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DIVERSITY OF INSECTS AND OTHER ARTHROPODS IN MONGOLIA

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Abstract. The insect fauna of Mongolia includes about 12,000 species belonging to 24 orders. The only order, Orthoptera, is richer in species in Mongolia than in the Far East of Russia. All other units show greater diversity in the Russian Far East than in Mongolia. There are a significant number of very interesting endemics. Tizanuras of the family Machilidae are relic insects, represented by five species in Mongolia. As examples of widespread Central Asian insects, a number of species of darkling beetles and weevils can be indicated, most of which are endemic to Mongolia or Central Asia.

Keywords. Arthropods, fauna, Mongolia.

РАЗНООБРАЗИЕ НАСЕКОМЫХ И ДРУГИХ ЧЛЕНИСТОНОГИХ В МОНГОЛИИ

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Аннотация. Фауна насекомых Монголии насчитывает около 12 000 видов, относящихся к 24 отрядам. Единственный отряд, Orthoptera, в Монголии богаче видами, чем на Дальнем Востоке России. Все остальные отряды демонстрируют большее разнообразие на Дальнем Востоке России, чем в Монголии. Существует значительное количество очень интересных эндемиков. Тизануры семейства Machilidae реликтовые насекомые, представлены пятью видами в Монголии. В качестве примеров широко распространенных среднеазиатских насекомых можно указать ряд видов чернотелок и долгоносиков, большинство из которых являются эндемиками Монголии или Средней Азии.

Ключевые слова. Артроподы, фауна, Монголия.

Mongolia has various natural zones and diverse habitats, including high mountains and boreal taiga forests in the north, the hot, dry desert-steppe and deserts in the south, its insect fauna is very diverse. However, even with this high insect diversity, until the recent time most groups of arthropods, certainly insects, have received little or no attentions. In this work, I will provide some information on the arthropod studies in Mongolia, including the brief outline of the previous research of insects and other arthropods in Mongolia, some data on insect diversity of Mongolia and brief information arthropods other than insects.

Mongolia is a country with well-developed animal husbandry, mainly pastoral livestock breeding. From ancient times, the livestock were mainly used for food, goods, consuming materials, traveling etc., hence there are many legends, true histories about the relation of man and livestock, especially that with horses. However, there is almost no antediluvian information about the relation among man and insects in this country. Only in the old books of Mongolian traditional medicine show that the insects are included as medicinal resources [3].

It was about 250 year ago that Carol von Linne started the describing and naming of insects and other organisms. In the meantime, only about 80 years have elapsed since Mongolia opened its gates to modern biological science. This means that entomology in Mongolia remains somewhat behind that of western countries.

The insect fauna of Mongolia is consists about 12 000 species belonging to 24 orders [1]. The majority of the fauna is consisted by such orders, as Coleoptera, Diptera, Hymenoptera, Lepidoptera, Homoptera and Hemiptera, which comprise more than 60% of total species in the country (Table). However, it should note that most groups of insects have not been studied sufficiently, and the great proportion of non-described species is due to their small size, cryptic life form and also to the difficulty of identifying them. Mongolia is a rather large country incorporating various geographical regions and climatic zonation, consequently it would be expected that a large number of additional species and new records to be expected in this country.

Composition of main groups of insects and other arthropods in Mongolia

Name of groups	# species	Name of groups	# species
Crustacea	46	Mallophaga	52
Arachnida	~ 950	Thysanoptera	42
Myriapoda	32	Neuroptera	65
Insecta: Collembola	48	Rhaphidoptera	5
Thysanura	15	Mecoptera	1
Ephemeroptera	96	Trichoptera	198
Odonatoptera	60	Homoptera	> 800
Blattoptera	3	Coleoptera	> 2600
Orthoptera	165	Strepsiptera	1
Mantoptera	5	Diptera	> 1500
Plecoptera	53	Lepidoptera	> 1000
Hemiptera	> 460	Hymenoptera	> 1300
Psocoptera	30	Aphaniptera	> 100
Dermaptera	4	Total	> 12,000

There are considerable numbers of very interesting and important insects from the systematic point of view. They are strictly endemic species of Mongolia and endemic, but commoner, Central Asian species. As an example of the former category we can mention thysanurans of the family Machilidae, the relict insect species represented by five species in Mongolia [2]. As examples of widely ranging Central Asian insects, it is appropriate to mention a number of species of darkling and weevil beetles, majority of which are endemic for Mongolia or Central Asia [5, 7, 8, 9].

Among the surrounding regions of Mongolia, the insect fauna of Russian Far East is well known after long term exploration on their taxonomic diversity [6]. Though the geographical location and ecosystem conditions are somewhat different, it is meaningful to compare the faunas of these two adjacent regions, but it should consider that the land area of Russian Far East is just twice as that of Mongolia. We selected 10 major groups of insects, which well represented in both regions. Only single order, Orthoptera is species richer in Mongolia

than in the Russian Far East. All other orders show higher diversity in the Russian Far East than in Mongolia. Especially, such groups as Plecoptera, Hemiptera, Coleoptera and Lepidoptera exhibit about 2–4 times higher taxonomic diversity. Only a few groups, such as Ephemeroptera, Odonata, Neuroptera show similar species diversity in these compared regions. Overall insect fauna of Mongolia is about three times lesser than that of the Russian Far East. Although, we should estimate the diversity of local specific habitats, this data is reflected with intensity of the faunal exploration of Mongolia.

The fraction of the Mongolian insects in the fauna of Palaearctic region is insignificant. Only two orders, namely Odonata and Homoptera are comprise more than 10% of total Palaearctic species in these orders, and 6 orders or families are composed more than 5% of the total species diversity in respective taxa. Low participation of several orders, such as Coleoptera, Lepidoptera, and families, as Syrphidae, Scarabaeidae, Cerambycidae, Carabidae should be noted. Moreover, several insect orders represented in the Palaearctic region, such as Protura, Zoraptera, Embioptera, Isoptera etc. are lacking in Mongolia [4]. Thus, the fraction of Mongolia in the insect fauna of Palaearctic is quite insignificant, comprising only less 6% total species.

As for the diversity of arthropods other than insects, the most groups are also not well explored, especially majority of crustaceans and arachnids are still unknown. The only group, Myriapoda, which consisting of centipedes and millipedes are well known as they have relatively few species in Mongolia.

Currently in Mongolia, the taxonomic studies on several groups, such as lamellicorn beetles, ground beetles, grasshoppers, some aquatic insects etc. are ongoing. Ecological study is also running on different groups of insects, as well as on various aspects, such as evaluation of bioindicator systems for environmental quality and impact assessment; the insects and their habitat relationships by analyzing diversity and abundance of insects in relation to physical and chemical characters of the environment. The control of pest species, such as Siberian and gypsy moths are now under monitoring research, because their outbreak periodically reaches extremely high densities that defoliate coniferous as well as deciduous forests across large areas.

Concerning the insect conservation, there is very little research on endangered species and thorough evaluation of their threat. Among the 230 species included in the Red Data Book of Mongolia, there are only 25 species of invertebrates including 19 insects. However, there is no population analysis on these and other endangered species, as well as main threats caused their extinction. There are several main threats for insect declining, but we need further comprehensive research on rare or endangered species.

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КОЛИЧЕСТВЕННАЯ ОЦЕНКА ВЛИЯНИЯ ГАЛЛОВЫХ ТЛЕЙ РОДА *PEMPHIGUS* (STERNORRHYNCHA: APHIDIDAE, PEMPHIGINI) НА ПАРАМЕТРЫ ЛИСТЬЕВ ТОПОЛЯ

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Аннотация. На примере тли *Pemphigus spyrothecae* изучены особенности формирования галлов на тополе черном (*Populus nigra*). Установлено, что поток питательных веществ к галлам направлен как со стороны побега, так и листа, на котором они формируются.

Ключевые слова. Галлообразующие тли, Aphididae, *Pemphigus*, *Populus*, оценка вреда.