w kamieniołomie wapienia koło Grodna.

Analiza podobieństw faunistycznych wykazuje dużą jednorodność badanej fauny, co wynika zapewne ze znacznego podobieństwa struktury siedliskowej głównych rodzajów wód, a zwłaszcza rzeki Niemen, dużych dopływów i starorzeczy oraz ich znaczenia dla kształtowania się fauny pluskwiaków wodnych całego badanego systemu hydrograficznego. W analizowanej faunie wyróżniono trzy elementy ekologiczne: reobiontyczny, reofilny i stagnobiontyczny. W systemie hydrograficznym Niemna stagnobionty stanowiły blisko połowę liczebności heteropterofauny.