

Species diversity of blood-sucking Diptera in the Kurgan region

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Abstract. The analysis of the literature data showed that 57 species of hematophagous Diptera insects are known for the territory of the Kurgan region. As a result of systematic long-term studies (2004-2021), 6 species were registered that were not previously reported by other researchers (*Aedes pionips* (Dyar, 1919), *A. annulipes* (Meigen, 1830), *A. albescens* (Edwards, 1921), *Culiseta bergrothi* (Edwards, 1921), *Hybomitra lundbecki* Lyneborg, 1959 and *Culicoides punctatus* (Meigen, 1804)). Currently, the faunistic list of blood-sucking Diptera includes 63 species. The species composition of horseflies and blood-sucking mosquitoes has been most fully studied, 20 and 41 species, respectively. There is no information about blackflies in the region in the available literature sources, and information about blood-sucking midges is fragmentary and relates mainly to the ecology of larvae.

1 Introduction

Hematophagous dipteran insects (Diptera: Tabanidae, Simuliidae, Ceratopogonidae) in the territory of the Russian Federation are represented by 654 species (including facultative blood-sucking species) [1]. The relevance of studying the fauna and distribution of these insects is largely due to their veterinary and medical significance. Currently, climate change processes are taking place on the planet, which lead to changes in the conditions for the existence of arthropods, the expansion of their habitats and shifts in phenodates. These factors, combined with the increased likelihood of pathogens of dangerous vector-borne diseases entering the country, indicate the feasibility of systematic monitoring of the species diversity of dipteran hematophagous, which can be involved in the spread of dangerous diseases of animals and humans.

2 Material and research methods

The Kurgan region is located in the southwest of the West Siberian Plain; in modern literature, this region is also often called the Southern Trans-Urals. The climate of the region is continental, characterized by severe winters with little snow and hot short summers with recurring droughts.

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Our own research was carried out in the vicinity of the village of Sokolovo in the Kargapolsky district of the Kurgan region in 2004–2021 (Figure 1). The study area is located on the left bank of the Miass River. To collect insect adults, 2 points were chosen, located in the biotopes most characteristic of this area: the first is the edge of a pine forest overgrown with young birches on the primary left bank of the river (Figure 2), the second is a water meadow in the floodplain with a large number of oxbow lakes (Figure 3). Collections of adults of blood-sucking dipterous insects were carried out according to the methods generally accepted in domestic dipterology. During the research period, 19837 insects were caught and identified. Species identification was carried out using the MSP-1 microscope and special identification tables. Identification of captured female biting midges was carried out by O.A. Fiodorova, candidate of Biological Sciences, Leading Researcher of the All-Russian Research Institute of Veterinary Entomology and Arachnology - a branch of the Federal Research Center of the Tyumen Scientific Center of the SB RAS.

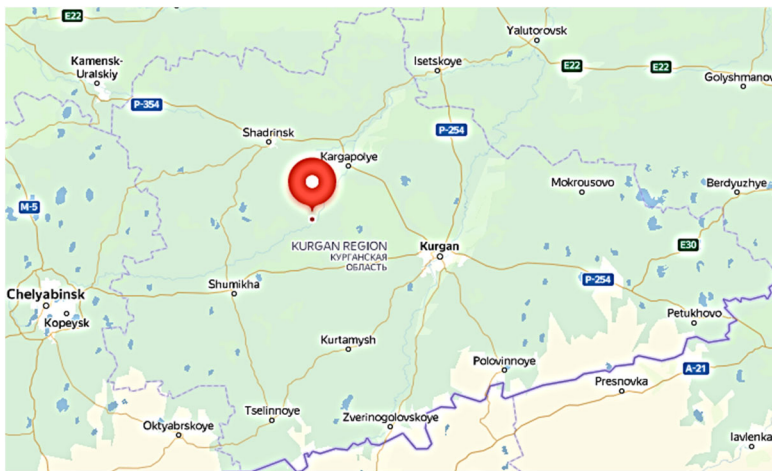


Fig. 1. Map of the collection site of blood-sucking Diptera.
(<https://yandex.com/maps/?ll=64.106241%2C55.631605&z=12.9>).



Fig. 2. Pine forest on the root bank of the river.



Fig. 3. Water meadow in the floodplain.

3 Results and discussion

The first information about horseflies (Diptera: Tabanidae) of the region is given in the work of Yu.M. Kolosov [2], which contains data on findings of 2 species in the region: *Chrysops pictus* (Meigen, 1820) and *Tabanus autumnalis* (Linneus, 1761). A.V. Novikova [3] recorded for the first time 14 species for the Southern Trans-Urals: *Chrysops relictus* (Meigen, 1803), *Tabanus sabuletorum gerkei* (Brauer, 1880), *T. bromius* (Linneus, 1758), *T. bovinus* (Linneus, 1758), *Atylotus pallitarsis* (Olsoufjev, 1936), *A. rusticus* (Linneus, 1767), *Hybomitra lurida* (Fallen, 1817), *H. m. montana* Meigen, 1820, *H. bimaculata* (Macquart, 1826), *H. expollicata* (Pandell, 1883), *H. muehlfeldi* (Brauer, 1880), *H. nitidifrons confiformis* (Chvala et Moucha, 1971), *H. ciureai* (Seguy, 1937), *Haematopota pluvialis* Linné, 1758. In 2011 A.V. Agapitova and V.A. Balakhonova [16], having analyzed the collection funds of Kurgan State University and materials of her own research, expanded the faunistic list of horseflies by 3 more species and 1 subspecies: *Chrysops c. caecutiens* (Linneus, 1758), *Hybomitra tarandina* (Linneus, 1761), *H. montana morgani* (Surcouf, 1912) and *Haematopota crassicornis* (Wahlberg, 1848).

As a result of our own research, the habitation of 10 previously known species of horseflies was confirmed and for the first time for the region in 2021, 1 species was registered - *Hybomitra lundbecki* Lyneborg, 1959, thus, to date, 20 species of the Tabanidae family have been established on the territory of the Kurgan region (Table 1).

Table 1. Hematophagous Diptera of the Southern Trans-Urals.

	Number of species
Family Tabanidae Latr. (Horseflies)	
Genus <i>Chrysops</i> Mg.	3
Genus <i>Atylotus</i> O.-S.	2
Genus <i>Tabanus</i> L.	4
Genus <i>Hybomitra</i> End.	9
Genus <i>Haematopota</i> Mg.	2
Total species:	20
Family Culicidae Mg. (Blood-sucking mosquitoes)	
Genus <i>Anopheles</i> Mg.	2

Genus <i>Coquillettidia</i> Dyar.	1
Genus <i>Aedes</i> Mg.	28
Genus <i>Culiseta</i> Felt.	5
Genus <i>Culex</i> L.	5
Total species:	41
Family Ceratopogonidae New. (Biting Midges)	
Genus <i>Culicoides</i> Latr.	2
Total species:	2
Total species:	63

The study of mosquitoes (Diptera: Culicidae) of the Southern Trans-Urals was started by V.P. Biryukov [17], as a result of the author's research, the habitat of *Anopheles maculipennis* Meigen, 1818 was established. Cytogenetic studies of malarial mosquitoes revealed that the range of this species does not cover Siberia and the Far East, and all early records of *A. maculipennis* for these regions refer to *Anopheles beklemishevi* Stegnii et Kabanova, 1976. All the information about *A. maculipennis* found in the scientific literature from the regions located east of the Ural Mountains, including the Kurgan region, in this regard, we attributed to *A. beklemishevi*. Yu.M. Kolosov in 1936 [2], 6 more species of mosquitoes were noted for the region: *Aedes cinereus* Meigen, 1818, *A. cataphylla* (Dyar, 1916), *A. caspius* (Pallas, 1771), *A. cypricus* Ludlow, 1920, *Culex pipiens* Linnaeus, 1758 and *Culiseta alaskaensis* (Ludlow, 1906). Four species new to the region (*Aedes flavescens* (Muller, 1764), *A. excrucians* (Walker, 1856), *A. riparius* (Dyar et Knab, 1907), *Coquillettidia richiardii* (Ficalbi, 1889)) were registered by G.E. Loginovsky [6]. A.V. Novikova [3], when studying natural foci of tularemia, found *Aedes vexans* (Meigen, 1830) inhabiting the territory of the region. N.V. Nikolaeva [7], in her work on mosquitoes in the Ural Federal District, lists 33 species for the Southern Trans-Urals, for the first time listing *Anopheles messae* Falleroni, 1926, *Aedes communis* (De Geer, 1776), *A. dorsalis* (Meigen, 1830), *A. subdiversus* (Martini, 1926), *A. alektorovi* (Stackelberg, 1943), *A. cantans* (Meigen, 1818), *A. detritus* (Haliday, 1833), *A. euedes* Howard, Dyar et Knab, 1913, *A. mercurator* (Dyar, 1920), *A. leucomelas* (Meigen, 1804), *A. punctor* (Kirby, 1837), *A. stramineus* Dubitzky, 1970, *A. behningi* (Martini, 1926), *A. rossicus* Dolbeskin, Gorickaja et Mitrofanova, 1930, *Culex modestus* Ficalbi, 1890, *C. vagans* Wiedemann, 1828, *C. pusillus* Macquart, 1850, *C. territans* Walker, 1856, *Culiseta longiareolata* (Macquart, 1838), *C. ochroptera* (Peus, 1935) and *C. fumipennis* (Stephens, 1825). Four species new to the region (*Aedes intrudens* (Dyar, 1919), *A. hexodontus* (Dyar, 1916), *A. diantaeus* (Howard, Dyar et Knab, 1913), *A. sticticus* (Meigen, 1838)) supplemented the existing list of mosquitoes L.S. Nekrasova et al. [8].

Our own research carried out in the Southern Trans-Urals revealed 12 species of mosquitoes, 4 of which are not mentioned in the publications of previous dipterologists. In 2017-2019, *Culiseta bergrothi* (Edwards, 1921) and *Aedes pionips* (Dyar, 1919) were found in collections, in 2020-2021, in addition to the previously mentioned species, female mosquitoes *Aedes albescens* (Edwards, 1921) and *A. annulipes* (Meigen, 1830). At present, the faunistic list of the family Culicidae of the Kurgan region includes 41 species (table).

Information about biting midges (Diptera: Ceratopogonidae) of the Kurgan region is contained in the publications of E.V. Shilkova [9], N.V. Nesterenko et al. [10]. As a result of the studies of these authors, the habitation of *Culicoides salinarius* Kieffer, 1914 in the territory of the region was established.

In 2021, we first recorded the blood-sucking biting midges *Culicoides punctatus* (Meigen, 1804). Thus, 2 species of the family Ceratopogonidae are known for the Kurgan region (table).

The blackfly fauna (Diptera: Simuliidae) of the Kurgan region has not been studied to date.

4 Conclusion

Long-term studies on the inventory of the fauna of blood-sucking dipterans in the Kurgan region made it possible to replenish the faunistic list with 6 species. The analysis of the obtained data and literary sources showed that 63 species of insects of this group have been registered for the territory of the region so far. The most studied species composition of horseflies (20 species) and blood-sucking mosquitoes (41 species). There is no information about blackflies in the region in the available literature sources, and information about blood-sucking midges is fragmentary and relates mainly to the ecology of larvae. The data obtained indicate the relevance and prospects of continuing research on the species composition of dipterous hematophagous in the South Trans-Urals.

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