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***SYNANTHEDON THERYI* LE CERF, 1916 (LEPIDOPTERA: SESIIDAE) ON THE COAST OF NORTHWESTERN ISTRIA**

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Abstract – New faunistic data on the distribution of the clearwing moth species *Synanthedon theryi* Le Cerf, 1916 are given. The species was first recorded in Slovenia by M. Kastelic on 6.9.2015 in Škocjanski zatok. Between 18 June and 26 August 2017, altogether one hundred and twenty-eight males were trapped in pheromone traps at all research locations in the Slovenian coastal area. Some exuvia, larvae and cocoons were also collected. *S. theryi* is an allochthonous species and is new to the fauna of Slovenia. It has also been found on the Italian side of the border. Its discovery, distribution and biology are described.

KEY WORDS: Sesiidae, *Synanthedon theryi*, Slovenia, Istria.

Izvilleček – STEKLOKRILEC *SYNANTHEDON THERYI* LE CERF, 1916 (LEPIDOPTERA: SESIIDAE) NA OBALI SEVEROZAHODNE ISTRE

Podane so nove favnistične informacije o razširjenosti steklokrilca vrste *Synanthedon theryi* Le Cerf, 1916. V Sloveniji je vrsto prvič zabeležil M. Kastelic 6. 9. 2015 v Škocjanskem zatoku. Med 18. junijem in 26. avgustom 2017 je bilo ujetih skupno sto osemindvajset samcev v feromonske pasti na skoraj vseh krajih raziskovanja na slovenskem obalnem področju. Zbranih je bilo tudi nekaj eksuvijev, ličink in kokonov. *S. theryi* je alohtona vrsta in je novost za favno Slovenije. Najdena je bila tudi na italijanski strani meje. Podan je opis njenega odkritja, razširjenost in biologija.

KLJUČNE BESEDE: Sesiidae, *Synanthedon theryi*, Slovenija, Istra.

Introduction

During recent research of the Sesiidae fauna of Slovenia, *S. theryi* was collected as the 18th confirmed species of the genus *Synanthedon* in this country (own data). It

is not listed in the check list of Slovenian Microlepidoptera (Lesar & Govedič, 2010). It is morphologically most similar to *Synanthedon vespiformis* (Linnaeus, 1761), one of the widely distributed species in the country (author's unpubl. data). *S. theryi* have so far had a Western Mediterranean distribution, limited to stands of its host plant, various species of tamarisk (*Tamarix* spp.). Until recently, it was known from restricted areas of Algeria, Morocco, Portugal, from the Balearic Islands and from Spain (Laštůvka & Laštůvka, 2001), where it is probably widespread (Laštůvka & Laštůvka, 2014). Recent discoveries have shown its prevalence in Atlantic and Mediterranean regions of France and in Corsica (Lepinet.fr, 2016, online). In Italy, *S. theryi* was not listed by Bertaccini & Fiumi (2002). However, M. Mossenta (2016, online) found one specimen in 2015 near Palmanova in the Friuli-Venezia Giulia region (Lepiforum, 2016, online; D. Bartsch, e-mail communication), not far from the sites of the new finds mentioned in this publication. According to D. Bartsch, *S. theryi* and its host plant may have been introduced into northern Italy together with imported garden *Tamarix* plants. In the same year Miroslav Kastelic (Animalia, 2016, online) found and photographed the first known specimen of this species in the natural reserve of Škocjanski zatok in the Slovenian coastal area. Further research has shown that the species is relatively common in this part of the Adriatic coast and recent finds of the species in Muggia near Trieste confirm its presence in northern Italy. It seems that *S. theryi* had spread its area of distribution from the west to the southeast, towards the Dalmatian coast.

Abbreviations: m a.s.l.: meters above sea level, pher. trap: pheromone trap, pher. old api: pheromone old apiformis, ♂: male.

Methods

Two methods of the work were used to explore the fauna in the field. One was the traditional method of searching for old exit holes, remains of cocoons, exuviae and feeding traces of larvae under the bark of the trunks and in branches of trees and bushes of *Tamarix* sp. (Tamaricaceae). The second was the method of attracting males to the most suitable synthetic pheromones, which were placed directly in the field and in pheromone traps. In addition to certain other factors, the success of directly placed pheromones strongly depends on the relevant weather conditions in the field, which were sometimes too windy during the time of the research. Special emphasis was given to working with pheromone traps as the most effective way for fauna research, which enables more comprehensive detection and research of local populations, their phenology and population dynamics. Pheromone traps were baited with pheromones originally developed for *Sesia apiformis* (Clerck, 1759), in this article under the name old apiformis and produced by Plant Research International (PRI) in Wageningen, The Netherlands. Pühringer & Ryrholm (2000) highly recommended old apiformis pheromones containing Z3,Z13-18:OH as the sole component for *S. theryi*. Each pheromone was placed singly in transparent plastic delta glue traps (RAG-Trap), which had an exchangeable bottom coated with the sticky material

poliizobutilen, and in funnel plastic traps (UNI-Trap) with poison (TUS). Traps were hung at selected localities with common *Tamarix* sp. trees and bushes, sometimes on single trees, on various ruderal sites, and were fixed to tree branches at heights of 1.5 m to 3 m above the ground. One to seven traps were placed at each locality, with a distance of 2-25 meters between each. Specimens trapped in delta traps were later soaked in clean gasoline and prepared. Captured and reared specimens were identified by analysis of their external morphological characters. Representative specimens have been deposited in the private collection of the author. The nomenclature used is according to Laštůvka & Laštůvka (2001).

Biology and Phenology

There is not much reported about *S. theryi* in the literature. The host plants of oligophagous larvae are various *Tamarix* species (Tamaricaceae). According to Jogan (2001), *T. gallica* L. and *T. dalmatica* Baum. grow in the Slovenian coastal area. Larvae, often several of them together, live one year in the trunks and branches, especially in damaged places. Their presence is sometimes observable externally from traces of excrement in the bark. During its one-year development, the larva forms a short, broad and flat tunnel between the bark and the wood, where it pupates in a cocoon of saw-dust and silk beneath the bark. The flight season of adults occurs from May to



Fig. 1: Male resting on the trunk of *Tamarix* sp. Koprsko primorje, near Ankaran, 23.7.2017.



Fig. 2: Micro-habitat of the species on the beach. Muggia/Milje, San Rocco, 23.7.2017.

September (De Freina, 1997; Špatenka et al., 1999; Laštůvka et al., 2000; Laštůvka & Laštůvka, 2001, 2014; Lepinet.fr, 2016, online). According to Pühringer & Ryrholm (2000), males respond to pheromones between 11.00 to 16.00 h. Results in the Slovenian coastal area confirmed the high efficiency of the pheromone old apiformis for *S. theryi*. Males were caught in the traps between 9.45 am to 13.30 pm, on free hanging pheromones, between 11.40-12.57 h. The species was present throughout the whole research period, from 18.6. until 26.8.2017; and taking into account the first find on 6.9.2015, up to early September. Judging by the number of trapped males, the peak of activity was determined as being between late July and early August.

Results and Discussion

The investigated coastal area lies in the most northwestern part of the Istrian peninsula in the gulf of Trieste/Trst, in the northeast Adriatic Sea. The most important criterion in selecting research sites was the presence of Tamarisk (*Tamarix* spp.). The investigated area was divided into four research sites. Three of them, Koprsko primorje, Strunjan and Sečovelje salt pans, cover the Slovenian coast in its entire length. The fourth was on the Italian side of the state border, in Muggia bay. A total of twenty traps of both types baited with old api pheromone lures were

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Fig. 3: Males of *S. theryi* in a delta pheromone trap RAG. Muggia/Milje, San Rocco, 23.7.2017.



Fig. 4: Micro-habitat of the species in Sečovlje saltpans, 10.8.2017.



Fig. 5: Male of *S. theryi* in funnel pheromone trap UNI. Koprsko primorje, near Ankaran, 10.7.2017.

hung across the entire research area. Traps were examined differently, during the same day on examination and after one to nine days (mostly early in the afternoon), between 18.6. and 26.8.2017. Some exuviae, old cocoons and larvae were also found.

1. Koprsko primorje. The first research site was the largest and, at the same time, the most explored area in the two and a half months of research. It covered a four-kilometer wide part of the coastal flat in the hinterland of the port city of Koper, comprising the territory along the channel of the Rižana river near Ankaran over Bonifika, with the northernmost and southern edge of the natural reserve of Škocjanski zatok on the periphery of Sermin. In the periods between 18.6. and 5.8. and 15.-26.8.2017, a variable number up to a maximum of twenty traps of both types together were hung at a maximum of ten selected locations with groups or single trees of *Tamarix* spp., such as various ruderal sites along the roads, near the edges of a swamp, fields and parking lots, on construction sites and landfills. On 10.7. some of the traps were moved to the next trap locations along the coast. Trapped male specimens were recorded at seven locations, with a distance of four kilometers between the two most distant locations. In a number of cases, numerous males of the clearwing species *Bembecia ichneumoniformis* ([Denis & Schiffermüller], 1775), less of *Pyropteron chrysidiformis* (Esper, 1782), and in one case *S. vespiformis* were trapped together with males of *S. theryi* in the same pheromone traps, baited with pheromone old api. Other clearwing species that we found in the same area were *S. apiformis*, *Paranthrene tabaniformis* (Rottemburg, 1775), *Synanthedon formicaeformis* (Esper, [1783]), *S. melliniformis* (Laspeyres, 1801), *S. myopaeformis* (Borkhausen, 1789), *Bembecia pavicevici* Toševski, 1989 and *B. uroceriformis* (Treitschke, 1834).

2. Strunjan. The next research site covered the edges of Strunjan lagoon Stjuža, and saltpans in Strunjan landscape park. Five pheromone traps of both types were hung at three selected locations on the coast in the time between 10. 7. and 5.8.2017.

3. Sečovlje. This is by far the southernmost research site of *S. theryi*, separated by a distance of 31 km from the most northerly site of finds in Muggia/Milje. It covered the edge of the Sečovlje saltpans (Lera) in Sečovlje landscape park in Piran bay, not far from the border with Croatia. Seven pheromone traps of both types were hung in the time from 10.7.-5.8.2017, at two selected locations along a bike path and the marshy edges of the salt pans with groups of *Tamarix* sp.



Fig. 6: This-year's exuviae with a cocoon under the open bark of *Tamarix* sp. 20.8.2017.



Fig. 7: Strongly attacked *Tamarix* sp. Exit holes are marked with yellow arrows, open larval chambers (with the remains of cocoons) with red arrows. Škocjanski zatok -Stanjolski zaliv, 20.8.2017.

4. Muggia/Milje, Friuli-Venezia Giulia, Italy. The last research site was situated on the Italian side of the state border, in Muggia bay, near the port city of Trieste/Trst. The town of Muggia/Milje is the most northwestern and, at the same time, the only Istrian town on the Italian side of state border. Four pheromone traps of the RAG type were hung in the time between 10.7. and 5.8.2017 at two selected locations. The first location was located directly on the beach, next to the port of San Rocco, the other next to a shopping center in the town.

Finds:

SLO: Koprsko primorje, Ankaran, along the channel of the Rižana river, near a parking place, 45°34'05.7"N 13°45'008"E, 0.8 m a.s.l., 5.-10.7., 1♂, 13.7., 13.15-

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13.43 h, 1♂, 13.-15.7., 1♂, 15.7., 12.10-12.32 h, 1♂, 15.-22.7., 9♂, 23.7., 12.40-13 h, 1♂ and five old larvae traces with rests of cocoons on a site of a branch with a diameter of 60 mm, 23.-29.7., 3♂, 29.7., 7.30-14.05 h, 2♂, 29.7.-5.8., 6♂, 5.8., 8.30-12 h, 1♂, all in pher. trap UNI, pher. old api, 15.8.2017, 3♂, pher. old api, 12.48-12.57 h.

SLO: Koprsko primorje, Ankaran, along the channel of the Rižana river, near fields, 45°34'01.7"N 13°45'41.6"E, 0.2 m a.s.l., 14.5., fresh feeding trace of larvae, opened by birds; 25.6., 9.44 h, 1♂, 30.6.-5.7., 1♂, 5.-10.7., 1♂, 10.-13.7. 2017, 1♂, 15.-20.8. 2017, 1♂, all in pher. trap UNI, pher. old api.

SLO: Koprsko primorje, Ankaran, Sermin, truck stop by the river Rižana, 45°33'27.9"N 13°45'29.2"E, 0 m a.s.l., 5.-10.7.2017, 1♂, pher. trap UNI, pher. old api.

SLO: Koprsko primorje, Bertoki, Sermin, under the viaduct Bonifica, 45°33'18.9"N 13°45'17.4"E, 1.4 m a.s.l., 18.-25.6., 1♂, 30.6.-5.7., 1♂, 5.-10.7., 1♂, 10.-13. 7.2017, 1♂, all in pher. trap RAG, pher. old api.



Fig. 8: Micro-habitat of the species near Ankaran, 10.7.2017.



Fig. 9: Map of finds.

SLO: Koprsko primorje, Bertoki, Sermin, near railway station Luka Koper, 45°33'12.4"N 13°45'26.9"E, 0 m a.s.l., 5.-10.7., 2♂, 13.-15.7., 1♂, 23.-29.7., 11♂, 29.7-5.8., 13 ♂, all in trap UNI, pher. old api, 15.8.2017, 1♂, pher. old api, 11.43 h.

SLO: Koprsko primorje, Bertoki, Škocjanski zatok, northern edge of the swamp, 45°33'11.2"N 13°45'20.2"E, 0.4 m a.s.l., 18.-25.6., 1♂, 5.-10.7., 5♂, 10.-13.7., 3♂, 13.-15.7., 3♂, 15.-22.7., 3♂, 23.-29.7., 4♂, 29.7-5.8., 14 ♂, 15.8., empty cocoon under the bark, 2♂, 11-13.30 h, 15.-20.8., 5♂, 20.-26.8.2017, 4♂, all in pher. trap UNI, pher. old api.

SLO: Koprsko primorje, Koper, Škocjanski zatok - Stanjolski zaliv, southern edge of the swamp, 45°33'11.2"N 13°45'20.2"E, 2 m a.s.l., 10.-13.7., 4♂: 2♂, pher. trap UNI, pher. old api, and 2♂, pher. trap RAG, pher. old api, 13.-15.7., 1♂, pher. trap UNI, pher. old api, 15.-23.7., 2♂: 1♂, pher. trap UNI, pher. old api, and 1♂, pher. trap RAG, pher. old api, 23.-29.7., 3♂, 29.7.-5.8., 2♂, all in pher. trap UNI, pher. old api, 15.8., more old exit holes, 5 exuviae and 3 larvae, 26.8.2017, old exit hole and one exuviae, all under the bark of *Tamarix* sp.

SLO: Strunjan-Stjuža, edge of the lagoon, parking, 45°31'55.8"N 13°36'17.5"E, 1 m a.s.l., 15.-23.7. 2017, 1♂, pher. trap RAG, pher. old api.

SLO: Strunjan-Stjuža, edge of the salt pans, near road, 45°31'49.5"N 13°36'25.7"N, 23.-29.7. 2017, 1♂, pher. trap UNI, pher. old api

SLO: Sečovlje, salt pans (Lera) 45°28'48.2"N 13°37'14.1"E, 0 m a.s.l., 13.-15.7., 1♂, 15.-23.7., 1♂, 29.7.-5.8. 2017, 1♂, all in pher. trap UNI, pher. old api.

ITA: Friuli-Venezia Giulia, Muggia/Milje, San Rocco, beach near Porto, 45°36'28.5"N 13°45'24.6"E, 1.5 m a.s.l., 15.-23.7., 3♂, 23.-29.7., 1♂, 29.7.-5.8.2017, 4♂, all in pher. trap RAG, pher. old api.

Results in the field of the research show the general presence of *S. theryi* at almost any site with tamarisk and it appears to be present exclusively in places with *Tamarix* sp. Where both types of pheromone trap were set in the same location, significantly more males were caught in the UNI pheromone traps. There was a decline in the number of trapped specimens in traps from the north towards the south. Comparing the number of trapped specimens at the four locations in Koprsko primorje between 10.7. and 5.8. a total of 91 specimens were found in only four available traps, while in Strunjan only two specimens (in five traps) and in the most southern research site in Sečovlje salt pans only three specimens (in seven traps) were caught. This evidently smaller number of trapped males, despite suitable habitats with a number of host plants in Sečovlje and Strunjan, is probably related to the spread of the species towards the south-east. However, the larger number of trapped male specimens on the Slovenian coast indicates the probable frequency of *S. theryi* in unexplored areas with tamarisk, in the interior of the Primorska region, as well as in the north of the Apennine peninsula in Italy. According to Villar et al. (2012) *T. dalmatica* grows as an endemic on the Balkan peninsula and on parts of the Apennine peninsula, so it is also possibly prevalent along the Adriatic coast on the Croatian side.

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