Acarina 26 (2): 219–225

WATER MITES (HYDRACHNIDIA) FROM THE BOLSHOY YUGAN RIVER BASIN, WESTERN SIBERIA

Vitaly A. Stolbov[1*], Evgeniy S. Babushkin[2] and Sergey A. Ivanov[1]

[1]Tyumen State University, Tyumen, Russia
[2]Yugansky State Natural Reserve, Tyumen Region, Russia
[*]corresponding author; e-mail: vitusstgu@mail.ru

ABSTRACT: In this work, we present the data pertaining to the fauna and ecology of water mites found in the water bodies of the Bolshoy Yugan River Basin in the vicinity of the Yugansky State Nature Reserve. The Bolshoy Yugan River, Nyogusyakh River, Lake Yegipamynglor, as well as a number of floodplain lakes were studied. We collected 29 species of water mites from 12 families, including a rare species, *Lebertia oblonga* Koenike, 1911. The distribution and seasonal dynamics of these water mites were investigated. In the rivers, water mites are represented by rheophilous fauna, which, albeit its regular occurrence in samples, is low in abundance and diversity of species. The fauna of stagnant waters is more numerous and diverse, and is represented by eurytopic species. Only two of the eurytopic species are common to rivers and lakes.

KEY WORDS: Water mites, Hydrachnidia, fauna, ecology, Yugansky State Nature Reserve, Western Siberia.

DOI: 10.21684/0132-8077-2018-26-2-219-225

INTRODUCTION

The faunistic composition and the ecological characteristics of water mites (Hydrachnidia) in Western Siberia are poorly understood (Stolbov 2010). Water mites of the Khanty-Mansi Autonomous Area, as well as of the entire north of Western Siberia, have not been previously studied, with the exception of the Malaya Sosva Nature Reserve (Filimonova and Stolbov, 2018). The Bolshoy Yugan River is a tributary of the Ob River; its basin is located in the Yugansky Nature Reserve, which features a number of middle taiga sites, previously untouched by human activities. At the same time, a number of oil reserves located near the Nature Reserve have had negative effects on the environment (Soromotin 2011).

This article aims to explore the faunal diversity and the ecological structure of water mite communities inhabiting the water bodies of the Bolshoy Yugan River Basin (Middle Ob Region, Western Siberia).

MATERIAL AND METHODS

The material has been collected in the Bolshoy Yugan River Basin (Middle Ob) in the vicinity of the Yugansky State Nature Reserve (60°15′ N, 74°10′ E) in 2010–2013 (Fig. 1).

The descriptions of the investigated area, the water ecosystems and the research sites have been published previously (Babushkin 2011; 2015; Sharapova and Babushkin 2013; Vinarski *et al.* 2015).

The Bolshoy Yugan River (1,063 km long) is the left tributary of the Ob River; it flows through the middle taiga zone. The section (which we studied) is 60–140 m wide and up to 10 m deep. The Nyogusyakh River, the right tributary of the Bolshoy Yugan, is 298 km long. The studied section of Nyogusyakh is 30–50 m wide and up to 8 m deep. Both rivers (Bolshoy Yugan and Nyogusyakh) have a slow water flow, as well as sandy and silty-sandy bottoms. Macrophytes are absent.

Lake Yegipamynglor is 1.1×1.2 km in size, with a sandy bottom. Macrophytes are abundant.

In addition, several floodplain ponds of the rivers Ugutka, Bolshoy Yugan and Nyogusyakh were studied. All of these water bodies are small; they all have silty bottoms, and they are abundant in macrophytes. Since they are very similar, we decided to combine them into one group for analysis.

266 samples were taken, of which 450 water mite specimens have been collected. In floodplain pools, the material was sampled with a common hand net with a 250 μm mesh. In rivers and lakes, the Petersen grab was used (the capture area=0.025 m^2). The faunal similarity among the water bodies was calculated according to the Sørensen index. Calculations were performed using the BioDiversity Pro v. 2 software (McAleece *et al.* 1997).

RESULTS AND DISCUSSION

In the examined water bodies, 29 species of water mites from 12 families were recovered (Table 1).

With regards to the composition of inhabiting water mites, the studied water ecosystems can be divided into two groups: rivers and stagnant water bodies. Only two eurytopic species were common to both water body types—*Mideopsis orbicularis*

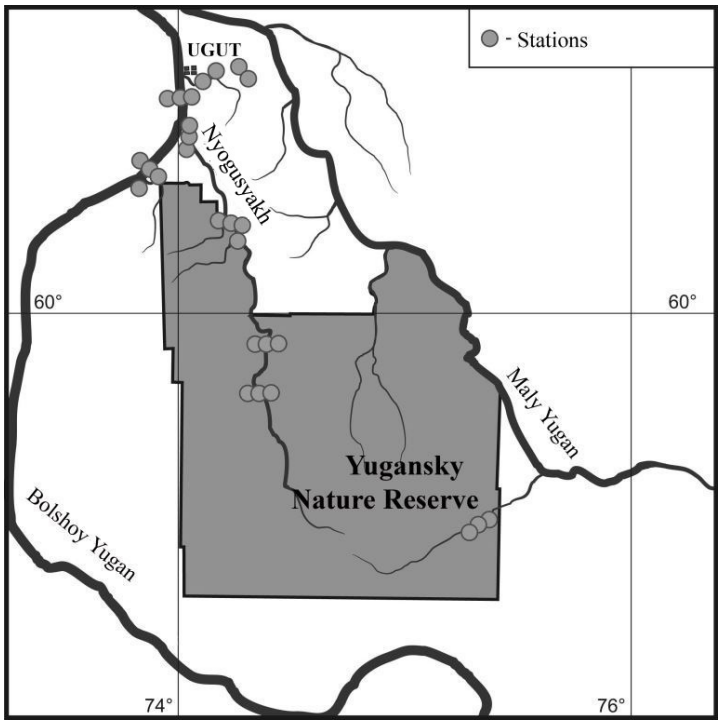

Fig. 1. Study area.

and *Hydrochoreutes ungulatus*. They are known to inhabit various standing and flowing waters (Zhavoronkova 2009). No recovered species were common to all of the investigated water bodies.

At the same time, high levels of similarity in water mite communities were recorded between the rivers Bolshoy Yugan and Nyogusyakh, as well as between Lake Yegipamynglor and floodplain ponds (Fig. 2).

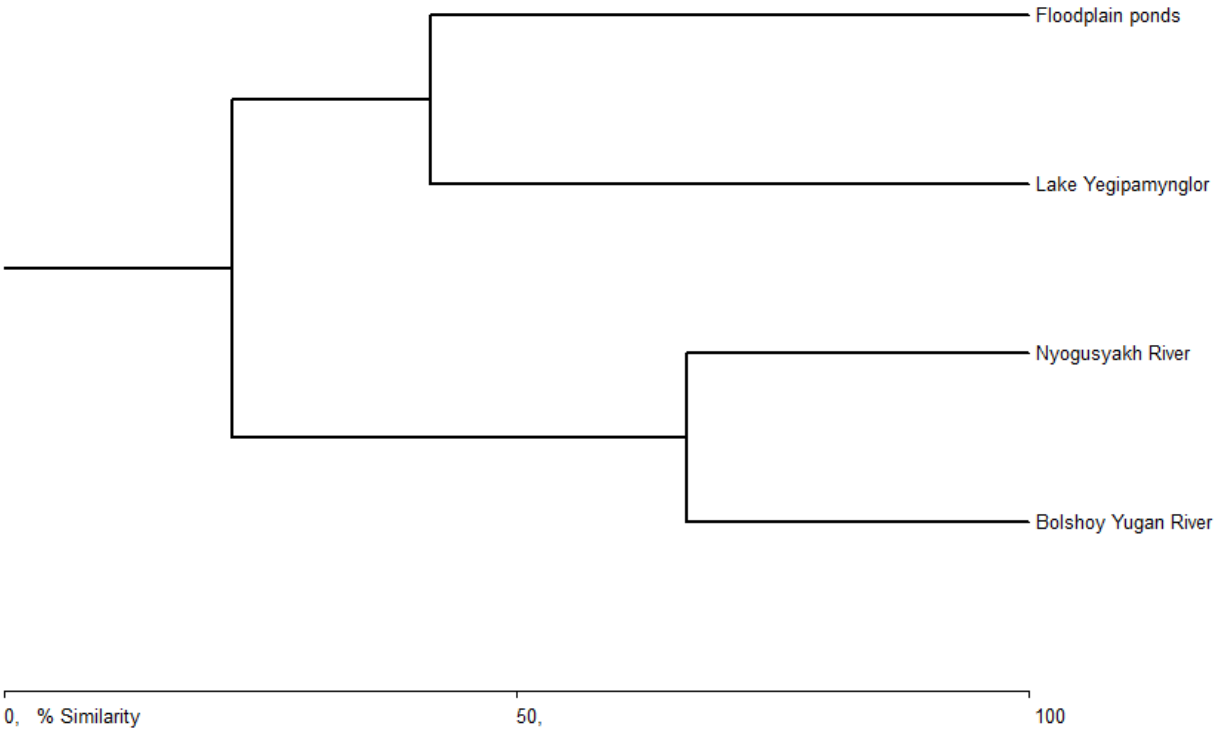

Fig. 2. Faunal similarities (Sørensen index) between studied water bodies.

In the rivers Bolshoy Yugan and Nyogusyakh, the representatives of the families Lebertiidae and Hygrobatidae were prevalent. These species are known to be typical of rivers and big oligotrophic lakes (Di Sabatino *et al.* 2002). There were 12 species recovered, 6 of which were common in both rivers. Most of the identified species were rheophilous. Rheobiontic species were not noted, as the studied rivers are large and slow-flowing. It is known that in large rivers with a slow flow, standing-water species, as well as eurybiontic species prevail (Tuzovsky 2007; Stryjecki and Kowalczyk-Pecka 2013). Thus, *Hygrobates nigromaculatus*, which prefer standing waters, were found in these rivers. At the same time, a closely related species, *H. setosus*, which prefer fast-flowing rivers (Gerecke *et al.* 2016; Tuzovsky 2017), and which are widespread in small rivers of Western Siberia, were not recorded.

Among the water mites found, a very rare species was observed—*Lebertia oblonga*, which is known from several records from Europe (Gerecke 2009; Di Sabatino *et al.* 2010). In Russia, this species has previously been recorded only in Lake Ladoga (Sokolow and Yankovskaya 1962).

The relatively small number of species can probably be related to the absence of macrophytes. Besides that only benthos dwellers were studied. In the periphyton of these rivers, the number of species is possibly larger. A small number of species in the study region is typical not only for water mites, but also by other groups of water organisms (Vinarsky *et al.* 2015).

In relation to the general biomass of benthos in the basin of the Bolshoy Yugan, the share of mites was low due to the light weight of individuals. The maximum quantity of 540 specimen/m^2 was recorded in the sludgy sandy soils of the banks of the Nyogusyakh, in the middle of July 2013. The share of mites at that time was 13% of the general benthos biomass. The largest share of Hydrachnidia in relation to the general quantity of benthos—31,8%—was also recorded in July 2013. This parameter was recorded in the middle course of the Nyogusyakh, in the samples taken from the sandy bottom, with silt covering. The number of mites was 280 specimen/m^2. The average share of aquatic mites in relation to the general quantity of benthos, observed during the research period, was 1.5±0.4% in the Bolshoy Yugan and 2.1±0.4% in the Nyogusyakh (Table 2).

Despite similarity of appearance of the two rivers, the occurrence and numbers of mites were much less in the Bolshoy Yugan than in the Nyogusyakh (Tables 2 and 3). The latter river had mites in more than half of the samples. From all the recorded species, only four have sufficiently high criteria of occurrence and abundance: *L. oblonga, L. inaequalis, H. longiporus* and *H. nigromaculatus*. At the same time, *L. inaequalis* was prevalent numerically in both rivers.

In 2011, samples were collected throughout the entire season, which allowed studying seasonal dynamics of water mites (Fig. 3). A characteristic feature of both rivers was the increased amount of mites in the autumn.

In the Bolshoy Yugan, small fluctuations in numbers were observed with the highest numbers occurring in August. In September, the population of mites was sharply reduced. At the same time, in the Nyogusyakh, the number of water mites in-

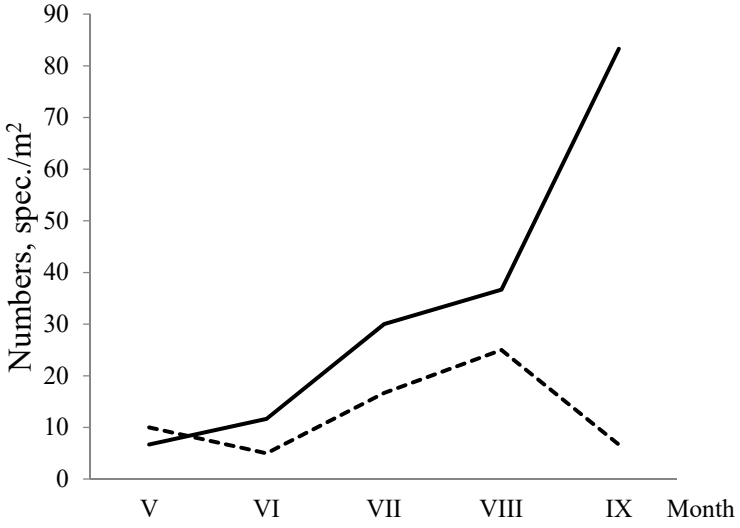

Fig. 3. Seasonal population dynamics of water mites in rivers Bolshoy Yugan and Nyogusyakh in 2011.

creased throughout the period, reaching a peak in September. A phenomenon of autumnal increase the number of water mites in rivers has previously been acknowledged in the literature (Tuzovsky 1972; 1974; 1996).

In the two years of research (2011–2012), changes in the quantitative development of water mites differed between the two rivers (Table 4). In the Bolshoy Yugan, the occurrence and the number of mites have not changed in two years. On the other hand, in the Nyogusyakh, in 2012, these indexes exceeded their previous year values by two–three times.

Thus, despite the similarity in the faunal composition of the two studied rivers, the species diversity and the quantity of the water mites were significantly higher in the Nyogusyakh. In addition, seasonal and interannual fluctuations of mite populations were more pronounced in the Nyogusyakh.

In Lake Yegipamynglor, 8 species of mites were recorded. These species were found sporadically in the samples. Water mites from these samples (Table 1) are eurytopic species, which are widespread and typical for stagnant and slow-flowing waters. The same species were collected in a stream that flows out of Lake Yegipamynglor. This stream has a slow flow, shallow depth, a large amount of detritus and a typical limnophilic fauna of Hydrachnidia. Unfortunately, the small number of samples and mites do not allow conducting a more detailed analysis of the fauna.

The floodplain ponds of the rivers Bolshoy Yugan, Nyogusyakh and Ugutka have the greatest number of species of Hydrachnidia—16 (Table 1). All of the identified water mites are eurytopic species, typical of stagnant and slow-flowing waters with well-developed higher aquatic vegetation. All of these species have a wide distribution (Tuzovsky 1990; Zhavoronkova 2000).

The species diversity was dominated by the Pionidae family, which accounted for almost half of the species—7. The Pionidae and Limnesiidae families, which usually are the dominant mite groups in the waters of this type, were the most numerous species in our samples.

Five species of water mites were the same in Lake Yegipamynglor and the floodplain water bodies, which indicates the similarity of conditions in the studied standing waters. (Fig. 2). At the same time, only one species—*Hydrochoreutes ungulatus*—was found in a river (Nyogusyakh) and in floodplain ponds, despite that these water bodies are closely located.

REFERENCES

Babushkin E.S. 2010. [Hydrobiological studies]. *Chronicle of Nature of the Yugansky State Nature Reserve*, 26: 35–50. [In Russian]

Babushkin E.S. 2015. [Contribution to the study of the dynamics of macrozoobenthos in the rivers of the Bolshoy Yugan River basin (Middle Ob)]. *Environmental Dynamics and Global Climate Change*, 6 (2): 44–54. [In Russian]

Di Sabatino A., Boggero A., Miccoli F. and Cicolani B. 2002. Diversity, distribution and ecology of water mites (Acari: Hydrachnidia and Halacaridae) in high Alpine lakes (Central Alps, Italy). *Experimental and Applied Acarology*, 34 (1–2): 199–210.

Di Sabatino A., Gerecke R., Gledhill T. and Smit H. 2010. Chelicerata: Acari II. *In*: R. Gerecke (Ed.). Süßwasserfauna von Mitteleuropa, bd. 7/2–2. Springer, 234 pp.

Filimonova M.O. and Stolbov V.A. 2018. [First data about water mites (Acariformes, Hydrachnidia) of the Malaya Sosva Nature Reserve]. *In*: A.N. Bagashev *et al.* (Eds.). Man and the North: Anthropology, Archeology, Ecology: Materials of All-Russian Scientific Conference (2–6 April 2018, Tyumen, Russia). Tyumen Scientific Center SB RAS Press, Tyumen, vol. 4, pp. 586–589. [In Russian]

Gerecke R. 2009. *Revisional studies on the European species of the water mite genus* Lebertia *Neuman, 1880 (Acari: Hydrachnidia: Lebertiidae)*. Abhandlungen der Senckenberg Gesellschaft für Naturforschung, 566: 1–144.

Gerecke, R., Gledhill, T., Pešić, V. and Smit, H. 2016. Acari: Hydrachnidia III. *In*: R. Gerecke (Ed.). Süßwasserfauna von Mitteleuropa, bd. 7/2–3. Elsevier, 429 pp.

McAleece, N., Gage, J.D.G., Lambshead, P.J.D. and Paterson, G.L.J. 1997. BioDiversity Professional statistics analysis software. Version 2. Jointly developed by the Scottish Association for Marine Science and the Natural History Museum London. http://www.sams.ac.uk

Sharapova, T.A. and Babushkin, E.S. 2013. Comparison of zoobenthos and zooperiphyton of large and medium rivers. *Contemporary Problems of Ecology*, 6 (6): 622–626.

Sokolow, I.I. 1940. Hydracarina (1.re partie: Hydrachnellae). *In*: D. Sernow and T. Stackelberg (Eds.). Faune de l'URSS. Arachnides, vol. 5 (2). Moscow, Leningrad, 24+511 pp.

Sokolow I.I. and Jankowskaja A.I. 1962. [List of water mites (Acariformes, Hydracarina) of the Leningrad region and Karelia]. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR*, 31: 389–428. [In Russian]

Soromotin A.V. 2011. Ecological consequences of different stages of the development of oil and gas deposits in the taiga zone of the Tyumen Region. *Contemporary Problems of Ecology*, 4 (6): 601–608.

Stolbov V.A. 2010. [Taxonomic composition and biotopic distribution of water mites (Acariformes: Hydrachnidia) in various waterbodies of the Tyumen Region]. *Tyumen State University Herald*, 7: 101–107. [In Russian]

Stryjecki R. and Kowalczyk-Pecka D. 2013. A faunistic and ecological characterization of the water mites (Acari: Hydrachnidia) of the highly anthropologically transformed Mietiulka River in Polesie National Park. *Environmental Protection and Natural Resources*, 24 (1): 11–15.

Tuzovsky P.V. 1972. [Autumn increase in the numbers of water mites in the mouths of rivers and streams]. *Biology of Inland Waters. Information Bulletin*, 15: 48–49. [In Russian]

Tuzovsky P.V. 1974. [Distribution of water mites in the temporary flooding zone of the Rybinsk reservoir and adjacent water bodies]. *Trudy Instituta biologii vnutrennikh vod,* 25 (28): 202–229. [In Russian]

Tuzovsky P.V. 1990. Opredelitel deytonimph vodyanykh kleshchey [*Key to Water Mite Deutonymphs*]. Nauka, Moscow. 238 pp. [In Russian]

Tuzovsky P.V. 1996. Vodyanye kleshchi verkheney Volgi [*Water Mites of the Upper Volga*]. Institute of Ecology of the Volga River Basin of the Russian Academy of Science, Togliatti, 82 pp. [In Russian].

Tuzovsky P.V. 2007. [Water mites (Hydrachnidia, Acariformes)]. *In*: O.V. Bucharin and G.S. Rozenberg (Eds.). Bioindikatsiya ekologicheskogo sostoyaniya ravninnykh rek. Moscow, Nauka, pp. 255–261. [In Russian].

Tuzovsky P.V. 2017. On the systematics of the water mites *Hygrobates nigromaculatus* Lebert, 1879 and *H. setosus* Besseling, 1942 (Acari, Hydrachnidia, Hygrobatidae). *Zootaxa,* 4277 (1): 17–31.

Vinarski M.V., Andreev N.I., Babushkin E.S. and Karimov A.V. 2015. [Materials on the fauna of freshwater pulmonate mollusks of the Zapovednik (Nature Reserve) "Yuganskiy" and adjacent territories]. *Environmental Dynamics and Global Climate Change*, 6 (2): 34–43. [In Russian].

Zhavoronkova O.D. 2000. Vodyanye kleshchi (Hydracarina, Acariformes) verchne-volzhskogo basseina. Katalog rasteniy i zhivotnykh Volzhskogo basseina [*Water mites (Hydracarina, Acariformes) of the Upper Volga basin. Catalog of plants and animals of the Volga basin*]. Yaroslavl, pp. 229–240. [In Russian]

Zhavoronkova O.D. 2009. [Water mites (Acariformes, Hydrachnidia) from Lake Glubokoye]. *In*: N.M. Korovchinskii and N.N. Smirnov (Eds.). Trudy gidrobiologicheskoy stantsii na Glubokom ozere imeni N.Yu. Zografa. KMK Press, vol. 10, pp. 118–147. [In Russian]

Table 1

Species composition of water mites in water bodies of the basin of the Bolshoy Yugan River.

Taxon	**1**	**2**	**3**	**4**
Family Limnocharidae				
1. *Limnochares aquatica* (Linnaeus, 1758)	–	–	+	+
Family Eylaidae				
2. *Eylais mutila* Koenike, 1897	–	–	–	+
Family Hydrodromidae				
3. *Hydrodroma despiciens* (Muller, 1776)	–	–	–	+
4. *Hydrodroma pilosa* Besseling, 1940	–	–	–	+
Family Lebertiidae				
5. *Lebertia* (*Lebertia*) *oblonga* Koenike, 1911	+	+	–	–
6. *Lebertia* (*Pilolebertia*) *inaequalis* (Koch, 1837)	+	+	–	–
7. *Lebertia* (*Pilolebertia*) *insignis* Neuman, 1880	+	+	–	–
8. *Lebertia* (*Pilolebertia*) *porosa* Thor, 1900	–	+	–	–

Family Oxidae				
9. *Oxus setosus* (Koenike, 1898)	+	−	−	−
Family Torrenticolidae				
10. *Torrenticola amplexa* (Koenike, 1908)	+	−	−	−
Family Limnesiidae				
11. *Limnesia maculata* (Muller, 1776)	−	−	+	−
12. *Limnesia undulata* (Muller, 1776)	−	−	+	+
Family Hygrobatidae				
13. *Hygrobates longiporus* Thor, 1898	+	+	−	−
14. *Hygrobates nigromaculatus* Lebert, 1879	+	+	−	−
Family Unionicolidae				
15. *Unionicola crassipes* (Muller, 1776)	−	−	+	+
16. *Unionicola gracilipalpis* (Viets, 1908)	−	−	−	+
Family Pionidae				
17. *Forelia variegator* (Koch, 1837)	−	+	−	−
18. *Forelia liliacea* (Muller 1776)	−	+	−	−
19. *Piona carnea* (Koch, 1836)	−	−	−	+
20. *Piona coccinea* (Koch, 1836)	−	−	−	+
21. *Piona conglobata* (Koch, 1836)	−	−	−	+
22. *Piona discrepans* (Koenike, 1895)	−	−	+	−
23. *Piona nodata* (Muller, 1776)	−	−	−	+
24. *Piona variabilis* (Koch, 1836)	−	−	+	+
25. *Hydrochoreutes ungulatus* (Koch, 1836)	−	+	+	+
26. *Tiphys ornatus* Koch, 1836	−	−	−	+
Family Mideopsidae				
27. *Mideopsis orbicularis* (Müller, 1776)	+	+	+	−
Family Arrenuridae				
28. *Arrenurus* (*Arrenurus*) *neumani* Piersig, 1895	−	−	−	+
29. *Arrenurus* (*Arrenurus*) *pustulator* (Müller, 1776)	−	−	−	+

Study sites: 1—Bolshoy Yugan River, 2—Nyogusyakh River, 3—Lake Yegipamynglor, 4—Floodplain ponds.

Table 2

Share of water mites in the benthos of the rivers Bolshoy Yugan and Nyogusyakh during the study period.

The share of water mites (%) in the benthos	**Bolshoy Yugan River**	**Nyogusyakh River**
Minimum	0	0
Maximum	20.0	31.8
Medium	1.5±0.4	2.1±0.4

Table 3

The occurrence and numbers of water mites in the rivers Bolshoy Yugan and Nyogusyakh.

Taxon	Bolshoy Yugan River			Nyogusyakh River		
	F	**N**	**R**	**F**	**N**	**R**
Lebertia oblonga	6.5	3.26±1.45	24.2	26.5	8.82±1.83	15.6
L. inaequalis	9.8	4.57±1.9	34	41	35.49±6.68	62.85
L. insignis	2.2	0.65±0.48	4.8	4	0.78±0.38	1.4
L. porosa	0	0	0	1	0.2±0.2	0.35
Oxus setosus	1.1	0.22±0.22	1.6	0	0	0
Torrenticola amplexa	2.2	0.43±0.3	3.2	0	0	0
Hygrobates longiporus	5.4	1.3±0.6	9.6	10.8	2.94±0.9	5.2
H. nigromaculatus	5.4	2.83±1.39	21	13.7	6.67±2.06	11.8
Forelia variegator	0	0	0	2	0.39±0.27	0.7
F. liliacea	0	0	0	1	0.2±0.2	0.35
Hydrochoreutes ungulatus	0	0	0	1	0.2±0.2	0.35
Mideopsis orbicularis	1.1	0.22±0.22	1.6	3	0.78±0.47	1.4
Total	22	13.48±3.45	100	52	56.47±9.77	100

F—frequency of occurrence, %, N—numbers, specimen/m^2, R—relative abundance, %.

Table 4

Change in the quantitative development of water mites in the rivers Bolshoy Yugan and Nyogusyakh during two years.

	Bolshoy Yugan River		Nyogusyakh River	
	2011	**2012**	**2011**	**2012**
Number of species	8	4	6	5
Frequency of occurrence, %	21.7	16.7	35	77.8
Numbers, specimen/m^2	12.67	13.3	33.67	93.3