



## THE FIRST RECORD OF *DOLICARTHRIA STIGMOSALIS* (HERRICH-SCHÄFFER, 1848) IN SLOVAKIA (LEPIDOPTERA, CRAMBIDAE)

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**Abstract:** *Dolicharthria stigmosalis* (Herrich-Schäffer, 1848) has been found in Slovakia for the first time. The species was found in southwestern Slovakia in the Holuby's forest steppe (Slovak: Holubyho lesostep) (Pezinok env.) in June 2016. The specimens were fluttering several square meters around an oak – *Quercus dalechampii* Ten., or landing on the flowers of a wild privet – *Ligustrum vulgare* L. Consequently, the previously unknown preimaginal stages were obtained, observed and documented.

**Key words:** *Dolicharthria stigmosalis*, Lepidoptera, Crambidae, Slovakia, preimaginal stages, bionomics.

### INTRODUCTION

According to the current checklist of the lepidoptera of Slovakia (PASTORÁLIS et al. 2013), *D. stigmosalis* is not recorded in the fauna of Slovakia. It was found there for the first time in the Holuby's forest steppe (Pezinok env.) in June 2016. The lack of knowledge of the species bionomy provided reasons for the research, and consequently for observing the behaviour of preimaginal stages connected with oviposition of the captured females. The individual life cycle was photographically documented.

**Diagnostic characteristics:** Black, slightly bigger but slimmer than *Pyrausta coracinalis* (Lerout, 1982). The wing is slightly brighter with significantly darker posterior crossline. The frons, palps and collar have white bottoms (HERRICH-SCHÄFFER 1847–1855). The moth belongs to the Crambidae family, subfamily Spilomelininae, genus *Dolicharthria* Stephens, 1834. Only 6 species of this genus are known in Europe, 2 of them in Central Europe (Lepiforum e.V.). In Slovakia *Dolicharthria punctalis* ([Denis & Schiffermüller], 1775) is present as well and was observed at the locality too, however, three weeks later than *D. stigmosalis*. It is possible to clearly distinguish *D. stigmosalis* from related species. In comparison to *D. punctalis*, it is smaller, darker and with identically distinctive spots on forewings as well as on hindwings.

**Bionomics:** The adults are on wing from May to August. The larva is not known (SLAMKA 2010).

**Distribution:** In his work from 1847–1855 Herrich-Schäffer indicates Constantinople (Turkey, Istanbul) as the type locality. The species has been found in France, Austria, Hungary, Croatia, Greece, Republic of Macedonia, Bulgaria, Romania, Ukraine and Turkey (Wikipedia, The Free Encyclopedia). According to SLAMKA (2010), it is a predominantly southern European species, as well as from Asia Minor. It is very rare in Central Europe, only known from Hungary, near Budapest (Svábhegy) and near the Balaton lake (Fövenyes) (BUSCHMANN 2005), Lower Austria, Western Ukraine (Chernelitsa), and it was also recorded from Romania. According to accessible internet sources, the species inhabits Crimea (lepidoptera.crimea.ua) and the European part of Russia – Krasnodarsky krai (Abrau Dyurso) and Rostov oblast (Rostov-on-Don) (macroid.ru).

## MATERIALS AND METHODS

The research material from the Holuby's forest steppe locality consists of 29 specimens, of which 14 are males and 15 females. The specimens were obtained on the following dates: 2 June 2016, 4 June 2016 and 2 June 2017. They were taken as adults, either using a net, collecting on flowers right to plastic containers or attracting them to UV light trap. The genitalia were dissected in the usual way and the temporary preparations in glycerin were made.

**Photographic documentation:** Photos of the habitat and a female sitting on a flower were taken with mobile phone Huawei P9 camera, including the video of a flying moth. Photographs of the egg, young and adult larva, prepupa, pupa, cocoon and prepared specimens were taken with Canon EOS 6D with Macro Photo Lens MP-E 65mm at 1:1 – 5:1, using Aputure Amaran Halo HC100 ring flash. Photo of the head also with the same lens at 4.5:1, but the head was illuminated with Fomei Terronic Basic 400P diffused flash, 1/160 sec, f/6.3, ISO 100. Photos of the scales and antenna were taken with a DM-10 monocular digital microscope with 400x and 100x magnification. Genitalia photos were taken with combination of mentioned macro lens and the microscope using a 4x objective and a 10x ocular (for the details of aedeagus and uncus a 10x objective and a 10x ocular). All the macrophotos were edited using the software Zerene Stacker 1.04 and Adobe Photoshop CS5.

## RESULTS AND DISCUSSION

**Occurrence in Slovakia:** *D. stigmosalis* (Slovak: viačka stigmatizovaná) has been found in Slovakia for the first time. The species was found in southwestern

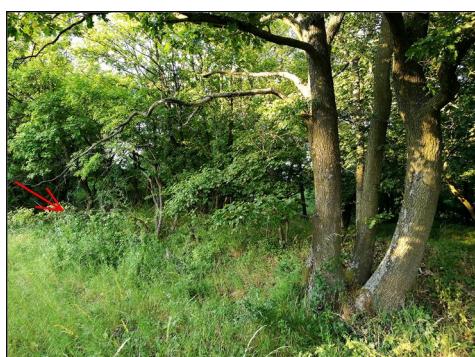
Slovakia in the Holuby's forest steppe, near Vinosady (Pezinok env.) on 2 June 2016, 6.50 PM. That evening was warm and it was drizzling. An unusually high activity of insects in the locality was observed. The first specimens were observed pollinating the flowers of a wild privet – *Ligustrum vulgare* L.. Many more specimens (dozens) were fluttering several meters further, around an oak – *Quercus dalechampii* Ten., near the ground above the vegetation. Nearly



**Fig. 1.** *Dolicharthria stigmosalis*, female sitting on a flower.



**Fig. 2.** Habitat, undergrowth around the oak, heliophilic activity of *Dolicharthria stigmosalis*.  
[\[www.youtube.com/watch?v=OWaHvMAIJq8\]](https://www.youtube.com/watch?v=OWaHvMAIJq8)



**Fig. 3.** Habitat with *Quercus dalechampii* and *Ligustrum vulgare* (arrow).



**Fig. 4.** Habitat, location of highest activity of *Dolicharthria stigmosalis*.

all specimens were males (significantly damaged). The observation was carried out until dawn, when their activity decreased. The moths were flying in a radius of only several square meters. The second day of the observation (4 June 2016) was very hot and sunny. Specimens of *D. stigmosalis* were observed between four and five in the afternoon until a thunderstorm started and the temperature decreased from 26 to 16 °C. Even though similar types of biotopes occurred in the locality, the species was not found elsewhere. The crambid moths showed heliophilic activity, meanwhile the number of flying males and females was approximately the same, however, less than two days ago. Apart from landing on flowers during observation, they were only sporadically landing on the bottom of leaves in the vicinity of their native oak. A year later, on 2 June 2017, the moths were observed again in the evening hours fluttering around the oak. In contrast to the previous year, several specimens were seen visiting the flowers of *L. vulgare* on neighbouring meadows too. However, a similar oak with an activity of the crambid moths was not found. Another difference was that the flowers were being pollinated nearly exclusively by undamaged females after they had been hatched (Fig. 1). On the same day an attraction to UV light trap near the oak, which was the location of their highest activity, was performed. The male and female specimens were attracted individually until 10.30 PM and their ratio was 1:1. The flight period in the locality appears to be at the beginning of June, probably end of May as well, and possibly extends to mid-June. By the end of June the imagines were not present in the locality any more. By that time the closely related species of *D. punctalis* appeared there. The moths fly low above ground, with slow flight and higher wingbeat frequency (Video, below Fig. 2).

**Observation of captured specimens:** The specimens were acquired with the aim of gaining knowledge of the habitual features of their preimaginal stages and the way of life of the larvae. The females were placed in transparent plastic containers with the purpose of their oviposition. The impulse for the oviposition was provided by inserting a slightly dew-dampened lichen and decomposing leaves. Initially, the females were crawling over them, drinking water and searching with their ovipositors for an appropriate spots for laying eggs. The eggs were laid individually and mostly into the crevices in the lichen, consequently onto the leaves and less frequently onto the walls of the plastic container. The oviposition occurred predominantly at night. The oviposition process is relatively complicated compared to other species. It appears as if the female were forming the future shape of the egg by moving the end of its abdomen. The shape of the egg depends on the surface area where it will lay onto. The egg in the lichen crevices and in the corners of the container was larger, whereas on the flat surface it was flatter (Figs. 5, 6). It is

rather fragile and will collapse upon a gentle touch. It has an oval shape, meanwhile one side is pointier with a diameter of the longest part around 0.64 mm. The colour is grey-white with a soft surface structure. The larvae hatch within 7 days at room temperature. They feed on decomposing leaves of plants, especially the oak. They are lucifugal and hygrophilous. They live freely in soft tissue under decomposing leaves. In case they are exposed to light, they



**Fig. 5.** *Dolicharthria stigmosalis*, egg in a lichen crack.



**Fig. 6.** *Dolicharthria stigmosalis*, egg on a leaf.

immediately crawl under the leaves. They perish within a few hours in dry environment. The seven-day-old larvae are approximately 3 mm in length (Fig. 7). The young larvae are shiny, transparent with a purple colouring along the centre of their body. Adult larvae are yellowish grey-white with a dark line along their back where a haemolymph movement is visible (Fig. 9). The head, the spiracles and bases of the prolegs are orange, the part behind the head brownish (Fig. 8). The first two segments show a pair of grey patches on top and several more patches on the sides. The indents between the individual segments are dark. The body is covered with setae. There is one seta on the



**Fig. 7.** *Dolicharthria stigmosalis*, young seven-day old larva (length 3mm).



**Fig. 8.** *Dolicharthria stigmosalis*, detail of the head of the larva.

bottom of each segment on both sides, three setae on the sides above the prolegs, two setae between the prolegs and the spiracles, one long seta above the spiracles (on the side of the body), two setae on the top of the body on both sides. The setae are growing in a circular form from the thoracic legs around each segment, thus creating three rings. The head is covered with several thin setae. Adult larvae are 17 mm in length. Before pupating, they shorten and thicken slightly (Fig. 10). They move for a long time until they find a suitable spot for pupating. They create a tight and relatively firm cocoon 9



**Fig. 9.** *Dolicharthria stigmosalis*, adult five-week old larva (length 17mm).



**Fig. 10.** *Dolicharthria stigmosalis*, larva before pupating.

mm in size, into which they stick the remnants of leaves (Figs. 11, 12, 13). Inside, in a few days, they turn into a pupa which is 7.75 mm in length. On its ventral side there is a marked part where the legs, antennae and proboscis are developing (Fig. 15). From the last segment of the pupa (anal area, cremaster) 4 pairs of hooks grow, which are bent at the end, meanwhile the medial pair of hooks has split ends (Fig. 14). The egg development takes 1 week at room temperature, the larva development 5 weeks. The pupae probably hibernate. The wingspan of the male specimens is 16.9–18.6 mm, the female specimens have a wingspan of 16.1–17.9 mm. On average, the male specimens of the studied material are larger than the females. The sexual dimorphism is related mainly to the shape of wings, shape and thickness of antennae and the length



**Fig. 11.** *Dolicharthria stigmosalis*, prepupa in the cocoon, seen from below.



**Fig. 12.** *Dolicharthria stigmosalis*, prepupa in the cocoon, seen from the side.



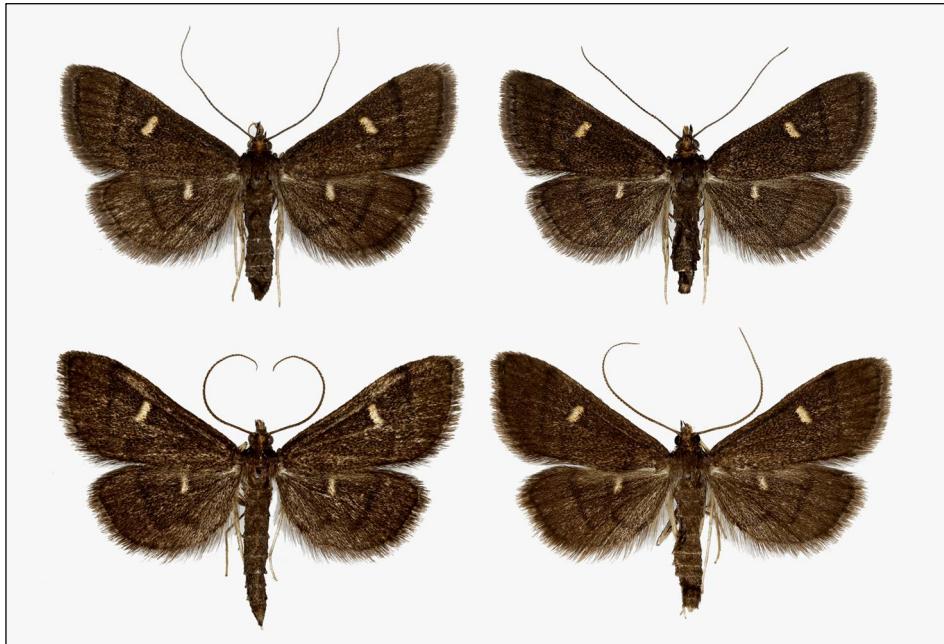
**Fig. 13.** *Dolicharthria stigmosalis*, cocoon.



**Fig. 14.** *Dolicharthria stigmosalis*, pupa, the last segment with growing pair of hooks (detail).



**Fig. 15.** *Dolicharthria stigmosalis*, pupa, ventral part (above) and lateral part (below).



**Fig. 16.** *Dolicharthria stigmosalis*, prepared females (above) and males (below).



**Fig. 17.** *Dolicharthria stigmosalis*, detail of the head ( $\delta$ ).

**Fig. 18.** *Dolicharthria stigmosalis*, detail of the scales (spot on forewing, ♀, 400x magnification).



**Fig. 19.** *Dolicharthria stigmosalis*, detail of the antenna ( $\varphi$ , 100x magnification).

of abdomen (Fig. 16). It was found that the size of the head in antero-posterior direction (up to the end of palps) is 1.7 mm and the eye diameter is 0.56 mm (Fig. 17). The scales on forewing and antenna were displayed (Figs. 18, 19) as well

as the preparations of male and female genitalia with the details of aedeagus and uncus (Fig. 20).



**Fig. 20.** *Dolicharthria stigmosalis*, female genitalia (above) and male genitalia (below, with details of aedeagus and uncus).

**Character of the locality:** The Holuby's forest steppe belongs to one of the few preserved natural xerothermous locations of the southeastern part of the Small Carpathians in the middle of intensively exploited vineyards. It is significant for its great preservation of habitats, its number of xerothermous communities and rich diversity in plant species. The xerothermophilous flora is observed on the xerothermous site of the Holuby's forest steppe, in mainly natural grass communities and thermophilous oak forest margins, on a shale bedrock, on Haplic Cambisol and Anthropic Regosol soil types. 280 species of vascular plants (Cormobionta) were identified here, 240 of which are grasses, 40 trees and bushes, 14 of which belong to rare or endangered species and 9 to protected species of the Slovak flora. Also a wider variety of synantropic species and planted unnatural woody species occur on the Holuby's forest steppe, which is connected to the agriculture in the surrounding vineyards and on the plots of owners (BUDINSKÁ 2000).

## CONCLUSION

*D. stigmosalis* has been recorded in Slovakia for the first time. According to the limited area of the discovery site of the moth in the Holuby's forest steppe locality, where the species was observed with high abundance only within a few square meters, it is to be assumed that the species has high ecological demands and is able to survive in locations under strictly specific conditions. The habitat is located on the edge of a forest belt, namely between the oak and the wild privet bushes in the vicinity of a meadow which is cut in a rotation system by leaving uncut strips throughout the year. *Quercus dalechampii* and *Acer campestre* L. predominate in the forest vegetation. The oak with varied herbaceous undergrowth in its surroundings grows in the centre of the habitat. It is probable that exactly here, in the plant detritus, the larvae find ideal conditions for their development. An advantage for the imagines is the fact, that during flight period, the *ligustrum* blooms and thus serves as their food source. It was found that the species is on wing in the locality during sunny weather, slight drizzle, when it is humid, but also at night when the males and females were attracted individually to a UV light trap. Knowledge of ways of life and pupating of the larva was obtained. Description of the larva with the number and location of growing setae was documented. Detailed photographs of the prepupa and pupa with significant features in the last segment which were standing out at high magnification were figured. Measurements of the wingspan, head and eye were performed on the prepared specimens. Preparations of male and female genitalia were made and displayed, as well as the details of the scales and antenna.

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