**CLEARWING MOTHS (LEPIDOPTERA: SESIIDAE) NEW TO THE  
FAUNA OF SLOVENIA**

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**Abstract** - The clearwing moth species *Synanthedon soffneri* Špatenka, 1983, *Chamaesphecia doleriformis colpiformis* (Staudinger, 1856) and *Chamaesphecia nigrifrons* (Le Cerf, 1911) are new to the territory of Slovenia. The first concrete finds of *Bembecia himmighoffeni* (Staudinger, 1866) in the coastal part of Slovenian Istria are given. According to Laštůvka & Laštůvka (2001), the presence of *B. himmighoffeni* has already been mentioned for Slovenia, but without exact data and it is not included in the List of Slovenian Macrolepidoptera. All four species were discovered with aid of synthetic sexual pheromone lures (PRI-DLO, Wageningen, The Netherlands).

**KEY WORDS:** Lepidoptera, Sesiidae, new records, Slovenia.

**Izvleček - NOVE VRSTE STEKLOKRILCEV (LEPIDOPTERA: SESIIDAE) V  
FAVNI SLOVENIJE**

Steklokrilci vrst *Synanthedon soffneri* Špatenka 1983, *Chamaesphecia doleriformis colpiformis* (Staudinger, 1856) in *Chamaesphecia nigrifrons* (Le Cerf, 1911) so novi za ozemlje Slovenije. Podane so prve konkretne najdbe vrste *Bembecia himmighoffeni* (Staudinger, 1866) v obalnem delu Slovenske Istre. Po Laštůvki in Laštůvki (2001) je bila prisotnost *B. himmighoffeni* za Slovenijo že navedena, vendar brez podrobnejših podatkov in ni zajeta v seznam makrolepidopterov Slovenije. Vse štiri vrste so bile odkrite s pomočjo sintetičnih spolnih feromonskih vab (PRI-DLO, Wageningen, Nizozemska).

**KLJUČNE BESEDE:** Lepidoptera, Sesiidae, novi podatki, Slovenija.

## Introduction

With the development and ever more frequent use of pheromones, the number of finds of clearwing moths in Slovenia and elsewhere through the world in recent years has greatly increased. There has been a series of discoveries also of populations of species that, mainly because of their local distribution or small numbers, have been unnoticed to date.

There is not a great deal of data from the past in the literature. The works of domestic authors Ivan Hafner (1909-1912) and Dr. Jan Carnelutti (1992a, 1992b) are important. A review of old material of clearwing moths of the Central Collection of the Natural History Museum of Slovenia has been published (Predovnik, 2003).

The results of intensive fieldwork on clearwings of Slovenia in the last few years are reflected among other things also in the ever more frequent articles in this field. We obtained an important, in terms of the number of species, rich list in the work *The Sesiidae of Europe* (2001), in which the authors Zdenek and Aleš Laštůvka state 41 species for the fauna of Slovenia.

The main purpose of my research throughout these years has been to complete as far as possible the aforementioned list of clearwings of Slovenia. New finds have continued (Predovnik 2001, 2002, 2004) and the list has become longer by several new species, and the presence of the majority of others has been reconfirmed. With the present contribution, the total number of clearwings of Slovenia has increased to 48 and, if we take into account data from some earlier literature (Carnelutti, 1992a, 1992b), even to 50 species.

Research must be continued into this group of moths, since we can certainly expect further new species in the fauna of Slovenia, and some from existing lists will need to be confirmed by new finds.

Short descriptions of the biology and habitats are given for each species. Nomenclature used is according to *The Sesiidae of Europe* (Laštůvka & Laštůvka, 2001).

## Species treated

### *Synanthedon soffneri* Špatenka, 1983

Material examined:

VM15: surrounding of Mójstrana, Belca, 720 m, 15. 5. - 12. 6. 2004, 1 ♂ (trap capture), leg. Predovnik; 13. 6. - 18. 6. 2004, 1 ♂ (trap capture), leg. Predovnik.

Twenty plastic pheromone traps (type VARs+, Csalomon, Hungary) were used in several localities in northwestern Slovenia in the period from 15. 5. - 12. 6. 2004. Eighteen traps were equipped with the optimal attracting synthetic pheromone lures for *S. soffneri* E2,Z13-18:Ac + Z3,Z13-18:Ac (100µg:10µg) (Priesner, 1993) and two traps with pheromone lures intended for *Synanthedon myopaeformis* (Borkhausen, 1789).

The first control on 12. 6. 2004 revealed the first specimen of *S. soffneri* in one of the two traps with the *soffneri* pheromone lure near the village of Belca. This specimen was already dry, and it was probably caught in the trap at the beginning of

June. All other traps with *soffneri* pheromone lures, which were employed in localities near Mojstrana (Vrata), on Vretov vrh (Kepa), Medvedjek and Planica, were empty.

On the same day (12. 6.), three specimens of *Synanthedon culiciformis* (Linnaeus, 1758) were found in one of two traps with pheromone intended for *S. myopaeformis* near the town of Jesenice (one of which was still fresh).

During the second control, on the 18. 6., another specimen of *S. soffneri* was found in the trap at the same place as the first one.

The locality of *S. soffneri* near the village of Belca is located on a xerothermic slope of the Fajferica Mountain, in the southwestern Karavanke Mountains. The exposed area on the south side is covered with pine forest, the undergrowth mixed with extensive bushes of *Lonicera nigra* L., the potential host plant of *S. soffneri*.

*S. soffneri* occurs in various types of habitat. The larva lives for two or three years in branches or twigs of *Lonicera nigra*, *L. xylosteum*, *L. caerulea* and *L. tatarica*, where it usually makes small swellings. Pupation takes place without the construction of a cocoon (Laštůvka, 2001, Špatenka, 1983).

The adults fly mostly in May, in colder areas also in June. To date, *S. soffneri* has been found in France, Germany, Switzerland, Austria, Bohemia, Slovakia and Russia (Laštůvka, 2001).

### ***Bembecia himmighoffeni* (Staudinger, 1866)**

Material examined:

UL94: Istria, surrounding of Koper, Gažon, 243 m, 21. 6. - 23. 7. 2003 (Pher.), 11 ♂, leg. Predovnik; 18. 7. - 14. 8. 2004 (Pher.), 8 ♂, leg. Predovnik, 1 ♂, leg. J. Broder (Kranj).

UL80: Croatia, Istria, Gradina, 130 m, 21. 7. 2001 (Pher. comb. api+hyl+myo+tab+tip+vesp, 10.20 -11.15 am), 4 ♂ and between 11. 23 - 15 h, 3 ♂ on/above lower vegetation, leg. Predovnik; Rajići, 125 m, 20. 7. 2001 (Pher. hyl., 9.45 am), 1 ♂, leg. Predovnik.

The specimens were attracted to pheromone lures, placed in the dense vegetation after warm dry nights from 7.45 am on, with a maximum between 8.00 and 9.00 am. Later only single specimens were recorded until 12.40 pm. In colder or cloudy weather, the specimens began to fly significantly later, usually after 9.40 am.

According to Laštůvka (2001), this Atlanto-Mediterranean species inhabits dry, xerothermic lowland meadows and mountainous regions. Larvae feed for one year on the roots of *Coronilla minima* L. and *Lotus corniculatus* L. The adults fly from June to September and occur in the Iberian Peninsula, southern France, northwestern and central Italy, Istria and Krk. From Croatia there is also an older record from the village of Knin, Dalmatia (Predovnik, 2003).

### ***Chamaesphecia doleriformis colpiformis* (Staudinger, 1856)**

Material examined:

WM84: surrounding of Ormož, Formin, 200 m, 4. 6. - 25. 7. 2003 (Pher.), 41 ♂, leg. Predovnik; 21. 6. - 1. 8. 2004 (Pher.), 14 ♂, leg. Predovnik; 29. 4. - 2. 5. 2004, ca.

35 caterpillars in roots of *Salvia pratensis* L., leg. Predovnik; 22. 5. 2004, ca. 14 caterpillars in *S. pratensis*, leg. Predovnik and T. & W. Garrevoet (Antwerpen).

The males of *Ch. doleriformis colpiformis* were attracted well to different pheromone combinations of base Wageningen pheromones. Mostly to lures, intended for *Paranthrene tabaniformis* (Rottemburg, 1775). Usually the specimens approached cautiously, slowly and low above ground. The specimens did not make efforts to start copulation with the lures, suggesting that the used pheromone mixtures are not yet optimal and require further study.

In optimal weather conditions (after a dry, warm night) specimens began to fly towards the pheromone lures after eight a clock in the morning, with an optimal attraction between 8.20 and 9.30 am. In colder weather (after a rainy and colder night, wet grass in the morning) specimens were attracted one hour later, with a maximum between 9.00 and 10.00 am. Once single individuals were observed until noon, in one case in early afternoon. Using several funnel pheromone traps (VARs+) with pheromone lures for *P. tabaniformis* only a few males of *P. tabaniformis* were caught.

Numerous one and two year old caterpillars (length between 8-10 mm and 18-22 mm) were found in the roots of *Salvia pratensis* L. which is a common species in the biotope. Infested plants did not show external signs of infection. However, most infested roots showed obvious and typical tracks filled with dark brown or black, mostly wet sawdust. In shorter roots with a hollow core the infection was usually less visible. Two year old caterpillars were found in the upper parts of the host plants, one year caterpillars usually deeper in the roots, sometimes up to 20 cm under the soil level. When digging up the infested roots, some of the young caterpillars remained in the ground.

According to Špatenka et al. (1999) *Ch. doleriformis colpiformis* (as *Ch. colpiformis*) inhabits warm, open xerothermic biotopes, steppes and forest steppes, including ruderal land, such as edges of fields and road sides. Caterpillars feed for two years in the roots of different species of *Salvia* (Lamiaceae). Adults occur in June, July and August in the south-eastern parts of central Europe, north-eastern Balkan Peninsula, South Ukraine and South Russia.

### ***Chamaesphecia nigrifrons* (Le Cerf, 1911)**

Material examined:

WM84: surroundings of Ormož, Formin, 200 m, 1. - 30. 5. 2004 (Pher.), 8 ♂, leg. Predovnik; 10. 9. - 1. 11. 2004, numerous caterpillars in roots of *Hypericum perforatum* L., leg. Predovnik.

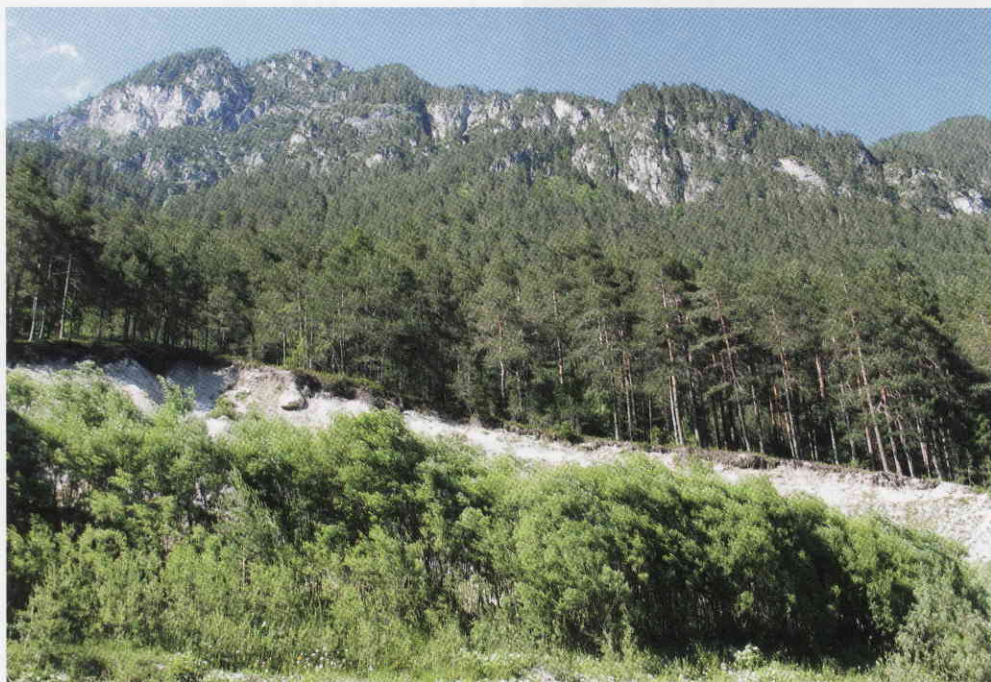
The first imago was attracted to a pheromone lure, intended for *Synanthedon tipuliformis* (Clerck, 1759). Other specimens flew to a pheromone composition specially designed for *Ch. nigrifrons* supplied by Dr. Franz Pühlinger: E2,Z13-18:Ac + Z3,Z13-18:OH + E3,Z13-18:Ac + E3,Z13-18:OH (30µg:30µg:100 µg:30µg). The specimens approached to the pheromone directly; two specimens sat on the lure for a short time and made efforts to copulate with it.

According to Laštůvka (2001), *Ch. nigrifrons* has a scattered distribution in west, central and southeast Europe, where it occurs on forest edges, clearings, and pastures. Larvae live for one year in the roots of *Hypericum perforatum* L. In autumn the larvae extrude a lot of deep red sawdust from the galleries at the base of the stems while the larvae construct a tunnel up into an old stem. Very often these stems break off during winter. The moths emerge usually from these broken stems. Adults fly from May to July.

## Discussion

Last years' research on clearwing moths confirms the reachness of the fauna of Sesiidae in Slovenia. Geographic distribution of the clearwing moth species treated shows a good example of a big diversity of habitats in this part of Europe. Many species of insects with Pannonian, Alpine, Dinaric and Mediterranean distribution pattern live in this region. The true number of clearwing moth species in the Slovenian territory is expected to be around fifty.

*S. soffneri* was caught in pheromone traps in the Alpine valley of the Sava Dolinka river, by the village of Belca in Gorenjska (northwest Slovenia). The discovery of a species on the south side of the Alps represents important extension



**Fig. 1:** Habitat of *S. soffneri* (southwest Karavanke Mts.). Here the author found also specimens of *P. hylaeiformis*, *S. apiformis*, *S. bembeciformis*, *Syn. spheciformis*, *Syn. formicaeformis*, *Syn. andrenaeformis* and *Ch. empiformis*.



**Fig. 2:** Dead specimen of *S. soffneri* (ventral view) on bottom of the funnel trap VARs+, leg. Predovnik.



**Fig. 3:** Male of *S. soffneri*, Belca, 13. - 18. 6. 2004, leg. et coll. Predovnik.



**Fig. 4:** Female of *Ch. doleriformis colpiformis*, e.l., ex. *S. pratensis*, leg. Predovnik.

of the known distribution of *S. soffneri* in Europe. This find strongly suggests the presence of other still undiscovered populations of this clearwing species in the mountains of northern Italy and perhaps also in the Balkan Peninsula.

Numerous specimens of *Ch. doleriformis colpiformis* and several specimens of *Ch. nigrifrons* were observed as they flew on pheromone lures on extremely warm south and south-westerly exposed slopes along the River Drava channel below a hydroelectric power station in Formin (northeast Slovenia). Of neighbouring countries, *Ch. doleriformis colpiformis* and *Ch. nigrifrons* have been found in Austria, Croatia and in Hungary, so that their discovery in the Subpannonian part of Slovenia was expected.

After extended intensive investigations on the short Slovenian coast and its hinterland, I found *B. himmighoffeni* on hot, dry meadows above Izola and Koper,



**Fig. 5:** Partially poorly grown ruderal sites on the banks at the River Drava channel below the hydroelectric power station in Formin are rich in numbers of clearwing species. In addition to *Ch. doleriformis colpiformis* and *Ch. nigrifrons*, the author found here specimens of *S. apiformis*, *P. tabaniformis*, *S. spheciformis*, *S. formicaeformis*, *S. andreaeformis*, *S. melliniformis*, *S. myopaeformis*, *S. loranthi*, *P. triannuliformis*, *B. ichneumoniformis*, *B. albanensis*, *Ch. euceraeformis*, *Ch. tenthrediniformis* and *Ch. empiformis*. Some east-European elements of moth and butterfly species such as *Penthophera morio* L. and *Colias erate* Esp. have also been found in these Subpannonian localities.

near village of Gažon. All specimens belong to the dark form *baumgartneri* (Špatenka, 1992). Laštůvka (1995, 2001) considers *B. baumgartneri* as an infrasubspecific form of *B. himmighoffeni*, as such dark specimens occur throughout the range of *B. himmighoffeni*. More collected material of these interesting species from Slovenia would perhaps allow more thorough analysis, needed to answer the question, if *baumgartneri* should really be regarded as a subspecies of *B. himmighoffeni*.



**Fig. 6:** Female of *Ch. nigrifrons*, e.l., ex. *H. perforatum*, leg. Predovnik.



**Fig. 7:** Set of male specimens of *B. himmighoffeni* f. *baumgartneri* from the locality of Gažon, leg et coll. Predovnik.

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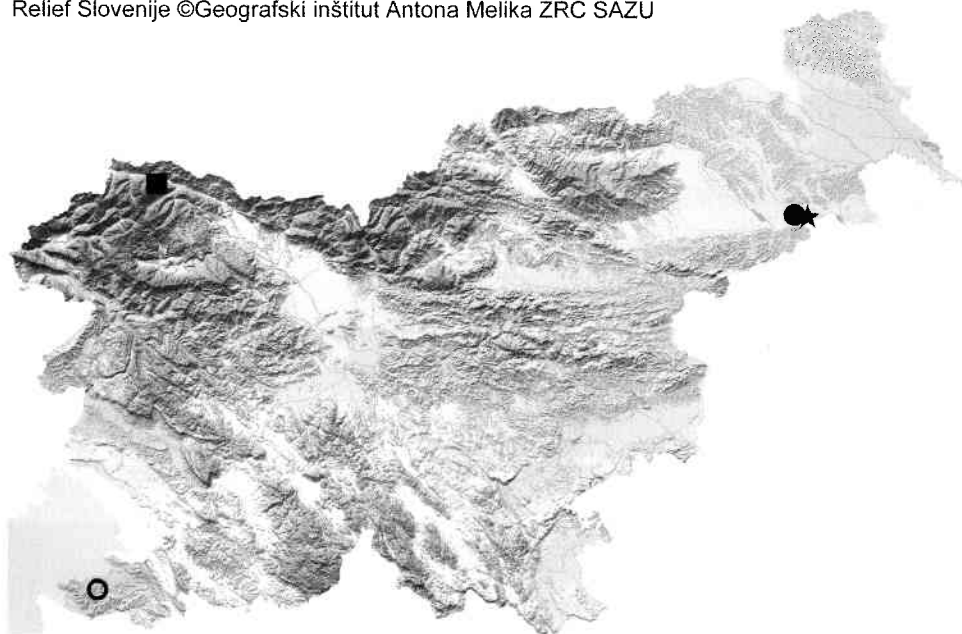
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- **Chamaesphacia doleriformis colpiformis**
- ★ **Chamaesphacia nigrifrons**
- **Synanthedon soffneri**
- **Bembecia himmighoffeni**

**Fig. 8:** Map of Slovenia with the localities of the finds.

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