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New data on distribution of *Chamaesphecia efetovi* O. Gorbunov, 2019, in the Crimea (Lepidoptera: Sesiidae)

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Abstract

Chamaesphecia efetovi O. Gorbunov was described in 2019 from the Crimea, Volgograd Region and Stavropol Territory (Russia). In the Crimea, this species was mentioned from 15 localities. In 2020, the authors continued studying the range of this species in the Crimea and found 24 additional localities. *Ch. efetovi* is widely distributed in the Crimea in Plain region, Kerch Peninsula and in some localities of Mountain region. The peculiarities of the biology of the species are discussed. *Ch. efetovi* is also known from Romania, Bulgaria and Serbia. It is assumed that this species can also be distributed in adjacent territories: Moldova, Ukraine, Turkey, and (in addition to Bulgaria and Serbia) in other countries of the Balkan Peninsula. The confirmation of this requires further research.
KEY WORDS: Lepidoptera, Sesiidae, *Chamaesphecia, Ch. efetovi*, new localities, Crimea.

Nuevos datos sobre la distribución de *Chamaesphecia efetovi* O. Gorbunov, 2019, en Crimea (Lepidoptera: Sesiidae)

Resumen

Chamaesphecia efetovi O. Gorbunov fue descrita en 2019 de Crimea, Región de Volgogrado y Territorio de Stávropol (Rusia). En Crimea, esta especies fue mencionada de 15 localidades. En 2020, los autores continúan estudiando el rango de esta especie en Crimea y encuentran 24 localidades adicionales. *Ch. efetovi* se distribuye extensamente en Crimea en la región mesetaria, Península de Kerch y algunas localidades de la región montañosa. Se discuten las peculiaridades de la biología de esta especie. *Ch. efetovi* también es conocida de Rumanía, Bulgaria y Serbia. Asumimos que esta especie también puede distribuirse por territorios próximos: Moldavia, Ucrania, Turquía y (en suma a Bulgaria y Serbia) en otros países de la Península Balcánica. Se requiere la confirmación para futuras investigaciones.
PALABRAS CLAVE: Lepidoptera, Sesiidae, *Chamaesphecia, Ch. efetovi*, nuevas localidades, Crimea.

Introduction

This paper is a continuation of the authors' investigation of the family Sesiidae in the Crimean Peninsula (EFETOV *et al*., 2012a, 2012b; GORBUNOV, 2019a, 2019b; GORBUNOV & EFETOV, 1990, 2016, 2018). According to our knowledge, the family Sesiidae is represented in the Crimea by 8 genera and 35 species. The genus *Chamaesphecia* Spuler, 1910 (type species: *Sphinx empiformis* Esper, 1783) is the largest sesiid genus in the Crimea and has 14 species here. *Chamaesphecia* (*Scopulosphecia*) *efetovi* was described by the second author not long ago (GORBUNOV, 2019b) from the Crimea, Volgograd Region and Stavropol Territory (Russia). 15 localities (including the type locality of this species) were mentioned in the peninsula in the original description (Figs. 1, 2). These

localities are situated in Simferopol', Sevastopol' and five Districts of Crimea: Chernomorskoye, Belogorsk, Sovetskoye, Kirovskoye, and Lenino Disricts.

In the season 2020, the authors decided to determine more accurately the distribution of *Ch. efetovi* in the Crimea. For this purpose, 12 field trips were undertaken from 5-VII-2020 to 24-VII-2020 and many new localities were found.

Abbreviations

The material studied is kept in the following collections abbreviated in the text as follows:

CKAE Collection of Konstantin A. Efetov, V. I. Vernadsky Crimean Federal University, Simferopol', Russia.

COGM Collection of the A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russia.

Methods

The males of *Ch. efetovi* (Figs. 3, 6, 7) were attracted to artificial female sex pheromone (Fig. 10) for European species *Synanthedon vespiformis* (Linnaeus, 1761) produced by PHEROBANK®, Wijk bij Duurstede, the Netherlands. The application of the female sex attractants has one negative aspect: this method allows to collect only males (EFETOV *et al*., 2014a, 2014b, 2016; GORBUNOV & EFETOV, 2018). The females (Figs. 8, 9) were collected by net when feeding on flowers or flying around the larval host plant *Marrubium peregrinum* L. (Fig. 4). Specimens of both sexes were also obtained by breeding the larvae found in the roots of the host plant.

The images of moths were taken by the second author with a Sony® α450 DSLR camera equipped with a Minolta® 50 f/2.8 Macro lens. The processing of all illustrations was finalized with Adobe® Photoshop® 2020 software. Pictures of the specimens are labeled with a number which consists of the name of the family, two consecutive digits and a year (e.g., SESIIDAE pictures NºNº 0161-0162-2020). These numbers correspond to those of the illustrated specimens in the archives of the second author. Photos in the field were taken by the first author with a CANON PowerShot G11 camera.

Plant names are given according to YENA (2012).

Results

As was mentioned above, 15 localities of *Ch. efetovi* were cited in the original description. In 2020, the authors found this species in 21 new localities. In addition to Chernomorskoye District, Belogorsk District, Lenino District (Arabatskaya strelka), Sovetskoye District, and Kirovskoye Disrict, Simferopol' and Sevastopol' this species was also found in Saki District, Razdol'noye District, Kransnoperekopsk District, Pervomayskoye District, Dzhankoy District, Krasnogvardeyskoye District, Nizhnegorskiy District, Simferopol' District, Bakhchisaray District, and Kerch Peninsula (Lenino District and Kerch). The list of collected specimens and localities is presented below.

1 ♀, Crimea, Chernomorskoye District, Tarkhankut, 6 km W Krasnaya Polyana, 45º28.965'N, 032º51.381'E, 115 m, 06-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0149-0150-2020) (COGM); 1 ♂, Crimea, Chernomorskoye District, Tarkhankut, Olenevka, 45º23.690'N, 032º32.571'E, 87 m, 06-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0145-0146-2020) (COGM); 1 ♂, Crimea, Chernomorskoye District, Tarkhankut, Dzhangul', 45º28.011'N, 032º31.239'E, 7 m, 06-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0147-0148-2020) (COGM); 2 ♂♂, Crimea, Dzhankoy District, Blizhnegorodskoye, 45º38.357'N, 034º22.438'E, 18 m, 08-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0211-0214-2020) (COGM); 4 ♂♂, Crimea, Dzhankoy District, Pridorozhnoye, 45º47.864'N, 034º26.376'E, 1 m, 08-VII-

2020, O. Gorbunov & K. Efetov leg. (CKAE); 2 ♂♂, Crimea, Dzhankoy District, Pridorozhnoye, 45º47.864'N, 034º26.376'E, 1 m, 08-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0155-0158-2020) (COGM); 2 ♂♂, Crimea, Dzhankoy, Izumrudnoye, 45º47.732'N, 034º22.835'E, 6 m, 08-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0159-0162-2020) (COGM); 3 ♂♂, Crimea, Simferopol' District, Mramornoye, 44º49.646'N, 034º15.499'E, 492 m, 10-VII-2020, O. Gorbunov & K. Efetov leg. (CKAE); 2 ♂♂, Crimea, Simferopol' District, Mramornoye, 44º49.646'N, 03415.499'E, 492 m, 10-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0151-0154-2020) (COGM); 1 ♂, Crimea, Simferopol' District, Skvortsovo, 45º04.898'N, 033º48.367'E, 38 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0143-0144-2020) (COGM); 1 ♂, 1 ♀, Crimea, Saki District, Novoozyornoye, 45º22.892'N, 033º08.817'E, 28 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0163-0166-2020) (COGM); 2 ♂♂, Crimea, Chernomorskoye District, Krasnoyarskoye, 45º30.076'N, 033º15.394'E, 25 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0167-0170-2020) (COGM); 5 ♂♂, Crimea, Razdol'noye District, Kashtanovka, 45º37.243'N, 033º21.166'E, 66 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (CKAE); 2 ♂♂, Crimea, Razdol'noye District, Kashtanovka, 45º37.243'N, 033º21.166'E, 66 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0171-0174-2020) (COGM); 1 ♂, Crimea, Kransnoperekopsk District, Vorontsovka, 45º50.676'N, 033º47.458'E, 2 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0175-0176-2020) (COGM); 1 ♂, Crimea, Pervomayskoye District, Matveyevka, 45º44.907'N, 033º49.087'E, 20 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0177-0178-2020) (COGM); 1 ♀, Crimea, Kerch Peninsula, Kerch, Adzhimushkay, 45º22.691'N, 036º32.332'E, 64 m, 12-VII-2020, P. Ruchko, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0179-0180-2020) (COGM); 2 ♂♂, Crimea, Kerch Peninsula, Kerch, Adzhimushkay, 45º22.935'N, 036º31.283'E, 55 m, 12-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0181-0184-2020) (COGM); 2 ♂♂, Crimea, Kerch Peninsula, Lenino District, Bagerovo, 45º22.809'N, 036º17.091'E, 90 m, 12-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0185-0188-2020) (COGM); 2 ♂♂, Crimea, Kerch Peninsula, Lenino District, Lugovoye, 45º13.840'N, 035º43.271'E, 42 m, 12-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0189-0192-2020) (COGM); 1 ♂, Crimea, Nizhnegorskiy District, Sadovoye, 45º17.492'N, 034º38.909'E, 52 m, 13-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0193-0194-2020) (COGM); 3 ♂♂, Crimea, Krasnogvardeyskoye District, Nekrasovo, 45º25.443'N, 034º16.869'E, 54 m, 13-VII-2020, O. Gorbunov & K. Efetov leg. (CKAE); 3 ♂♂, Crimea, Krasnogvardeyskoye District, Nekrasovo, 45º25.443'N, 034º16.869'E, 54 m, 13-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0197-0202-2020) (COGM); 5 ♂♂, Crimea, Bakhchisaray District, Repino, 44º49.350'N, 033º50.815'E, 210 m, 21-VII-2020, K. Efetov & A. Efetova leg. (CKAE); 2 ♂♂, Crimea, Simferopol', Neapol' Skifskiy, 44º56.791'N, 034º07.073'E, 266 m, 24-VII-2020, K. Efetov & A. Efetova leg. (CKAE).

Beside those localities we can mention three more on the base of the photos of imagines presented by V. V. Savchuk available from http://lepidoptera.crimea.ua/families_frame/frame_1201_Sesiidae.htm: 5 ♂♂, 4 ♀♀, Feodosiya, Kurortnoye, mountain Ashlamalyk, VII-2010; 2 ♂♂, Feodosiya, mountain Tepe-Oba, VII-2011; 1 ♀, Sudak, Vesyoloye, mountain Chatal-Kaya, VI-2012 (this female is determined by V. V. Savchuk as *Ch. dumonti* Le Cerf, 1922).

The Crimean Peninsula can be divided landscape-geographically into three parts (Fig. 5): the Plain region (with steppe vegetation), the Hilly Kerch Peninsula (also steppe) and the Mountain region. The last one is represented by foothill forest-steppe, mountain forests, yayla (mountain meadows) and Southern coast of the Crimea with forests and scrub of sub-Mediterranean type. The Crimean Mountains are situated between Sevastopol and Feodosiya having 180 km in length. They consist of three mountain ridges: the Main ridge (up to 1545 m above sea level), the Internal ridge (up to 738 m above sea level), and the External ridge (up to 344 m above sea level).

According to our data, *Ch. efetovi* is known in the Crimea in Plain region, Kerch Peninsula and in some localities of Mountain region (foothill forest-steppe and eastern part of Southern coast of the Crimea). So far there are no findings of the species in the western part of Southern coast. Apparently *Ch. efetovi* is absent in mountain forests and meadows of the mountain tops (yayla) because of the absence of *Marrubium peregrinum* in these biotopes.

Biology

Ch. efetovi is an univoltine species with an annual life cycle. The larvae of *Ch. efetovi* live in the roots of *Marrubium peregrinum* L. in which they bore tunnels about 5-8 cm long. Pupation takes place in the upper part of the tunnel (the upper part of the root or lower part of the stem). Males of *Ch. efetovi* have alar expanse 16.5-20.5 mm (Figs. 6, 7), females - 16.8-21.0 mm (Figs. 8, 9). Moths are on the wing from the end of June to the second half of July. Imagines have well developed proboscis and can be found feeding on flowers. The species inhabits open biotopes with *Marrubium peregrinum* L.: steppes, abandoned lands, roadsides etc. In some biotopes *Ch. efetovi* can be found sympatrically with *Chamaesphecia* (*Scopulosphecia*) *oxybeliformis* (Herrich-Schäffer, 1846) and/or *Ch.* (*S.*) *dumonti* Le Cerf, 1922. Males of *Ch. efetovi* are active in the late afternoon and can be attracted from 16:30 to 19:00 (local time) to synthetic sex attractants for *S. vespiformis*. On overcast, but not rainy days, activity shifts somewhat towards mid-day.

Differential diagnosis

Ch. annellata species-group is represented in the Crimea by three species, viz. *Chamaesphecia* (*Scopulosphecia*) *efetovi* O. Gorbunov, 2019, *Ch.* (*S.*) *annellata* (Zeller, 1847) and *Ch.* (*S.*) *dumonti* Le Cerf, 1922. These species have different host plants. The larvae of *Ch. efetovi* are living in roots of *Marrubium peregrinum* L., those of *Ch. annellata* - in roots of *Ballota nigra* L., while larvae of *Ch. dumonti* - in different species of the genus *Stachys* (all above mentioned plants belong to the family Lamiaceae). Moreover, *Ch. efetovi* differs well from *Ch. dumonti* and *Ch. annellata* by the size of the transparent areas of the forewing (GORBUNOV, 2019b).

The Crimean species *Ch.* (*S.*) *oxybeliformis* in which the larvae feed in the roots of *Phlomis herba-venti* ssp. *pungens* (Willd.) Maire ex DeFilipps (Lamiaceae) differs from the *Ch. annellata* species-group not only by the host plant but also by morphological characters, especially by the female genitalia (GORBUNOV, 2019b).

Range of *Ch. efetovi*

Russia: Volgograd Region, Stavropol Territory, Crimea; Romania, Bulgaria (GORBUNOV, 2019b). Moreover, two females from Ram (Ramska Pescara, North-East Serbia) reared (ex l.) "ex *Marrubium vulgare*, June 5-16, 1985, leg. and coll. Tosevski", mentioned as *Ch. oxybeliformis* and figured in the thesis of Dr I. Toševski ("Sesiidae fauna of Serbia (Lepidoptera, Dytrisia)", 1991) should refer to *Ch. efetovi*.

Ch. efetovi most probably can be distributed also in adjacent territories, for example, in Moldova, Ukraine, Turkey, and (in addition to Bulgaria and Serbia) in other countries of the Balkan Peninsula (where *Marrubium peregrinim* L. is distributed). The confirmation of this requires further research.

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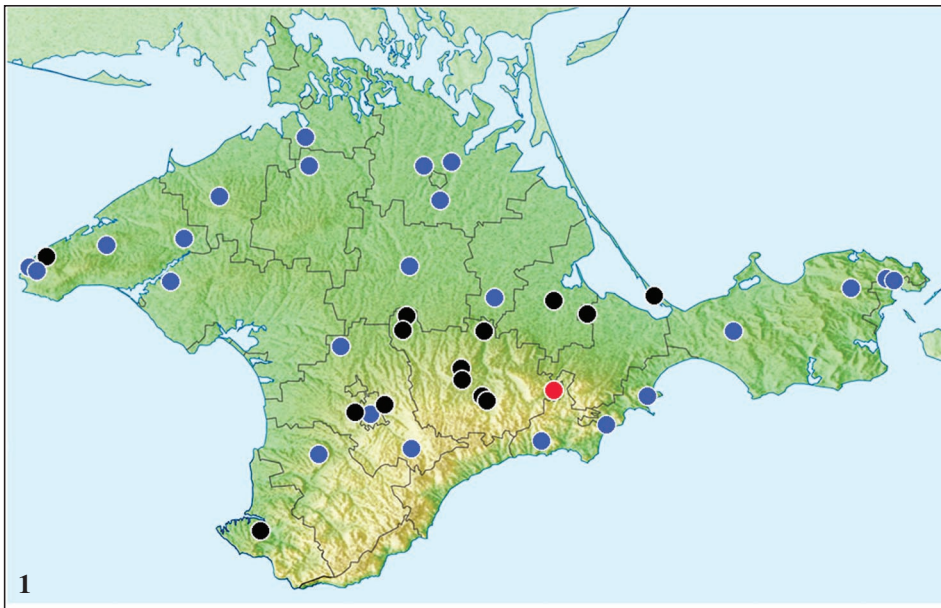
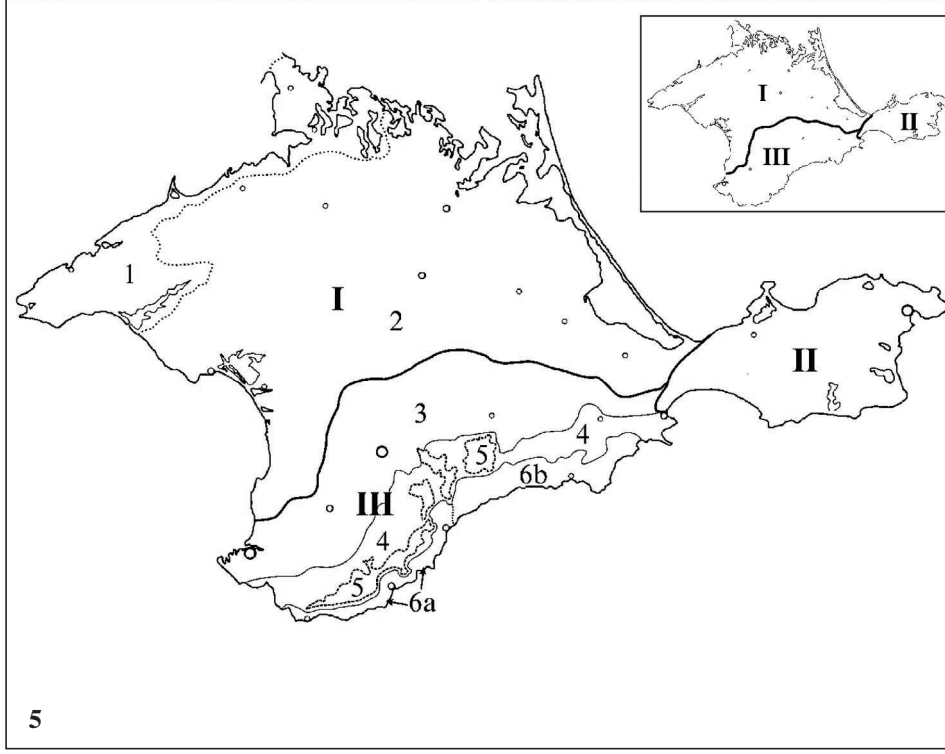
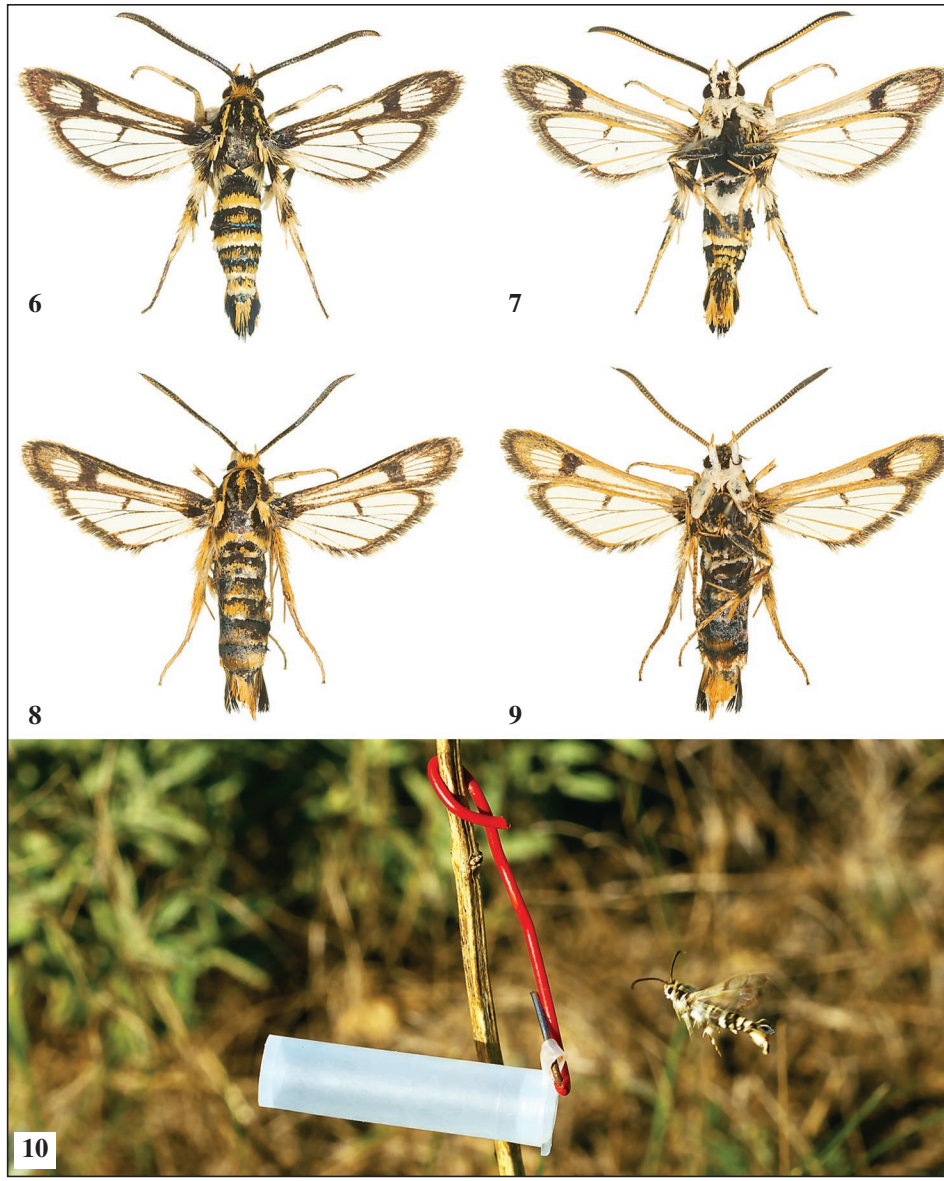


Figures 1-2.– 1. Distribution of *Chamaesphecia efetovi* in the Crimea. Red dot - type locality, black dots - localities mentioned in the original description of *Ch. efetovi*, blue dots - new localities discovered in 2020. **2.** Type locality of *Ch. efetovi*: Crimea, Belogorsk District, 2.8 km NW of Kurskoye, Bor-Kaya, 177 m, photo: K. A. Efetov.



Figures 3-5.– 3. Male of *Ch. efetovi*, Crimea, Bor-Kaya, 8-VII-2017, photo: K. A. Efetov. **4.** *Marrubium peregrinum* L. (Lamiaceae) - larval host plant of *Ch. efetovi*, Crimea, Bor-Kaya, 12-V-2016, photo: K. A. Efetov. **5.** Crimean landscapes (after EFETOV, 2005): I - Plain region (steppe) (1, Tarkhankut and Perekop-Karkinit landscapes, 2, central plain); II - Hilly Kerch Peninsula (steppe), III - Mountain region (3, foothill forest-steppe, 4, mountain forests, 5, yayla, mountain meadow steppe, 6, Southern coast of the Crimea (forests and scrub of sub-Mediterranean type): 6a, western part, 6b, eastern part).



Figures 6-10.– *Ch. efetovi*. **6-7.** Male. Russia, Crimea, Simferopol' District, Mramornoye, 44º49.646'N, 034º15.499'E, 492 m, 10-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0153-0154-2020). Alar expanse 17.8 mm (COGM). **8-9.** Female. Russia, Crimea, Saki District, Novoozyornoye, 45º22.892'N, 033º08.817'E, 28 m, 11-VII-2020, O. Gorbunov & K. Efetov leg. (SESIIDAE pictures NºNº 0163-0164-2020). Alar expanse 19.2 mm (COGM). **10.** A male attracted to artificial sex pheromone. Russia, Crimea, Razdol'noye District, Kashtanovka, 45º37.243'N, 033º21.166'E, 66 m, 11-VII-2020. Photos: O. G. Gorbunov.