Title: First record of Criomorphus williamsi China, 1939 (Hemiptera: Fulgoromorpha: Delphacidae) in Poland

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First record of *Criomorphus williamsi* China, 1939 (Hemiptera: Fulgoromorpha: Delphacidae) in Poland

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**ABSTRACT.** First record of *Criomorphus williamsi* China, 1939 (Hemiptera: Fulgoromorpha: Delphacidae) in Poland.  
The paper presents the information on *Criomorphus williamsi* China, 1939 – a species of Delphacidae family found in Poland for the first time. The single specimen of this species was collected in south-eastern part of country. In Europe this species is quite rare and with scattered distribution, in isolated populations in England, Germany, Czech Republic, Slovakia, Hungary, Norway, Sweden, Finland, Estonia, Latvia, the European part of Russia, also it is distributed in Kazakhstan and Kyrgyzstan. *C. williamsi* is species connected with *Poa* spp. The paper presents data on its biology and diagnostic features.  
**KEY WORDS:** Planthoppers, fauna of Poland, Eastern Beskidy Mountains, new record.

**INTRODUCTION**

Planthoppers and leafhoppers (Fulgoromorpha Evans, 1946 and Cicadomorpha Evans, 1946) belong to a group of phytophagous insects with piercing-sucking mouthparts within the Hemiptera order (Gębicki et al. 2013). Both units previously thought to be uniform group called Auchenorrhyncha. However, in recent years most authors based both on molecular data and fossil record, consider planthoppers and leafhoppers as two monophyletic taxa, which are separate, although related suborders: Fulgoromorpha and Cicadomorpha (Sorensen et al. 1995, Szwedo et al. 2004). Nevertheless, it should be noted that the study of some scientists still seem to claim close relationship, or even monophyletic origin of the considered groups (Yoshizawa & Saigusa 2001, Szklarzewicz et al. 2007).

For many years Polish scientists conducted an intensive research on planthoppers and leafhoppers fauna, and presented publication is a part of the series of works devoted to the area of the Eastern Beskidy Mts. (Taszkowski et al. 2015a, b). In recent years, those insects were studied both in natural habitats (Piarczyk et al. 2014, Świeczewski et al. 2015), in cities (Walczak & Musik 2012, Walczak et al. 2014) or other anthropogenic areas, especially extremely degraded like heaps of coal and zinc (Gibas 2015, Mielimonka 2015, Pniok 2015).

Since the last publication of planthoppers and leafhoppers check-list, which included 542 species (Gębicki et al. 2013), the number of known species in the Polish

Genus Criomorphus Curtis, 1833 includes 12 known species, wherein the typical species is Criomorphus albomarginatus Curtis, 1833. Some species – C. albomarginatus Curtis, 1833, C. borealis (Sahlberg, 1871), C. moestus (Boheman, 1847) and presented here C. williamsi occur in the western part of the Palearctic region, mainly in Europe and Russia (Nast 1987, Nickel 2003). Other like C. euagropyri Emeljanov, 1964 and C. inequalis Emeljanov, 1964 are known from the central Asia (Emeljanov 1964) while C. agnus Anufriev et Averkina, 1982, C. inconspicuus (Uhler, 1877), C. firmatus Emeljanov, 1977, C. niger Ding et Zang, 1994, C. nigerrimus Dlaba, 1965 and C. ovis Anufriev et Averkina, 1982 inhabit the areas from central Siberia to the Far East. One of the listed species (C. inconspicuus) was recorded even in the USA (Van Duzee 1916, Dlaba 1965, Anufriev & Averkin 1982, Ding & Zhang 1994, Bourgoin 2016).

MATERIAL AND METHODS

Collection data

Libusza (near Gorlice), UTM: EA10, geographical coordinates: N: 49°40’48’, E: 21°15’33’’ (Fig. 1), Rhamno-Prunetea class (plant communities of thermophilic coastal scrubs), order Prunetalia spinosa, 04.06.2015, 1 ♂, leg. A. Taszakowski.

Study area

Zoogeographic area (according to Katalog Fauny Polski: Burakowski et al. 1973): the Eastern Beskid Mountains (Beskid Wschodni), in respect of physico-geographical division of Poland by Kondracki (2013) this site is situated in the Jasielskie Foothills (Pogórze Jasielskie). Eastern Beskid Mts., in terms of Fulgoromorpha et Cicadomorpha fauna is relatively poorly studied. So far, in this area, only 108 representatives of this group were noted (Gębicki et al. 2013, Musik & Taszakowski 2013, Taszakowski et al. 2015a, b).
Methods

Specimen was identified with a stereomicroscope, and the external morphological features were used to determine family and genus. Species identification was based mainly on the male genitalia morphology features: pygophore (Fig. 2A), genital styles (Fig. 2C), anal tube, aedeagus (Fig. 2B). We based on the Biedermann & Niedringhaus (2009) key. Genitalia were carefully dissected and macerated in a 10% potassium hydroxide solution (according to the procedure used in this group) in order to remove soft tissues. This procedure also turns the male genitalia semi-diaphanous, which allows visualizing the shape and all details (Knight 1965).

Species characteristics

Criomorphus williamsi China, 1939 is classified in the family Delphacidae Leach, 1815, subfamily Delphacinae Leach, 1815, and Delphacini Leach, 1815 tribe. In terms of its size and external morphology structure it is similar to other species gathered in the Criomorphus genus (Biedermann & Niedringhaus 2009). However, it stands out from the genus with the structure of male sexual apparatus, especially aedeagus, which in most species is a rod-shaped construction, almost straight with massive spikes. Unlike C. williamsi has a short, strongly curved and hooked aedeagus, serrated with a very small spikes with massive basis and strongly tapered ends. Shaft of aedeagus is
strongly curved, at the base distinctly extended, apically almost sharp (Fig. 2B). While its pygophore, which is widely spaced downward with long and spiky appendages is somewhat similar to the one of *C. firmatus* Emelianov, 1977. Appendages of anal tube are long, thickened at the base (Fig. 2A). Genital styles are symmetric (Fig. 2C). Females of Central European species of the genus *Criomorphus* are possible to be distinguished due to the shape of lateral genital lobe, however, there are not clearly visible differences.

Individuals belonging to *C. williamsi* represent forms brachypterous and rarely macropterous (Nickel 2003, Biedermann & Niedringhaus 2009). The collected male is a macropterous individual.

In Europe *C. williamsi* is quite rare. Its geographic range include spread, probably isolated, populations in England, Northern Germany, Czech Republic, Slovakia and Hungary (China 1939, Lauterer 1983, 1992, Holzinger et al. 2003, Orosz 2009). Also, it occurs almost in the entire northern Europe – including Norway, Sweden, Finland, Estonia, Latvia and Russia – where it was recorded from the vicinity of Murmansk, St. Petersburg, and areas located to the east of Moscow: Chuvashia, Nizhny Novgorod
and Penza (Anufriev 2002, Söderman et al. 2009). Furthermore, it inhabits Ile Alatau Mountain range in the Tien Shan, Kalbinsky Mountain range in Altai, and West Tien Shan (Ubinsky mountain range) in Kazakhstan, as well as Issykkulski Circuit (Issyk Kul) in the eastern Kyrgyzstan (Anufriev 2002). The holotype of this species comes from England (China 1939). In relation to the Polish borders, the nearest localization where C. williamsi was recorded, is situated in South Moravia in the Czech Republic (Malenovský & Lauterer 2010). Lauterer (1983) claims that the specimens originating from Kazakhstan have been mistakenly identified by Mitjaev (1968), but Anufriev (2002) argues that incorrectly mentioned was only a specimen originating from Ulbinsky Mountain Range in the western part of Altai (Nowicka et al. 2005).

C. williamsi can be found among tall grasses on wet and often slightly eutrophic habitats, like open forest areas, floodplain meadows, along ditches and even on abandoned farmlands. Probably it is 2-degree monophagous (feeding on one genus of plants) (Nickel & Remane 2002), associated with Poa trivialis and P. palustris (Nickel 2003). Species overwinters in the nymph stage and has one generation per season (Nickel & Remane 2002). Nickel and Remane (2002) determined chorological element C. williamsi as probably Kazakh, but taking into account that many records are known from Scandinavia, Estonia, Latvia, or the northern Russia (Söderman et al. 2009, Anufriev 2002), it seems, it is rather a Euro-siberian species.

In the Czech Republic, due to the rarity, C. williamsi, along with 4 other species: Tettigometra leucophaea (Preysler, 1792), Delphax pulchellus (Curtis, 1833), Euides alpina (Wagner, 1948) and Zygina frauenfeldi Lethierry, 1880, it is considered as critically endangered species, and it is placed on the Red List of endangered invertebrates of this country (Malenovský & Lauterer 2012). Its biology is hardly known, evidenced by a small number of caught specimens: only 3 known from Germany (Biedermann & Niedringhaus 2009); 6 from the Czech Republic (Malenovský & Lauterer 2010) and only a few from Kyrgyzstan (Anufriev 2002).

**DISCUSSION**

C. williamsi is another interesting planthopper species recorded recently from the area of Poland. Records of new species in Polish fauna are the result of research conducted in various plant communities, both natural (such as wet meadows, moors, xerothermic grasslands, forests) and anthropogenic (Świerczewski & Wocjiewowski 2009, Pilarczyk et al. 2014, Walczak et al. 2014, Świerczewski et al. 2015). This indicates the need for further research in various plant communities i.e. in the areas of national parks, landscape and nature reserves, because the knowledge of the structure of planthoppers and leafhoppers communities within these habitats appears still incomplete. Nevertheless, even within cities and other areas subjected to a strong human pressure many rare and interesting species can be found (Walczak & Musik 2012, Walczak et al. 2014).
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STRESZCZENIE

Pierwsze stwierdzenie Criomorphus williamsi CHINA, 1939
(Hemiptera: Fulgoromorpha, Delphacidae) w Polsce

Jeden osobnik Criomorphus williamsi CHINA, 1939 – makropteryczny samiec, został odłowiony w Libuszy k. Gorlic (Beskid Wschodni) w czerwcu 2015 r. Jest to gatunek piewika nieznany wcześniej z obszaru Polski.

Criomorphus williamsi CHINA, 1939 to rzadko odnotowywany przedstawiciel rodziny Delphacidae. Gatunek ten znany jest z niewielkiej liczby okazów, chociaż rozpowszechniony jest na dość znacznym areale. Występuje w zachodniej i środkowej części Europy oraz Skandynawii, a ponadto w europejskiej części Rosji, Kazachstanie i Kirgistanie. Najczęściej spotykany jest na wilgotnych łąkach z wysokimi trawami, wzdłuż rowów, a nawet na terenach opuszczonych pól uprawnych i świetlistych lasów. Jest prawdopodobnie troficznie związany z dwoma blisko spokrewnionymi gatunkami traw: wiechliną błotną Poa palustris i wiechliną zwyczajną P. trivialis. Zimuje w stadium nimfy i ma jedną generację w sezonie.

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