Far Eastern Entomologist

Number 450: 15-20 ISSN 1026-051X (print edition) ISSN 2713-2196 (online edition) March 2022

https://doi.org/10.25221/fee.450.4
http://zoobank.org/References/0C946C4E-8568-4117-93C0-BCB99B24478D

NEW DATA ON ORTHOPTERA DISTRIBUTION IN THE SOUTHERN PART OF THE RUSSIAN FAR EAST

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Summary. *Elimaea fallax* Bey-Bienko, *Locusta migratoria* Linnaeus and *Trilophidia annulata* (Thunberg) are recorded from Khabarovsky krai for the first time. The new data show that some species mainly associated with the subtropical and tropical regions of Asia expand their ranges northward and north-eastward. These shifts may be determined by both global warming and local transformations of habitats.
Key words: Tettigoniidae, Acrididae, fauna, new record, Khabarovsky krai, Russia.

М. Г. Сергеев, В. В. Дубатолов. Новые данные о распространении прямокрылых (Orthoptera) в южной части Дальнего Востока России // Дальневосточный энтомолог. 2022. N 450. С. 15-20.

Резюме. Впервые для Хабаровского края указаны *Elimaea fallax* Bey-Bienko, *Locusta migratoria* Linnaeus и *Trilophidia annulata* (Thunberg). Отмечается смещение на север и северо-восток границ ареалов этих видов, распространенных преимущественно в субтропических и субтропических районах Азии, что может быть обусловлено как глобальным потеплением, так и локальными трансформациями местообитаний этих видов.

INTRODUCTION

The Orthoptera fauna of the south Far East is well known, especially relative to some other parts of Russia (Storozhenko, 1986, 2004, 2011). However, some areas of the region remain insufficiently studied. Besides, global climatic trends and local transformations of habitats often result in some serious shifts in species distribution. The goal of this article is to discuss new data on the distribution of three species of Orthoptera that are mainly associated with the tropical and subtropical territories.

MATERIAL AND METHODS

Specimens were collected by both different qualitative and quantitative sampling methods in 1977 by the expedition of Department of General Biology (Novosibirsk State University)

and by hand and light trap collecting in 2007–2019 by V.V. Dubatolov. In 1977 during the field trip the peculiarities of orthopteran ecological distribution were characterized by quantitative samples collected in natural and transformed ecosystems (Stebaev *et al*., 1989). Samples obtained during a fixed period of time were made in every habitat studied (Gause, 1930; Sergeev, 1986, 2011). Using this method, insects were caught with a standard net over a period of 10–30 minutes. Results for every habitat were reckoned for one hour. In many habitats, orthopteran densities were also estimated on 25 arbitrarily placed square plots 1 x 1 m. After that the average density was counted for every habitat investigated. Hand collecting, sweep netting, and light traps were also used.

NEW RECORDS

Family Tettigoniidae

Subfamily Phaneropterinae

Tribe Elimaeini

Genus *Elimaea* Stål, 1874

***Elimaea (Elimaea) fallax* Bey-Bienko, 1951**
Fig. 1

MATERIAL. **Khabarovsky krai**: Great Ussuri Island, opposite to Osinovaya Rechka settlement, meadow on old dam, 48º20–25'N 134º50–54'E, sweep netting sample, 1.IX 2007, 2♀ (V. Dubatolov); the same locality, flood-plain, natural levee, border of short oak grove, 48º24,78'N 134º53,557' E, by light trap, 24–25.VIII 2016, 1♂ (V. Dubatolov); Bolshekhekhtsirsky Nature Reserve, Bychikha settlement, 48º18'N 134º49'E, flower-bed and attracted to light, 16–17.IX 2021, 2♂ (V. Dubatolov); **Primorsky krai**: 46 km SW Kirovsky settlement, N Kronshtadtka settlement, Sorochevka River, 44°47′N, 133°06′E, flood-plain and wet lower terrace, meadows, 15.VIII 1977, 2♂ (I. Stebaev, V. Muraveva); Ussuri River, right side, N Gornye Klyuchi settlement, 45°15′N, 133°31′E, southern slopes, shrubs and openings of decidious forest with *Lespedeza bicolor*, 16.VIII 1977, 1♂, 3♀ (I. Stebaev, V. Muraveva); Ussuri River, right side, NE Gornye Klyuchi settlement, 5 km upstream bridge, 45°15′N, 133°33′E, upper terrace, 18.VIII 1977, 4♀ (I. Stebaev, V. Muraveva); 14 km SW Slavyanka settlement, Ryazanovka, attracted to light, 4.IX 1986, 1♀ (V. Dubatolov); Gamov Peninsula, NE edge of Vityaz Bay, 1.X 2020, 1♀ (V. Dubatolov).

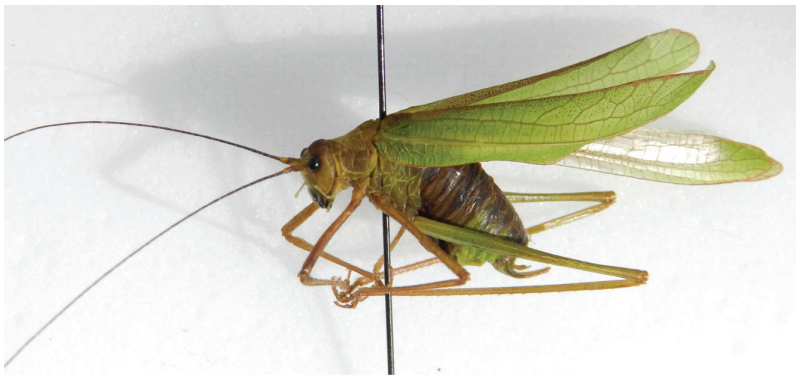

Fig. 1. *Elimaea fallax* Bey-Bienko, male from Bychikha (photo of V.V. Dubatolov).

REMARKS. Bey-Bienko (1951) described this species from the southern part the Russian Far East (Ussuriysk and Zareche settlement at 16 km SW Posyet) and NE China. He noted some strong relationships of this taxon and the tropical members of this genus. Later Bey-Bienko (1954) mentioned the locality of the species in N Korea.

DISTRIBUTION. Russia: Khabarovsky krai (new record), Primorsky krai (SW and along the Ussuri River valley); NW, N, NE, E, SW China, Korea (Jin & Xia, 1994; Storozhenko *et al*., 2015).

ECOLOGY. Our data show that the species prefers shrubs (especially *Lespedeza bicolor*) on openings and along edges of deciduous forests and meadows with tall vegetation as well (cf. Stebaev *et al*., 1989). In shrubs, its abundance may be about 1.5–8 ind./hour (with average density between 0.02 and 0.11 ind./m^2). It is relatively rare over meadow vegetation. Importantly, our recent observations showed that the species can settle some transformed habitats as well.

Family Acrididae

Subfamily Locustinae (= Oedipodinae)

Tribe Locustini

Genus *Locusta* Linnaeus, 1758

***Locusta migratoria* Linnaeus, 1758**

MATERIAL. **Khabarovsky Krai**: Bolshekhekhtsirsky Nature Reserve, Ussuri River, downstream Chirki River mouth, lower sandy flood-plain with scarce vegetation, 12.VII 2018, 1♂ larva; the same locality and habitat, 20.VII 2018, several larvae observed (V. Dubatolov)

REMARKS. The species was commonly mentioned for the southern part of the Russian Far East as the accidental one (Bey-Bienko, 1966). The dense population of the migratory locust was found for the first time in the southern part of the Khabarovsky krai.

DISTRIBUTION. Russian Far East: Khabarovsky krai (new record), southern part of Primorsky krai (Mistshenko, 1972; Storozhenko, 1986, 2018), Moneron Island (Storozhenko, 1986), Kunashir Island (Bey-Bienko, 1966; Kryvolutskaja, 1973; Storozhenko, 1985). The migratory locust is most widely distributed species. Its range includes almost all Eurasia (except the North), Africa, Australia and many islands (Ma *et al.*, 2012; Sergeev, 2017). The nominotypical subspecies is chiefly distributed in the extra-tropical regions. In China, the migratory locust occurs over almost all territory including its north-eastern regions (Zheng & Xia, 1998). Importantly, the gregarious form of the species was mentioned from Korea and NE China as well (Rehn, 1902; Ikonnikov, 1913; Bey-Bienko, 1930). Furthermore, the outbreaks of the migratory locust were observed in 2009 in the southern part of Heilongjiang province of China (Tu *et al*., 2020).

ECOLOGY. The migratory locust is one of the most important pests in a number of countries. Its populations are usually associated with reed beds, but in Tuva, its dense population was observed over the *Achnatherum* grasslands (Sergeev, 2017). The newly discovered population was found in the local lower sandy flood-plain. It included hoppers of different ages. One could suppose that the population was stable, however, this part of the river valley was overflowed in the end of July and August of 2018. The similar situations were observed in 2019–2021. As a result, some attempts to find the species again in the same location were unsuccessful. Nevertheless, one may hypothesize that some stable populations of the migratory locust occur across local reed beds (including the adjacent areas

of NE China). The alternative idea was suggested by Tu and co-authors (Tu *et al*., 2020). They supposed that the recent outbreaks of the migratory locust in Heilongjiang were resulted from long north-eastward migrations of *Locusta migratoria migratorioides* (Reiche et Fairmaire, 1849) = *L. migratoria manilensis* (Meyen, 1835). In any case, as we know the trends of climatic changes, particularly warming, are very notable, that means both the general number of local populations of the migratory locust and its common abundance can increase in the near future. This may result in some serious problems for the plant protection systems in the southern parts of the Russian Far East and NE China (cf. Tu *et al*., 2020).

Tribe Trilophidiini

***Trilophidia annulata* (Thunberg, 1815)**

MATERIAL. **Khabarovsky krai:** Bolshekhekhtsirsky Nature Reserve, Ussuri River, downstream Chirki River mouth, lower sandy flood-plain with scarce vegetations, 7–8.VIII 2013, 1♂ (V. Dubatolov); the same reserve, Bychikha settlement, 48º18'N 134º49'E, attracted to light, 24–25.VIII 2007, 1♂ (V. Dubatolov); the same locality, 29–29.IX 2009, 1♀, 13–14.IX 2013, 1♀ (V. Dubatolov); the same locality, short lawn, 18.IX 2013, 1♀ (V. Dubatolov); the same locality, 21.IX 2014, 1♂, 28.VIII 2016, 21.IX 2018, 1♂, 1♀, 10–11.IX 2019, 2♂ (V. Dubatolov).

REMARKS. The century ago the species was mentioned for Korea (Ikonnikov, 1913). Later it was found in the southern part of the Primorsky krai (Storozhenko, 1986). It occurs in the Russian part of the Changbai Mts. (Storozhenko, 2018). One can suppose that the species recently invaded the vicinity of Khabarovsk, perhaps, from the territory of Heilongjiang (NE China) across the Ussuri River.

DISTRIBUTION. Russia: Khabarovsky krai (new record), southern part of Primorsky krai (Storozhenko, 1986, 2018). This species widely distributed over S, SE and E Asia, from Afghanistan and Pakistan to Japan and from NE China to the Greater Sunda Islands (Hollis, 1965). In China, it occurs in almost all parts, except high mountains, but including Heilongjiang and Xinjiang (Zheng & Xia, 1998; Bai *et al*., 2016). However, the records for NW China (Xinjiang) may be based on either misidentification or incorrect labels, because this area is relatively distant from the main part of the species range and, moreover, it is characterized by very dry, desert climate.

ECOLOGY. The species is relatively common in N Korea (Kim & Puskás, 2012). In South Asia, it can be serious pest (Hollis, 1965). Near Khabarovsk *T. annulata* usually occurs in both natural, such as sandy flood-plains, and transformed habitats, especially across short lawns and wastelands. One can hypothesize its wide distribution over NE China is determined by very wide and common agricultural transformation of this region as well.

CONCLUSIONS

The new data concerning the orthopteran species distribution across the southern parts of the Russian Far East show that some species mainly associated with the subtropical and tropical regions of Asia may expand their ranges northward and north-eastward. These shifts can be determined by both global warming and local transformations of habitats, especially in some adjacent parts of China where anthropogenic habitats, such as agricultural fields, pasturelands, clearings, verges, lawns, occupy huge areas. In this context, the global trends change the general environment which allows the species exist, but local human activity often shapes habitats for many species associated with grasslands and openings.

ACKNOWLEDGEMENTS

The authors wish to express their sincere thanks to the late L.L. Mistshenko (St. Petersburg), the late I.V. Stebaev (Novosibirsk), V.M. Muraveva (Gorno-Altaisk) for advices, cooperation and interactions. The authors are also indebted to all companions during their field trips. These studies were partly supported by the Federal Fundamental Scientific Research Program (122011800263-6 and 122011800267-4). Some data used in the study were provided by the Siberian Zoological Museum, Institute of Systematics and Ecology of Animals.

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