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Short Communication

## First Records of the Walnut Shield Bearer *Coptodisca lucifluella* (Clemens, 1860) (Lepidoptera: Heliozelidae) in Bulgaria

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**Abstract:** The North-American walnut shield bearer *Coptodisca lucifluella* is reported as a new species for the fauna of Bulgaria. The species was detected on the common walnut *Juglans regia* at 36 localities in the urban and suburban areas in Bulgaria, at altitudes from 25 to 925 m a.s.l. During the period October – November 2019, the species was recorded in the following regions: the Black Sea coast, the Danube Plain, Predbalkana Mountains, Western Stara Planina Mountains, Zadbalkanski Kotlovini Plain, Sredna Gora Mountains, Upper Thracian Plain, the Western Rhodope Mountains, the Middle Struma River Valley, Osogovo Mountains, and Pirin Mountains. The moth is likely to be more widespread than recorded throughout Bulgaria, as it was collected at all localities surveyed. Most probably the moth has been introduced in Bulgaria by walnut plants imported for planting

**Key words:** Alien, distribution, invasive species, leafminer moth, pest on *Juglans regia*.

### Introduction

Thirteen species from Heliozelidae are known to occur in Europe (VAN NIEUKERKEN et al. 2018, TAKÁCS et al. 2020), among which is the walnut shield bearer *Coptodisca lucifluella* Clemens, 1860 (Lepidoptera: Heliozelidae). This North-American leafminer was recorded for the first time in Europe in 2010, from Italy, both on black walnut (*Juglans nigra* L.) and common walnut (*Juglans regia* L.) (Juglandaceae) (BERNARDO et al. 2011, 2012, 2015). In 2017, *C. lucifluella* was reported from Hungary (TAKÁCS et al. 2017), where it has been found in more than 100 localities (SZABÓKY & TAKÁCS 2018).

The leafminers from Heliozelidae are poorly studied in Bulgaria. Only four species are recorded until now: *Antispila treitschkiella* (Fischer von Röslerstamm, 1843) (TSCHORBADJIEV 1915, 1919, DRENOWSKY 1921, 1930, TULESCHKOV & SLIVOV 1975, BEIGER 1979, BUSZKO & BESHKOV 2004,

PERE et al. 2010, VAN NIEUKERKEN et al. 2018); *Antispila metallella* (Denis & Schiffermüller, 1775) (VAN NIEUKERKEN et al. 2018); *Holocacista rivillei* (Stainton, 1855) (NEDELTCHEFF 1930, DRENOWSKY 1930); and *Heliozela sericiella* (Haworth, 1828) (TSCHORBADJIEV 1915, 1919, DRENOWSKY 1930).

During a survey for early detection of alien insect species in Bulgaria, mines with larval holes were observed on the common walnut (*Juglans regia* L.) in Northern Bulgaria on 5th October 2019. This communication reports *C. lucifluella* as a new species to the fauna of Bulgaria.

### Materials and Methods

The field surveys were conducted during the period October – November 2019 in most of the geographical zones of Bulgaria: the Black Sea coast, the Danube Plain, Predbalkana Mountains, Western Stara Planina Mountains, Zadbalkanski Kotlovini

Plain, Sredna Gora Mountains, the Upper Thracian Plain, the Western Rhodope Mountains, the Middle Struma River Valley, and the mountains of Osogovo and Pirin.

Visual observations of walnut trees in the urban areas and the walnut orchards were conducted. The active mines detected were collected and reared. The adult emergence from pupal cases collected in October – November was forced in December by placing the cases at room temperature. As a result, 14 adult specimens were reared. The adult insects were determined following the morphological description provided by BERNARDO et al. (2015). The material was deposited in the author's collection at the University of Forestry, Sofia.

## Results

Material examined: /i/ the Black Sea coast: Varna, 30 m, larval holes, 11.10.2019, Burgas, 25 m, larval holes, 12.10.2019, Obzor, 35 m, larval holes, 12.10.2019, Byala, 42 m, larval holes, 11.10.2019, Banya, 190 m, larval holes, 11.10.2019; /ii/ the Danube Plain: Targovishte, 180 m, **larvae**, 11.10.2019, Lom, 50 m, larval holes, 24.10.2019, Dulovo, 230 m, **larvae**, 11.10.2019, Gorni Dubnik, 140 m, **larvae**, 5.10.2019, Borovan, 162 m, larval holes, 24.10.2019, Gabrovnitsa, 360 m, **larvae**, 24.10.2019; /iii/ Predbalkana Mountains: Brestnitsa, 320 m, **larvae**, 10.10.2019, Montana, 150 m, larval holes, 24.10.2019, Veliko Tarnovo, 220 m, larval holes, 11.10.2019, Sevlievo, 190 m, **larvae**, 10.10.2019, Vratsa, 390 m, larval holes, 24.10.2019, Troyan, 380 m, **larvae**, 10.10.2019; /iv/ the Western Stara Planina Mountains: Berkovitsa, 390 m, **larvae**, 24.10.2019, Pravets, 425 m, larval holes, 24.10.2019; /v/ Zadbalkanski Kotlovini Plain: Sofia, 550 m, larval holes, 22.10.2019, Karlovo, 420 m, larval holes, 21.11.2019, Kliment, 373 m, larval holes, 21.11.2019, Karnobat, 262 m, larval holes, 12.10.2019, Kostinbrod, 540 m, larval holes, 24.10.2019; /vi/ Sredna Gora Mountains: Ihtiman, 630 m, larval holes, 14.10.2019, Borika, 848 m, **larvae**, 14.10.2019; /vii/ the Upper Thracian Plain: Karabunar, 350 m, larval holes, 17.10.2019, Plovdiv, 160 m, larval holes, 17.10.2019, Kaloyanovo, 220 m, larval holes, 21.11.2019; /viii/ the Western Rhodope Mountains: Asenovgrad, 269 m, larval holes, 17.10.2019; /ix/ the Middle Struma River Valley: Blagoevgrad, 430 m, larval holes, 7.11.2019, Simitli, 300 m, larval holes, 7.11.2019; /x/ Osogovo Mountains: Kyustendil, 525 m, larval holes, 22.10.2019; /xi/ Pirin Mountains: Bansko, 925 m, larval holes, 7.11.2019.

The adults obtained from the reared pupal cases were determined as the walnut shield bearer *Coptodisca lucifluella*. This species is a tiny leafminer moth with a forewing colour pattern presented in Fig. 1a. The structure of the male genitalia is presented in Fig. 1b.

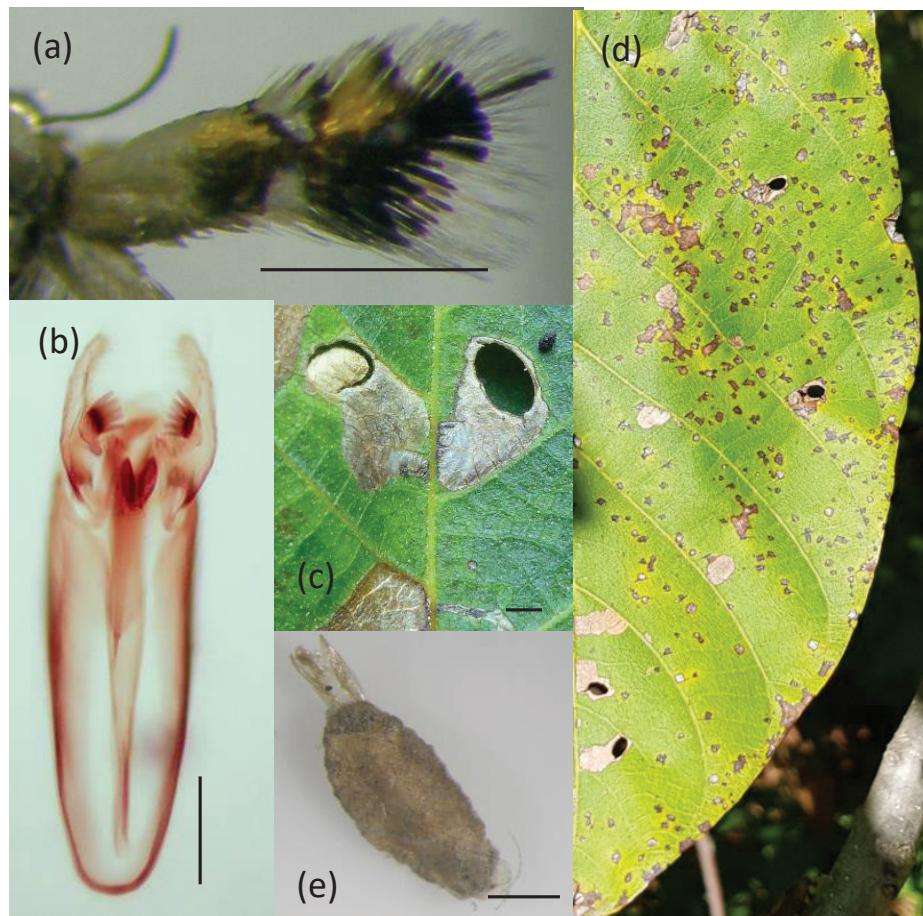
The larva makes a blotch-mine, which is noticeable on both sides of the leaf (Fig. 1c). Before pupation, the larva cuts out a characteristic oval hole from the leaf (Figs. 1c,d) to construct a flat, oval case by cutting a disc from the upper and lower epidermis of the mine and joins them with silk to form a cocoon (Fig. 1c). Then it crawls away with this case to the branches or to the trunk (DAVIS 1998, SZABÓKY & TAKÁCS 2018). The pupal exuvium protrudes from the case upon eclosion (Fig. 1e).

*Coptodisca lucifluella* was detected on the common walnut *J. regia* at 36 localities in the urban and suburban areas of Bulgaria (Fig. 2). The localities where *C. lucifluella* was found in Bulgaria are situated at altitudes from 25 to 925 m a.s.l.

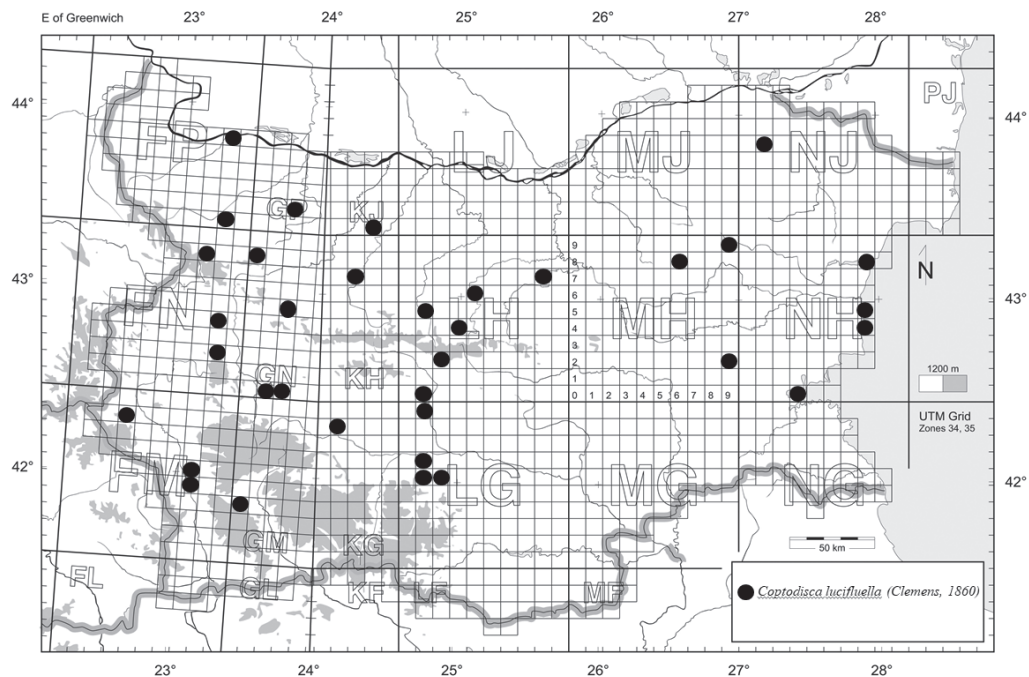
## Discussion

The leafmine produced by *C. lucifluella* is easily distinguishable from that produced by *Caloptilia roscipennella* (Hübner), which is the only leafminer that attacks *J. regia* in Bulgaria (TRENCHÉV & TOMOV 1996) and Europe (BERNARDO et al. 2015). The mines produced by *Caloptilia roscipennella* are completely different in shape (ELLIS 2014).

*Coptodisca lucifluella* appears to be widespread throughout Bulgaria. Its current distribution is likely to be more widespread than recorded, as it was collected at all localities surveyed. Because of the currently wide distribution it is likely that *C. lucifluella* arrived in Bulgaria several years ago. Many walnut orchards have been created in the recent years in Bulgaria and probably the moth has been introduced by walnut plants imported for planting. Depending on the sampling year, at least three or four generations are recorded annually in Italy (BERNARDO et al. 2012). In Hungary the species is presumably bivoltine (SZABÓKY & TAKÁCS 2018). Since the survey of the distribution of the species in Bulgaria started in October, mainly larval holes were observed and only a few active insect stages (larva present and feeding) were found. Having in mind the fact that the moth was detected in different climatic zones and altitudes in Bulgaria two – three generations could be expected. In Italy the damages, even with a high percentage of infestation, do not seem economically important, due to the small size of the insect and its mines. However, the



**Fig. 1.** *Coptodisca lucifluella* (Bulgaria, 2019): (a) Forewing, scale bar 1 mm; (b) Male genitalia with a phallus in a ventral view, scale bar 100 µm; (c) Different stages of the mines – an early stage, with an oval case, and a later stage with a cut hole, scale bar 1 mm; (d) Leaf of the common walnut *Juglans regia* with larval holes; (e) Pupal exuvium protruding from the case upon eclosion, scale bar 1 mm.



**Fig. 2.** Distribution of *Coptodisca lucifluella* in Bulgaria (2019). The UTM Grid template used is after ABADJIEV (2001).

damages caused by the leafminer could be used by pathogens to introduce themselves inside the leaves (BERNARDO et al. 2015). Therefore, considering the widespread presence of this walnut shield bearer in Bulgaria further studies of the impact of this species on walnut orchards should be carried out.

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