2005

Types of Areas and the Origin of Black Flies Fauna in Mongolia (Diptera: Simuliidae)

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Erforsch. Biol. Ress. Mongolei (Halle/Saale) 2005 (**9**): 461-464

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Abstract

The survey of Mongolian Black Flies species (Diptera: Simuliidae) is given in the presented work. The classification based on Emelyanov (1974) and Gorodkov (1984) appeared to be as most advantageous one. Black Flies species found on the Mongolian territory up to now were classified according to the character of their distribution among 5 groups: Holoarctic species (7 species), Eurasian (15), Eastern Palaearctic (20), Turanian-Mediterranean (7), Mongolian endemic species (8). Individual groups are divided according to the type of area into smaller subgroups. The zoogeographical analysis has shown big similarity with Black Flies zoogeography in Siberia and Far East (in percentage of individual zoogeographic groups). Finally, we can say that Black Flies fauna on the Mongolian territory consists at first of Eurosiberian and Siberian species and it is characterized by not very high specific endemism.

Keywords
Black Flies, Simuliidae, Mongolia, zoogeography, distribution

Results

Quite a big number of different variants of area type classifications has been published in special literature (Tolmachev 1962, Lavrenko 1965, 1970; Portenko 1965, Tachtadzhyan, 1978). On the basis of our results we came to similar classification as Emelyanov (1974) and Gorodkov (1984).

Some differences caused by the special feature of Black Flies distribution on the Mongolian territory are described in the following paragraphs.

According to the character of their distribution in the Mongolian Fauna should be individual Black Flies species classified among 5 groups: 1) Holoarctic, 2) Eurasian, 3) Eastern Palaearctic, 4) Mediterranean-Turanian, 5) endemic. According to the geographic distribution these groups can be divided into further smaller subgroups (table 1).

Species with very wide area of distribution are included into the Holoarctic species group. This area is indicated as Holoarctic or Arctoboreal with 6 species: S*imulium baffinense*, *Simulium rubtzovi*, *Simulium venustum, Simulium murmatum.* They are widely spread in Palaearctic and non-Arctic zones. In the Southern part of their area (including Mongolia) the above-mentioned species reach mountain regions. *Simulium pugetense* and *Simulium bicorne* belong according to the type of area to Northern Holoarctic Arctoboreal species which are distributed namely in Northern parts of Europe, Northern America and mountain regions of South Siberia and Mongolia. The species *Prosimulium alpestre* has to be classified according to its pattern of geographic distribution as Eastern Palaearctic - Western Arctic reaching the Far East and Western parts of Alaska. This type of area confirms the existence of Bering bridge of fauna exchange between American and Eurasian continent.

The second group of species is represented by Black Flies distributed in bigger parts of Eurasia. This group is divided into 2 almost same subdivisions, namely 7 trans-Palaearctic and 8 Eurosiberian species. The first group contains species with relatively wide Palaearctic areas (involving almost the whole Palaearctic) which should be found regularly in Mediterranean regions. The following species can be classified based on their geographic distribution as polyzonal Palaearctic and

Palaearctic- Arctoboreal: *Simulium maculatum*, S*imulium vernum*, *Simulium pusillum*, *Simulium erythrocephalum, Simulium ornatum*, *Simulium galeratum*, *Simulium reptans*. Eurosiberian species belong to the second subgroup are *Metacnephia pallipes*, *Simulium curvans*, *Simulium elburnum*, *Simulium transiens*, *Simulium vulgare*, *Simulium tumulosum*, *Simulium argyreatum*, *Simulium paramorsitans*.

The third biggest group (35 % of the total number of species) represent Eastern Palaearctic species. These species are distributed especially in Siberia. Some of them reach in the West the Sayan-Altai and in the South the Tian Shan mountain system. Eastern Palaearctic Black Flies species of Mongolia can be divided by our detailed studies into 5 subgroups: Black Flies with the Siberian type of area represent the first subgroup (widely spread in almost whole Siberia): *Sulcicnephia tungus, Simulium silvestris*, *Simulium decimatum*, *Simulium cholodkovskii*, *Simulium malyschevi.* The second subgroup means Eastern Siberian species (Eastern Siberian Okhotsk, Southern Siberian Okhotsk): *Gynmopais bifistulatus*, *Prosimulium tredecimfistulatum Metacnephia crassifistula*, *Simulium schevyakovi*, *Simulium aemulum*. The smallest group is represented by 2 species with Southern Siberian type of distribution: *Prosimulium tridentatum,* and *Simulium subvariegatum.* Manchurian, Siberian littoral and Southern Siberian Manchurian types of distribution show 4 species. The Manchurian species which reach to Eastern part of Mongolia are: *Simulium lama*, *Simulium pavlovskii*, *Simulium rubroflavifemur*, *Simulium subvariegatum*. Mountain species connected with Altai, Sayan and Tian Shan were included into an other subgroup, so called Southern Siberian Altai Sayan. That are 4 species: *Gymnopais rubzovi*, *Gymnopais bifistulatus*, *Metacnephia kirjanovae*, *Sulcicnephia octodecimfiliatum.*

Turanian-Mediterranean species belong to the fourth group and are found in the Setinsk region (terminology according to Emelyanov 1974). Eastern boundary of distribution of several species included in this group crosses Mongolia. Black Flies of this group (classified based on their type of area among Turanian-Mediterranean, Northern Turanian-Mediterranean and Upland-Asian) are: *Sulcicnephia ovtshinnikovi*, *Simulium veltistshevi*, *Simulium acrotrichum Simulium alajense*, *Simulium kozlovi, Simulium coarctatum*, *Simulium flavidum.*

Mongolian endemic species represent the fifth group. This relatively small group containing only 8 species is very important and includes species described on the Mongolian territory during the last decades: *Prosimulium aridum*, *Simulium kerzhneri*, *Smulium baatori*, *Simulium kaszabi*, *Simulium mongolicus Simulium chovdica*, *Simulium flavigaster*, *Simulium latitarsus.*

Table 1: Types of areas of Black Flies in Mongolia

type of area	**species**	
	number	**%**
1. Holoarctic	**7**	**12**
1.1. Holoarctic Arctoboreal	6	
1.2. Easternpalaeartic-West non-Arctic-Arctoboreal	1	
2. Eurasia	**15**	**27**
2.1. Trans-Palaearctic	7	
2.2. Eurosiberian	8	
3. Eastern Palaearctic	**20**	**35**
3.1. Siberian	5	
3.2. Eastern Siberian	5	
3.3. Southern Siberian	2	
3.4. Manchurian	4	
3.5. Southern Siberian Altay Sayan	4	
4. Mediterranean	**7**	**12**
5. Endemic	**8**	**14**

Zoogeographic analysis of Black Flies species shows clearly that in the Mongolian fauna Eastern Palaearctic and Eurasian (especially Eurosiberian) elements are prevailing. They represent almost 60 % of all known species. Such evident influence of the Eurosiberian fauna on the species composition in Black Flies can be entirely explained by the influence of climatic factors in Northern and Central Mongolian regions and the South of Siberia. As we mentioned above, especially in wet zones of Northern and Central Mongolian regions more than 90 % of all Black Flies species are concentrated. In the Southern arid regions only 3-5 species occur. Widely spread Holoarctic, Turanian-Mediterranean and Mongolian endemic species represent approximately one half of all Black Flies species known on the above-mentioned territory (12 %, 12 % and 14 %).

When comparing zoogeographic analysis of Mongolian Black Flies fauna with data on those of Siberia and the Far East the results are almost coincident. Eastern Palaearctic species represent the biggest group on the territory of Siberia and the Far East - almost 50 %. The second group is represented by Eurasian species - 30 %, other species groups are almost the same: Turanian-Mediterranean - 9 %, Holoarctic - 6 %. On the territory of Mongolia and Siberia and the Far East the group of Eastern Palaearctic species was formed in similar proportions in relation to the type of area.

The highest percentage in this group is represented by Manchurian species (25 % in Mongolia, 40 % in Siberia and Far East). Eastern Siberian and Siberian species are appearing almost evenly in all 3 regions (22 %, 22 %, 24 %). Mountain Southern Siberian Altai Sayan species represent the smaller group (17 % in Mongolia, 11 % in Siberia). The group of species which is demarcated by the South of Siberia is the smallest one (Mongolia 8 %, Siberia 5 %). The proportion of this group will be probably reduced at detailed research of Eurasia.

We conclude that Black Flies fauna in Mongolia consists primarily of Eurosiberian and Siberian species and it is characterized by low endemism.

Zusammenfassung

In vorliegender Arbeit wird die Übersicht der Arealtypen der Kriebelmücken (Simuliidae) der Mongolei vorgestellt. Am besten geeignet scheint die Klassifikation nach Jemeljanov (1974) und nach Gorodkov (1984) zu sein. Die 57 bis jetzt aus dem Gebiet der Mongolei festgestellten Kriebelmückenarten, haben wir nach dem Charakter ihrer Verbreitung in folgende 5 Gruppen eingeteilt: holoarktische Arten (7), euroasiatische (15), ostpaläarktische(20), mediterran-turanische (7), Endemiten der Mongolei (8). Einige Gruppen sind aufgrund der Arealtypen in weitere kleinere Untergruppen geteilt worden.

Es besteht große Ähnlichkeit mit der zoogeographischen Verteilung der Kriebel-mücken Sibiriens und des Fernen Ostens. Es ist festzuhalten, dass sich die Fauna der Kriebelmücken auf dem Gebiet der Mongolei vor allem aus eurosibirischen und sibirischen Arten zusammensetzt und nur wenige Endemiten aufweist.

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