

The First Record in Europe of an Invasive Alien Pest of Soybeans: *Medythia nigrobilineata* Motschulsky (Coleoptera: Chrysomelidae: Galerucinae)

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Abstract: *Medythia nigrobilineata* Motschulsky (= *Paraluperodes suturalis nigrobilineatus*) is a dangerous pest of soybeans in Asia. It is native to China, the Russian Far East, Japan, Nepal, Pakistan and South Korea. It has not been recorded in Europe until now. In 2016, a single female of *M. nigrobilineata* was collected at the Black Sea coast in the city of Sochi, in the south of European Russia. Though we have found only one specimen, it is extremely likely that it represents at least a temporarily successful colonisation. The likelihood of catching an individual from a current introduction, rather than from a breeding population, is negligibly small. *Medythia nigrobilineata* is the first species of the genus *Medythia* to be found in Europe. This pest poses potential threats to soybean production in Europe.

Keywords invasive species; pest of soybean; two-striped leaf beetle; *Paraluperodes suturalis nigrobilineatus*; Russia; Caucasus

Introduction

Invasive species are one of the most serious global ecological and economic problems of the last decades. Invasions of leaf-beetles (Chrysomelidae, excluding Bruchinae) are relatively rare: only 11 alien species of this group have been recorded in Europe (BEENEN & ROQUES 2010). Nevertheless, the negative impact of these invasions is significant, since some alien leaf beetles, e.g. *Leptinotarsa decemlineata* (Say, 1824), *Diabrotica virgifera* LECONTE, 1868 and *Epitrix papa* ORLOVA-BIENKOWSKAJA, 2015, are major pests of field crops (EPPO 2015, ORLOVA-BIENKOWSKAJA 2015). Alien pest leaf-beetles spread and rapidly become abundant. For example, *Diabrotica virgifera* was first recorded in Europe in 1992 but now it has spread to at least 21 countries and has become a major pest of corn in some regions (EPPO 2015). Therefore, the records of new alien pest leaf-beetles are very important. Here, we report the first European record of a common Asian pest of soybeans, the two-striped leaf beetle *Medythia nigrobilineata* (Motschulsky, 1861) (= *Paraluperodes suturalis nigrobilineatus*

Motschulsky, 1861) (Coleoptera: Chrysomelidae: Galerucinae). This is the first known occurrence of the species outside its native range and the first record of the genus *Medythia* in Europe.

Materials and Methods

Insects were collected in the North-western Caucasus in the south part of European Russia in May 2016 during a study conducted for the project of the Russian Scientific Foundation “An integrative study of invasions in beetles”. This region was chosen because it was especially prone to pest insect invasions (KARPUN 2016). Beetles were collected using swiping, pitfall traps, examination of plants and leaf litter under the plants in various locations and biotopes.

Results

About 1000 beetle specimens were collected in total. A single female specimen of the two-striped

leaf beetle *Medythia nigrobilineata* was collected by net-swiping on grass (N43.41°, E39.98°) on 19.05.2016 in Krasnodar Krai, city of Sochi, near Adler, Imereti lowland, on wasteland with grasses (Fig. 1). This specimen was identified using the following keys: GRESSITT & KIMOTO (1963), MEDVEDEV (1992), KIMOTO & TAKIZAWA (1994), LEE & AN (2001), MEDVEDEV & SPRECHER-UEBERSAX (2005) and WARCHAŁOWSKI (2010). In addition, we compared the specimen with specimens of *M. nigrobilineata* from the Russian Far East (Khabarovsk Krai, Primorskiy Krai) and North Korea. The material is deposited in the private collection of the first author (Zelenograd, Russia).

The genus *Medythia* Jacoby, 1887 includes 17 species (WARCHAŁOWSKI 2010). Three of them occur in the Palaearctic. *Medythia nigrobilineata* is native to N. China, Japan, Nepal, Pakistan, South Korea, North Korea and the Russian Far East (MEDVEDEV 1992, LEE & AN 2001, BEENEN 2010, WARCHAŁOWSKI 2010, TOEPFER et al. 2014). BEENEN (2010) and WARCHAŁOWSKI (2010) also mentioned this species from East Siberia. However, this record is not supported by any collecting data or other publications. Until now, the genus *Medythia* was not recorded from Europe, including from European Russia.

The key to Chrysomelidae of Europe and the Mediterranean area (WARCHAŁOWSKI 2003) should be supplemented with the genus *Medythia*. This genus should be placed near the genus *Leptomona* Bechyné, 1958. Both genera share a common character, i.e. first metatarsomere as long as three remaining metatarsomeres together. *Medythia* can be distinguished from *Leptomona* in the following key:

1(2) Hind wings normally developed. Body rufous with black parts ...*Medythia*

2(1) Hind wings absent. Head and pronotum reddish, elytra bluish black with metallic sheen. ...*Leptomona*

Diagnostic characters of *Medythia nigrobilineata*: Body elongate-oval, rufous with black parts: labrum, antennomeres 3-11, pronotal lateral border, narrow discal longitudinal stripe at each elytron, bases of tibiae, 1st tarsomeres and 4th tarsomeres. Dorsal surface glabrous. Antennal insertions situated slightly behind the middle of inner margins of eyes. Anterior margin of labrum emarginate. Antennal calli elongate-triangular, with anterior angles acute, projecting forward. Gena as long as 0.4 X smaller diameter of eye. Pronotum 1.2 X as broad as long, marginated laterally and posteriorly, without discal impressions. Mesosternum free, not covered by metasternum. Anterior coxal cavi-

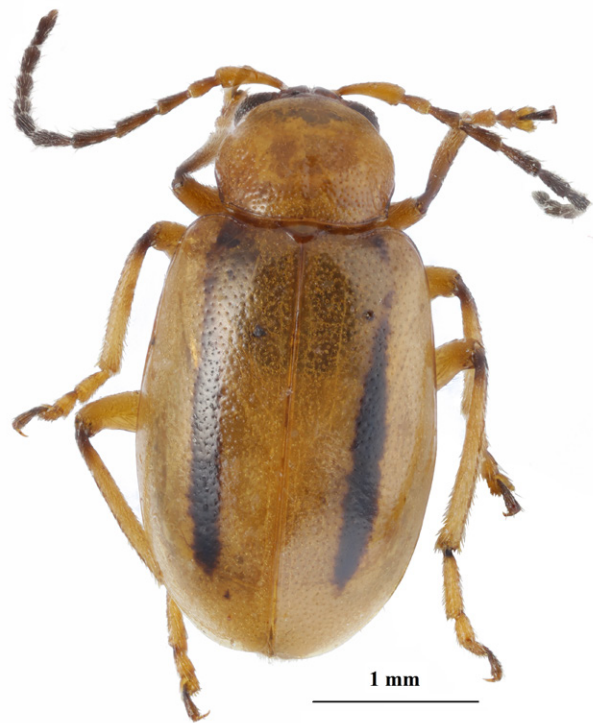


Fig. 1 Female of soybean pest *Medythia nigrobilineata* (Motschulsky) (Coleoptera, Chrysomelidae, Galerucinae) collected in the South of European Russia.

ties open behind. Middle coxae close to each other. Elytra covering abdomen. Elytral epipleurae broad in basal half, strongly narrowing in apical half. Hind wings normally developed. All tibiae with apical spine on lower margin. Spine of hind tibia almost as long as the width of the tibia apically. First metatarsomere as long as three remaining metatarsomeres together. Tarsal claw appendiculate. Body length: 3.0-3.9 mm. Our specimen from Sochi is 3.3 mm long.

Discussion

The two-striped leaf beetle was originally described as *Cnecodes nigrobilineatus* Motschulsky, 1861. Subsequently it was considered as *Luperodes* Motschulsky, 1858 or *Monolepta* Chevrolat, 1836 [see synonymy in OGLOBLIN (1936) and KIMOTO (1981)]. OGLOBLIN (1936) described the genus *Paraluperodes* and treated the two-striped leaf beetle as *P. suturalis nigrobilineatus*. Then the genus *Paraluperodes* Ogloblin, 1936 was argued to be a synonym of the genus *Medythia* Jacoby, 1887 (WILCOX 1973). This statement was proved by KIMOTO (1981), who examined the type species of both *Paraluperodes* and *Medythia*. KIMOTO (1981) proved the two-striped leaf beetle species as distinct members of the genus *Medythia* Jacoby,

1887 and indicated its differences from *M. suturalis* Motschulsky, 1858 both in external characters and male aedeagus. The combination *M. nigrobilineata* is also included to the Catalogue of Palaearctic beetles (BEENEN 2010). The combination *P. suturalis nigrobilineatus* is not valid, but it is used in articles on plant protection until now (TOEPFER et al. 2014).

Adults and larvae of *M. nigrobilineata* are known to be serious pests of soybeans in China, Japan and the Russian Far East. They often lead to death or underdevelopment of the plants (OGLOBLIN 1936, ZHANGLIN et al. 1997, MOSEYKO 2010, TAKEI et al. 2014, GUYER et al. 1977). The biology of *M. nigrobilineata* in its native range was described by OGLOBLIN (1936), KOYAMA (1940), MOSEIKO (2010) and TOEPFER et al. (2014). *Medythia nigrobilineata* develops only on soybeans. Adults feed on leaves and often damage immature pods. Besides that, beetles can feed on leaves of rice and sugarcane. Adults hibernate among fallen leaves and in the soil. In spring they begin to feed on soybean seedlings and damage leaves. Females lay eggs in the soil. Larvae feed on root nodules and pupate in the soil. The adults of the next generation appear in Primorskiy Krai (the Russian Far East) from the end of July till the beginning of August. There are 2–4 generations per year (MOSEIKO 2010, TOEPFER et al. 2014).

Currently, invasions of pest insects are common in the North-western Caucasus (KARPUN 2016, ORLOVA-BIENKOWSKAJA 2017). In 2000–2016, at least 12 other alien beetle species were firstly recorded in this region of European Russia: *Xylosandrus germanus* (Blandford, 1894) (Curculionidae: Scolytinae), *Megabruchidius tonkineus* (Pic, 1904), *Megabruchidius dorsalis* (Fåhræus, 1839) (Chrysomelidae: Bruchinae), *Harmonia axyridis* (Pallas, 1773) (Coccinellidae), *Stelidota geminata* (Say, 1825) (Nitidulidae), *Epitrix hirtipennis* (Melsheimer, 1847) (Chrysomelidae: Alticinae), *Rhynchophorus ferrugineus* (Olivier, 1791) (Dryophthoridae), *Luperomorpha xan-*

thodera (Fairmaire, 1888) (Chrysomelidae: Alticinae), *Lamprodila festiva* (Linnaeus, 1767) (Buprestidae), *Arthrolips fasciata* (Erichson, 1842) (Corylophidae), *Silvanoprus cephalotes* (Reitter, 1876), *Psammoecus trimaculatus* Motschulsky, 1858 (Silvanidae) (MANDELSHTAM 2000, KOROTYAEV 2011, 2015, BELYAKOVA & REZNIK 2013, TSINKEVICH & SOLODOVNIKOV 2014, ORLOVA-BIENKOWSKAJA 2014, ZHURAVLEVA & KARPUN 2014, KARPUN & VOLKOVITSH 2016, KOVALEV 2016, ORLOVA-BIENKOWSKAJA 2017, BIENKOWSKI & ORLOVA-BIENKOWSKAJA 2017). Most of the new invasive beetle species are native to Asia. It is believed that this dramatic increase of insect invasions to the North-western Caucasus is caused by the increase of plant import.

Apparently, *M. nigrobilineata* could be unintentionally introduced to the south of European Russia from Asia through Sochi International Airport. The specimen was collected 4 km south-east from this airport. Adults could be imported with soybeans. Though we have found only one specimen, it is extremely likely that it represents an established population. First, the likelihood of collecting an individual in nature from current introduction rather than from a breeding population is negligibly small. Second, the establishment of *M. nigrobilineata* in Krasnodar Krai is quite possible, since soybean is widely cultivated in this region (KONDRATENKO 2012). Currently, *M. nigrobilineata* is absent in the list of quarantine pests of Russia (LIST OF QUARANTINE SPECIES 2014).

We do not know how widespread the population of *M. nigrobilineata* in the south of European Russia is. But since the pest has been introduced from East Asia to the North-western Caucasus, we know of nothing that could hinder the species spreading to other regions of Europe. With this report, we urge European entomologists and experts in plant protection to be on the alert for this new potential threat.

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