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AQUATIC FLORA AND FAUNA

Blackflies (Diptera, Simuliidae) in Eastern Trans-Baikal: Taxonomic Composition and Physiographic Distribution

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Abstract—The blackfly fauna and biodiversity of some physiographic regions in eastern Trans-Baikal have been described. The structural characteristics of blackfly communities in the highlands and lowlands in the southern and northern territories of the region have been reported. A regional list of forty seven species in five genera of the Simuliidae family has been produced for the first time. The species distribution in three major river basins, Upper Amur, Lena, and Yenisei, are examined. A comparative cluster analysis of the similarities in species composition between the blackflies in the observed area and the adjacent regions is carried out. The blackfly species composition of the Upper Amur basin is more similar to the population of the Selenga River basin and significantly differs from the fauna in the middle and lower reaches of the Amur River; only three blackfly species typical for the Far East fauna have been indicated.

Keywords: black flies, *Simuliidae*, biodiversity, community, spatial distribution

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INTRODUCTION

Blackflies as amphibiotic insects are widely present in lotic waters; the adults are identified to the land ecosystems. In addition, many species are bloodsuckers. In the ecological respect, the blackflies are important as a component in the macrozoobenthos and bloodsucking-insect communities. Studying the blackflies in Siberia is mostly connected with the bloodsucking activities of insects having stress effects on the human and animal organisms. The first publications on blackflies in Trans-Baikal [14, 16, 29, 30, 32] presented lists of bloodsucking species, the biological features of their development, some characteristics of biotypes, and the environments for mass scale reproduction. The search for new control methods of bloodsuckers could support further research of insects in the indusrial regions of Siberia. In the period of constructing the Baikal–Amur Mainline railroad in the north of Trans-Baikal, a complex expedition surveying the general parasitological background was launched to predict performance and to work out the protection measures against bloodsucking arthropods, including blackflies. A series of publications on the outcomes of the long-term studies was issued [5, 8, 9]; information on the taxonomic composition of blackflies in the Muya, Vitim, and Chara river basins was obtained; new species unknown to science were described [6, 7, 35]; the phenology and the seasonal dynamics of preimaginal phases were studied; and recommendations on the protection measures in the railroad zone were developed. The information on the blackflies in the central and southern regions within eastern Trans-Baikal is limited by a single work [14]. Managing the program for surveying the biota of water ecosystems in the Trans-Baikal, the material from hydriobionts in the rivers of the region, including the blackflies, was collected by scientists of the Institute of Natural Resources, Ecology and Cryology, Siberian Branch, Russian Academy of Sciences.

The objectives of the work are to study the composition of the blackfly species and their spatial distribution across the physiographic regions and the main river basins and to assess the structure of blackfly communities in the highlands and lowlands in eastern Trans-Baikal.

MATERIALS AND METHODS

This work uses literature data [5, 9, 14, 16, 30, 32, 36] and the original materials (2001 to 2011) on the watercourses in eastern Trans-Baikal (Table 1), as well as the collections of imagoes of blackfly bloodsucking species in the environs of Priargunsk settlement (50°23′ N and 119°05′ E ; 583 m above sea level) and from the middle reaches of the Bukukun River

Table 1. Characteristics of surveyed watercourses in eastern Trans-Baikal

Watercourse	Date	Coordinates		Height above sea level	Size, length of watercourse, km	Depth, m	Substrate	Water flow	Water temperature, degrees C	River basins
		N latitude	E longitude							
Stream, Chita city	September 10, 2002	52°03′12.4″	113°17′49.9″	712	Small, 0.1	0.1–0.3	S, Gr	Slow	–	U-A
Rivers:										
Zharcha	July 25, 2005	52°31′03.8″	115°27′45.2″	689	Small, 56	0.2	B, moss	Medium	17.7	U-A
Il'a	July 12, 2005	50°40′05.2″	113°36′11.6″	746	Medium, 153	0.15	P, S	″	18.3	U-A
Onon	July 13, 2005	49°37′27.2″	112°37′22.2″	809	Medium, 1032	0.2	S, P	″	19.3	U-A
Kibirev:										
source	May 25, 2007	51°34′31.7″	116°34′44.6″	670	Small, 10	0.05–0.2	B, P, D	″	2.9	U-A
lower reaches	May 22, 2007	51°33′41.5″	116°36′09.8″	604	The same	0.2–0.3	B, P	″	3.6	U-A
Srednii Golgotai	June 08, 2007	51°29′24.5″	116°39′40.7″	654	Small, 22	0.1–0.6	P, B	Fast	14.2	U-A
Bystraya	September 11, 2007	51°32′24.3″	118°35′42.8″	770	Small, 12	0.3–0.6	P, St, B	″	8.9	U-A
Shamanka	September 09, 2008	51°09′22.8″	117°40′13.9″	878	Small, 16	0.3–0.7	Cl, macrophytes	Slow	8.6	U-A
Bugdaya	September 10, 2008	51°09′24.4″	117°41′21.7″	890	Small, 10	0.2–0.4	P	Medium	7.3	U-A
Unda	September 09, 2008	51°10′22.6″	117°39′53.2″	867	Medium, 273	0.5–1.2	S, P	″	8.3	U-A
Bukukun	June 24, 2011	49°24′37.4″	111°09′52.4″	1110	Small, 60	0.2–0.5	St, P	″	12.1	U-A
Bul'dzhinka:										
sourse	June 25, 2011	49°22′35.2″	110°16′37.6″	1537	Small, 17	0.2	B, St	″	3.2	Ye
lower reaches	June 24, 2011	49°16′38.1″	110°23′13.5″	1334	The same	0.5	Gr, St, S	″	11.5	Ye
Byiiki, Apsat River's tributary	September 03, 2011	57°05′38.8″	118°10′00.0″	1099	Small, 21	0.3	P, B	″	4.2	L
Ugol'nyi Stream, Byiiki River's tributary	September 04, 2011	57°07′28.2″	118°11′53.9″	1520	Small, 8	0.1–0.3	B, P	″	3.0	L
Khurtei River	May 27, 2001	51°36′25.5″	111°14′40.7″	859	Small, 25	0.2–0.7	P, S	″	–	Ye

(B) boulders, (St) stones, (P) pebbles, (G) gravel, (S) sand, (Cl) clay, (UA) Upper Amur, (Ye) Yenisei, and (L) Lena.

(49°27′ N and 111°08′ E ; 1144 m above sea level). The blackflies were collected on the territories of the Chita, Tungokochen, Dul'durga, Kyra, Balei, Gazimurskii-Zavod, Priargunsk, Kalar, and Khilok districts in the Trans-Baikal region.

The gradient criterion method based on the expert judgment for qualitative environmental characteristics was used to assess the biotope parameters. The dimensional classification of watercourses includes four categories: large rivers (>20 m width), medium rivers (3 to 15 m width), small size rivers, and streams (≤2 m width). The water flow was characterized by the velocity regime, such as: slow (<0.4 m/s), medium (0.4 to 0.8 m/s), fast (0.8 to1.2 m/s), and very fast (>1.2 m/s) [45]. In the substrate structure boulders (>50 cm), stones (20 to 50 cm), gravel (0.2 to 20 cm), sand, detritus, and clay (<0.2 cm) were indicated [39, 42]. The temperature regime of watercourses was the following: cold water (2.5 to 7.9°C), temperate-cold water (8.0 to 13.9°C), temperate-warm water (14.0 to 19.9°C), and warm water (≥20°C) [27, 37]. The spatial patterns in blackfly distribution were investigated, accounting the land forms and the altitude zones, as follows: steppe depressions and foothills (100 m to 500 m), forest-steppe low mountains (500 m to 1000 m), forest middle mountains (1000 m to 1800 m), sparse-forest high mountains and mountain tundra (>1800 m) [1, 4, 28]. The confinement of blackflies to the hydrobiological zones was considered according to the system of Illies and Batoshanyan [41]. The community structures were evaluated using the Engelmann's scale of dominance [40]: eudominant (40–100%), dominant (12.5–39.9%), subdominant (4–12.4%).

The material was determined up to the species, according to the current system of the Simuliidae family [38]. The similarity in species composition of blackflies was assessed with the cluster analysis in the Paleontological Statistics (PAST) software package based on Jaccard's index by the pair group method.

The spatial distribution of blackflies in eastern Trans-Baikal has been considered using the characteristics of landscape ecology in the physiographic regions [33] and the climatic conditions [28].

RESULTS

The blackflies of nineteen species representing two subfamily and four genera (*Gymnopais*, *Prosimulium, Metacnephia* and *Simulium*) have been indicated. The biggets diversity is found among the *Simulium* genus with three subgenera, one of which, the subgenus *Simulium* s. str., is characterized by a variety of bloodsucking species representing nine taxa of the *malyschevi* species group. The ratio between the bloodsucking species and nonbloodsucking species (autogenous species and anautogenous species [2]) is thirteen to six. The complex of autogenous blackflies includes the species of three genera: *Gymnopais*, *Prosimulium*, and *Metacnephia*, whereas the anautogenous species are only assigned to the *Simulium*.

The data that was obtained has been condensed into a summary table of the composition of blackfly species and their distribution across the physiographic regions and the river basins in eastern Trans-Baikal (Table 2). All of the watercourses were confined to four physiographic regions (the Selenga Middle Mountains, the Khantei-Chikoi Uplands, the Upper Amur Middle Mountains, and the Stanovoe Uplands); for two regions (the Uldza-Torei High Plain and the Vitim Plateau), an extrapolation of data from the adjacent areas was made.

In respect to the Selenga Middle Mountains, the data on the river Khurtei and the literature data on the adjacent areas in the middle and lower reaches of the Selenga river [15, 16, 30, 32] were used. A total of 19 species in three genera: *Prosimulium* (1), *Metacnephia* (1), and *Simulium* (17 species represented in the subgenera *Eusimulium*, *Montisimulium*, *Nevermannia*, and *Simulium* s. str. with 1, 1, 2, and 13 species, respectively) was registered. In the structures of the blackfly communities, the *S.* (*S.*) *murmanum*, *S. (S.) vulgare*, *S. (S.) decimatum*, *S.* (*S.*) *malyschevi*, and *S. (S.) longipalpe* species are characterized as dominants and subdominants.

The blackflies in the Khantei-Chikoi Uplands located in the transboundary territory with northern Mongolia are represented by 15 species from 4 genera (3, 1, 2, and 9 species from *Prosimuloim*, *Helodon*, *Metacnephia*, *Simulium* genera, respectively). The *S. (S.) cholodkovskii* and *S.* (*S.*) *malyschevi* species dominate in the communities, whereas *Simulium (S.) vulgare* and *Metacnephia kirjanovae* are common. The samples from the sources and the lower reaches of the Bal'dzhikanka River (Table 1) and the information on the Khentii Province in Mongolia were used for this region [11]. The availability of the *Simulium* s. str *bezzii* species group widely distributed in Central Asia remains uncertain [11, 18, 31, 36, 38].

For the Upper Amur Middle Mountains, the major part of a certain material and the information from the field work [14] along the lower reaches of the Onon River were used. The blackflies of 23 species from three genera, *Prosimulium* (3), *Metacnephia* (2), and *Simulium* (18), were detected; the latter genus was represented by four subgenera: *Byssodon* (1), *Montisimlium* (1), *Nevermannia* (4), and *Simulium* s. str. (12). In eastern Trans-Baikal, the *Prosimulium irritans* and *Simulium* (*Nevermannia*) *amurense* species, earlier known in the Far East of Russia and China, were found only in the Upper Amur Middle Mountains [38]. *S.* (*Nevermannia*) *vernum* and *S.* (*Simulium*) *decimatum* were identified as the dominant species in the communities; the *Prosimulium hirtipes*, *Metacnephia kirjanovae*, *Simulium* (*S.*) *cholodkovskii*, *S.* (*S.*) *murmanum*, and *S.* (*S.*) *subvariegatum* were identified as the subdominant species. In the southeastern part of the Upper

Table 2. Taxonomic composition and distribution of blackflies according to the physiographic regions in eastern Trans-Baikal

Species	Selenga Middle Mountains	Khantei-Chikoi Uplands	Upper-Amur Middle Mountains	Uldza-Torei High Plain	Stanovoe Uplands	Vitim Plateau
Gymnopais bifistulatus Rubtsov	–	–	–	–	+ •	+ •
G. trifistulatus Rubtsov	–	–	–	–	+	–
G. sp. 1	–	–	–	–	+	–
Prosimulium hirtipes (Fries)	+ •	–	++	–	–	+ •
P. irritans Rubtsov	–	–	+	–	–	–
P. candicans Rubtsov	–	+ •	–	–	–	–
P. intercalare Rubtsov	–	+	–	–	–	+ •
P. irkutensis Rubtsov	–	–	–	–	+ •	+ •
P. tridentatum Rubtsov	–	+ •	+ •	–	–	+ •
Helodon alpestris (Dorogostaisky, Rubtsov & Vlasenko)	–	+ •	–	–	+ •	+ •
Metacnephia bilineata (Rubtsov)	+ •	–	–	–	–	–
M. baicalica Usova & Bazarova	–	–	+	–	–	–
M. kirjanovae (Rubtsov)	–	++	++	–	–	–
M. sommermanae (Stone)	–	+ •	–	–	–	–
M. lyra (Lundström)	–	–	–	–	+ •	+ •
Simulium(Byssodon) koidzumii (Takahasi)	–	–	+ +	+ •	–	–
Simulium (Eusimulium) aff. *aureum* Fries	+ •	–	–	–	+ •	–
S. (E.) baatorii (Rubtsov)	–	–	–	+ •	–	–
Simulium (Montisimulium) schevyakovi Dorogostaisky, Rubtsov & Vlasenko	+ •	+ •	+	–	+ •	+ •
Simulium (Nevermannia) amurense (Rubtsov)	–	–	++	–	–	–
S. (N.) bicorne Dorogostaisky, Rubtsov & Vlasenko	+ •	–	+	–	+ •	+ •
S. (N.) curvans (Rubtsov & Carlsson)	–	–	+ •	–	++ •	++ •
S. (N.) silvestre (Rubtsov)	–	–	–	–	+ •	+ •
S. (N.) vernum Macquart	+ •	–	+++	–	+ •	+ •
Simulium (Schoenbaueria) pusillum Fries	–	–	–	–	+ •	+ •
S. (Sch.) tsharae (Yankovsky)	–	–	–	–	+ •	–
S. (Simulium) flavidum Rubtsov	–	+ •	–	+ •	–	–
S. (S.) cholodkovskii Rubtsov	+ •	+++	++*	–	++ •	++ •
S. (S.) decimatum Dorogostaisky, Rubtsov & Vlasenko	++	+ •	+++	–	+++ •	+++ •
S. (S.) jacuticum Rubtsov	–	–	–	–	+ •	+ •
S. (S.) malyschevi Dorogostaisky, Rubtsov & Vlasenko	++	+++	+	–	++ •	+++ •
S. (S.) murmanum Enderlein	+++	+	++	–	++	++ •

Table 2. (Contd.)

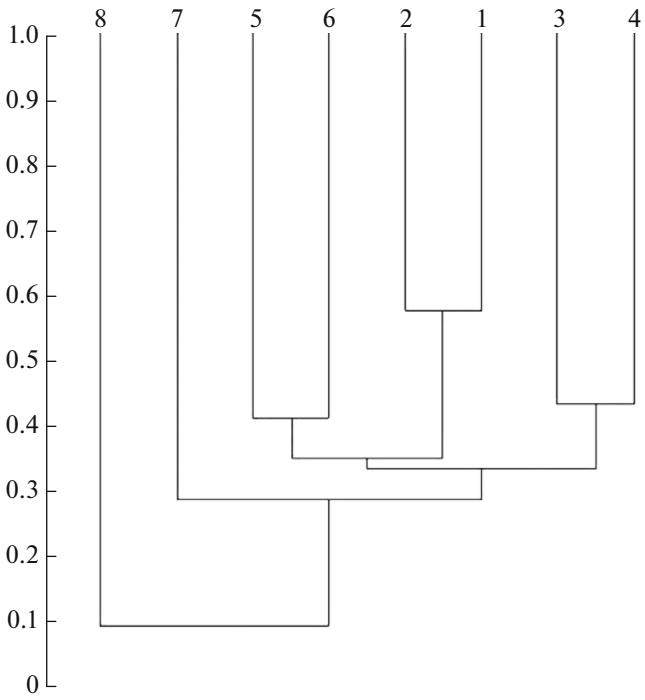
Species	Selenga Middle Mountains	Khantei-Chikoi Uplands	Upper-Amur Middle Mountains	Uldza-Torei High Plain	Stanovoe Uplands	Vitim Plateau
S. (S.) subvariegatum Rubtsov	+ •	–	++	+ •	–	–
S. (S.) noelleri Friederichs	+ •	–	+ •	–	+ •	+ •
S. (S.) palustre Rubtsov	–	–	+	–	–	–
S. (S.) vershininae Yankovsky	–	–	–	–	+ •	–
S. (S.) paramorsitans Rubtsov	–	–	–	–	+ •	–
S. (S.) rubtzovi Smart	+ •	–	–	–	+ •	–
S. (S.) splendidum Rubtsov	+	–	–	–	+	–
S. (S.) transiens Rubtsov	+ •	–	–	–	+++ •	++ •
S. (S.) tumulosum Rubtsov	–	+	+	–	+ •	–
S. (S.) vulgare Dorogostaisky, Rubtsov & Vlasenko	+++	+ +	+	–	+++	++ •
S. (S.) aemulum Rubtsov	–	–	+	–	+ •	++ •
S. (S.) longipalpe Beltyukova	++ •	–	+	–	++ •	++ •
S. (S.) rostratum (Lundström)	+ •	–	–	–	+ •	+ •
S. (S.) rubtzovi Smart	–	–	–	+ •	+ •	–
S. (S.) truncatum (Lundström)	+	+ •	+ •	+ •	++ •	++ •
Total species, 47	19	15	23	6	32	25
Percentage of total species, %	40.4	31.9	48.9	12.8	68.0	53.2
Number of species in the river basin	27		23	6	35	

"+" – species available, "–" – species unavailable, " • " – from the literature sources [5, 8, 9, 11, 14—16, 30, 32, 36].

Amur Middle Mountains, *S.* (*Byssodon*) *koidzumii* females that attacked humans for bloodsucking were collected in the environs of Priargunsk settlement (the Argun' river basin), while the preimaginal phases of this species were not indicated. The *Simulium* (*S.*) *cholodkovskii* blackflies were also attacking in the middle reaches of the Bukukun River (the upper Onon River).

The Uldza-Torei High Plain is classified into the closed system located in the southeast of Trans-Baikal; it is characterized by the arid climate. The information on six blackfly species of the *Similium* genus, indicated in the adjacent territory in northeastern Mongolia, was extrapolated across this region [11].

The northern territories of eastern Trans-Baikal unite two large physiographic regions: the Stanovoe Uplands and the Vitim Plateau. The blackflies in the Stanovoe Uplands are mostly studied in the region of the mainline railroad located in the middle reaches of the Vitim River [8, 9] and in the upper reaches of the Chara River [5]. Two of the points for sampling the material examined by the authors are located in the middle mountains of the Kodar Montain Range, where the larvae and pupae of two *Gymnopais* species, *G. trifistulatus* and *G.* sp. 1, first registered in the Stanovoe Uplands, were collected. Altogether, 32 blackfly species from 5 genera, *Gymnopais* (3), *Prosimulium* (1), *Helodon* (1), *Metacnephia* (1), and *Simulium* (26), were indicated in the Stanovoe Uplands. The *Simulium* genus is represented by four subgenera: *Eusimulium* (1), *Montisimulium* (1), *Nevermannia* (4), *Shoenbaueria* (2), and *Simulium* s. str. (18). Blackflies of *S.* s. str., especially of the *malyschevi* group (*S.*) *cholodkovskii*, *S.* (*S.*) *decimatum*, *S.* (*S.*) *jacuti-*



Similarities in species composition of blackflies in adjacent spatial areas. 1—Baikal area, Yenisei River basin; 2—Baikal-Stanovoi Range area, Lena River basin; 3—Trans-Baikal area, Selenga River basin; 4—Trans-Baikal area, upper Amur River basin; 5—Far East area, Middle Amur River basin; 6—Far East area, Middle Amur River basin; 7—Mongolia, Khubsugul area; 8—Mongolia, East-Mongolia area.

cum, *S.* (*S.*) *malyschevi*, and *S.* (*S.*) *murmanum*, which are active bloodsuckers, dominate in the communities. The blackflies of the *Schoenbaueria* subgenus, common in the zonal tundra and taiga, can be found only in the northern regions of eastern Trans-Baikal [21]. The *Simulium* (*Schoenbaueria*) *tsharae* and *S.* (*S.*) *vershininae* species were previously described with the data for the Chara Depression [36].

Information for the Vitim Plateau is not available; however, the data on 25 species distributed eastward, northward, and southward of the area can be extrapolated. It seems that the blackfly species composition of those regions and the Stanovoe Uplands can be most similar, since the natural environments promote it.

In eastern Trans-Baikal, the blackflies are generally represented by 47 species from 5 genera and 6 subgenera; among them, 68% of the total species composition was registered in the northern taiga regions, while the diametrically opposite low levels for the diversity were derived from the steppe regions of a closed system (12.8%). Forty-nine percent of the total species composition was found in the central and southwestern regions characterized by the average-frequency relief and the wide river valleys with the forest and steppeficated landscapes (Table 2).

The watercourses in eastern Trans-Baikal are classified into three large basins of the Yenisei, Lena, and Amur rivers. All of the studied watercourses (small and medium size rivers) flow over the middle mountain landscapes, intermountain valleys, or flat steppe lands. Twenty-three species were recorded in the Upper Amur river basin, 35 species (pooled data from the Stanovoe Uplands and the Vitim Plateau) were indicated in the Lena river basin, and 27 species were registered in the Yenisei river basin (the Selenga Middle Mountains and the Khantei-Chikoi Uplands) (Table 2). The comparison of the data from the adjacent territories and river basins showed how intensively the specificity of the blackfly Far East fauna tended to be presented in the Upper Amur river basin (see figure). The species composition of the blackflies in the Selenga and Upper Amur river basins differs from those both in the Middle and Lower Amur river basins and in the Pribaykalsky [21, 31] and Baikal–Stanovoy mountain range areas, the regions pertaining to the Yenisei and Lena river basins, respectively [5, 8, 9, 21, 36]. Three species, *Prosimulium irritans*, *Simulium* (*Nevermannia*) *amurense*, and *S.* (*Byssodon*) *koidzumii*, common for the Far East fauna were first recorded in the Upper Amur river basin by the authors.

DISCUSSION

Eastern Trans-Baikal relates to the Trans-Baikal landscape mountain region in Southern Siberia [12]. The area under consideration is intersected from southwest to northeast by the mountain ranges separated with the intermountain depressions and river valleys. The results can allow the authors to track the general tendencies to the changes in the diversity of blackflies according to the topography of the lands and the availability of water within the territory. The southern and northern territories are quite different in the landscape ecological and general climatic parameters. In the flat steppe lands (up to 500 m above sea level) and the low-mountain forest-steppe regions (up to 1000 m above sea level) in the south of eastern Trans-Baikal (the Khantei-Chikoi region, part of the Upper Amur circuit) with a river network of low density and small floods (the Chikoi, Onon and Argun' river basins), the blackflies are mostly represented by the *Simulium* s. str. eurybiont species, accounting for 26% of the total composition. The Upper Amur river basin is characterized by a lower stability of the water regime in the summer period; dry seasons with small-scale floods affecting the stability of the river biotopes are rather frequent [3]. In respect to the adaptive features, the presence of the *Nevermannia* subgenus in the blackfly communities across the lower reaches of the Onon and Argun' rivers should be noted, which is capable of existing at a low flow velocity (0.3 m/s) and in the sufficiently warm water (≥20°C) in the river. In the Shilka, Argun', and Selenga river basins in the cen-

tral regions of eastern Trans-Baikal, the water can warm up to 25–28°C [3]; these river biotops should be considered as potamal. In respect to the *bezzii* groups of the *Simulium* s. str., the possibility of their entry to the Khantei-Chikoi Uplands area from the adjacent Mongolia territory has remained unclear, though it is found to be quite feasible. The *S.* (*S.*) *alajense* Rubtsov [17, 31, 38] indicated both in the northern provinces of Mongolia [11] and in the Altai-Sayan mountain region in the south of Siberia [23, 25–27, 43, 44] and which was unregistered eastward of the Central Tuva Depression [24] is classified into the group of widespread species in Central Asia. Concerning the validity of the *S.* (*Byssodon*) *koidzumii* species, A.V. Yankovskii has an affirmative opinion [36], while Adler and Crossky [38] have merged it into a synonym for the *S.* (*B.*) *maculatum* (Meigen). The authors share the opinion of A.V. Yankovskii [36], since the indicated species differ in a range of morphological traits.

The blackflies of the *Prosimilium*, *Metacnephia*, and *Simulium* s. str. genera of the *malyschevi* group classified into stenobiont species inhabiting cold to cold–temperate waters (from 2.5 to 13.9°C) in rithral zones tend to develop in the mountain taiga and forest landscapes found in the middle mountains (1000–1800 m) in eastern Trans-Baikal regardless of the location latitude. The *S.* s. str. species is identified to the major complex of bloodsucking blackflies all over eastern Siberia [9, 10, 13, 20, 22]. The *S.* (*M.*) *schevyakovi* single representative of the *Montisimulium* subgenus, which can be locally found, is identified to the mount–forest communities. It is noteworthy that only 6 out of 74 species of this subgenus mostly distributed in Tien Shan and Pamir-Alai [34, 36, 38] can be found in the Altai-Sayan mountain region; the *Simulium* (*M.*) *schevyakovi* tends to be more frequent [23, 24].

In eastern Trans-Baikal, the river network density and the amount of precipitation during summer tend to increase from the south to the north; the river flow tends to increase as well [1, 19]. Various blackfly communities different in a composition can be formed in the water courses. Thus, the taxa of the *Gimnopais* and *Schoenbaueria* genera unavailable in the southern arid regions were registered only in the mountain–taiga watercourses within the Stanovoe Uplands. In the northern regions of eastern Trans-Baikal, long-term monitoring of Dipteran insects was conducted across the railway construction zone in addition to the other environment and climate conditions compared to the south natural settings; that contributed to the extension of the found-species list as well.

The Upper Amur river basin ranking intermediate between the positions of the Selenga, Lena, and Middle Amur river basins is of considerable interest in the diversity aspect. A comparison among the species compositions in the adjacent territories has shown that in the integrated cluster of Southern Siberia, the large rivers Yenisei and Lena have the highest similarity values, while the Upper Amur River and the Selenga River run for much of their distance from the middle and lower Amur reaches. This can be mainly explained by the differences in the landscapes, since the mountain-taiga land forms can cause the formation of blackfly populations considerably differed in a composition from the steppe lands. The population of blackflies in Southern Siberia is generally different from the populations in the northern territories of Mongolia, having Central Asian features. The geographic position and the landforms are expected to affect the population of blackflies, regardless of being adjacent to one or another river basin.

In respect to the Upper Amur River basin, it should be noted that only the certain species can enter the upper reaches of the Amur River from the east through the large river valleys. Further research surveys of blackflies in the Amazar-Shilka area, for which no information is currently available, may contribute some corrections to the increase in the number of species entering the Upper Amur reaches through the valley of the Shilka River.

CONCLUSIONS

Forty-seven species representing five genera and six subgenera are registered in the fauna of eastern Trans-Baikal. *Prosimulium* and *Simulium* s. str. provide a taxonomic basis (comprising 57% of the total amount of species composition) that is typical for the mountain–taiga regions in Southern Siberia. The blackfly diversity tends to decline from the north to the south due to changing natural zones and lowering of the river network density. The species typically found in the taiga landscapes in Eastern Siberia can be present in the north of eastern Trans-Baikal, while the species commonly inhabiting the mountain steppe land forms in Central Asia can be found in the south of the area. The altitudinal zonation can cause the formation of the blackfly communities by the analog of the zonal distribution. The Upper Amur River's blackfly population revealing close similarities to the Selenga River's population shows lower structural similarities to the fauna in the lower reaches of Amur River.

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