

The First Record of Two Moths (Lepidoptera) in Hatay Province of Turkey and External and Genital Morphology of the Species

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Abstract

This study was conducted in field and laboratory. *Nemophora fascielle* (Fabricius, 1775) (Adelidae) and *Endothenia sororiana* (Herrich-Schaffer, 1851) (Tortricidae) were caught with insect net, mercury vapour light trap and white screen, at different altitudes, with various vegetation in Hatay. In the field studies, *N. fascielle* totally 3 male and 2 female, and *E. sororiana* totally 5 male and 1 female were collected. Specimens were dissected in the laboratory and prepared male genitalia and wings slides. We described the external and male genital morphology of *N. fascielle* and *E. sororiana* in detail and also diagnostic morphological features. As a result of the study, *N. fascielle* and *E. sororiana* are first record for Hatay.

Keywords: *Nemophora fascielle*, *Endothenia sororiana*, Adelidae, Tortricidae, Hatay

Hatay'da İki Güvenin İlk Kaydı ve Türlerin Dış ve Genital Morfolojisi

Özet

Bu çalışma arazi ve laboratuvar çalışmaları şeklinde yürütülmüştür. *Nemophora fascielle* (Fabricius, 1775) ve *Endothenia sororiana* (Herrich-Schaffer, 1851) (Tortricidae), Hatay'da değişik bitki örtüsüne sahip çeşitli yüksekliklerdeki lokalitelerden atrap, cıva buharlı ışık tuzağı ve beyaz perde ile yakalandı. *N. fascielle*'dan toplam 3 erkek, 2 dişi ve *E. sororiana*'dan toplam 5 erkek 1 dişi birey toplanmıştır. Örnekler laboratuvarında preparat yapımı için hazırlandı, erkek genital ve kanat preparatları yapıldı. *N. fascielle* ve *E. sororiana*'nın dış morfolojisi ve erkek genital organları ayrıntılı olarak tanımlandı. Sonuç olarak, *N. fascielle* ve *E. sororiana* türleri Hatay için ilk kayıttır.

Anahtar Kelimeler: *Nemophora fascielle*, *Endothenia sororiana*, Adelidae, Tortricidae, Hatay

1. Introduction

The family Adelidae is members of Incurvarioidea. There are more than 300 species this of family distributed worldwide. This family is the best known for their enomously long antennae (especially in male 3 times as long as forewing). Most species have at least partially metallic patterns coloration and diurnal. Both males and females have a well developed haustellum. But, there is little known about the larval biology of these. Little is known about the life history of Adelidae. Early instar larvae of most species of Adelidae are likely miners. Later instar regularly construct a flattened, oval case made of dead plant material (Ahola et al, 2017). The genus *Nemophora* Hoffmannsegg, 1798 (Lepidoptera: Adelidae) currently includes about 150 species (Kozlov, 2004). The genus *Nemophora* is being represented by 11 species in Turkey (Koçak and Kemal, 2009).

The family Tortricidae, which with just over 9000 described species is the second largest lineage in the microlepidoptera, second only to the Gelechioidea, and by far the most important economically (Hancock and Bland, 2015). *Endothenia* Stephens, 1852 is a genus of moths belonging to the subfamily Olethreutinae of the family Tortricidae. A moderately large genus with some 50 species distributed in all regions of the world (Hancock and Bland, 2015). According to Razowski and Brown (2012), *Endothenia* is widely distributed in the Holarctic, Oriental, and Australian regions that encompassing 48 described species.

There are 462 species belonging to the family Tortricidae, and 8 species belonging to the genus *Endothenia* in Turkey (Koçak and Kemal, 2009).

The first attempt on the checklist of the Turkish moths was listed by Koçak and Kemal (2006, 2007). Totally 4604 moth species were listed together with their synonymous named and updated provincial distributions. Later, the authors (Koçak and Kemal, 2009), reported that the Turkey Lepidoptera fauna was 5128 species belonging to 76 families. In addition, a total of 508 lepidoptera species, 377 Heterocera and 131 Rhopalocera, belonging to the province of Hatay were listed by the same authors. Atay (2011) reported the number of species as 521 lepidoptera and 390 moths.

2. Materials and Methods

2.1. Field Studies

Field studies were carried out in the localities of different altitudes and vegetation covers in the Hatay province in 2017. All the field works were done under suitable weather conditions (without precipitation and strong winds), and started early in the morning and continued until sunset.

Nemophora fasciella and *Endothenia sororiana* were caught at intervals with insect net, mercury vapour light trap and white screen in different localities, at different elevations, in different climatic conditions, plant cover and surface features in Hatay. In the field studies, *N. fasciella* totally 3 male and 2 female, and *E. sororiana* totally 5 male and 1 female were collected.

2.2. Laboratory Studies

Before they lost their body water, the collected specimens were sorted for their body sizes and needled with the number 0 insect needles fitting their sizes on special stretching boards, and forewing and hindwing pairs were stretched in the laboratory works. For the drying of the stretched specimens, they were kept at room temperature for two weeks in a dark and dry place. Male genital organs of both species were prepared for the identification of the species following morphological examinations and measurements on the male and female specimens. The needling of the butterflies, stretching of the wings and genital organ preparations were done accordingly the methods defined in Atay's work (2006). The major taxonomic characters of both species were described. Important morphological organs of *Nemophora fasciella* and *Endothenia sororiana* were photographed and drawn. The specimens were stored at the Biology Department of Mustafa Kemal University in Hatay.

3. Results and Discussion

Genus *Nemophora* Hoffmannsegg, 1798 (Lepidoptera: Adelidae)

Syn: *Elasmion* Hübner, 1822; *Nemotois* Hübner, [1825]; *Epityphia* Hübner, [1825]; *Nemotophora* Agassiz, 1847 nec Gry., 1840; *Ucetia* Walker, 1866; *Trichofrons* Amsel, 1937 (Koçak and Kemal, 2009)

Nemophora fasciella (Fabricius, 1775) (Adelidae)

Syn: *schiffmillerella* [Denis & Schiffmüller], 1775; *fascia* Haworth, 1828; *schiffmuellerella* Treitschke, 1833; *annae* Zeller, 1853; *purpureus* Stainton, 1867 (Kozlov, 2004; Fazekas, 2010; Koçak and Kemal, 2009)

The distribution in Turkey: Amasya, Bursa, Mersin, Malatya, Kahramanmaraş, Van (Koçak ve Kemal, 2009).

The distribution in the World: Norway, Denmark, Sweden, Finland, Estonia, Czech Republic, Slovakia, Germany, England, Belgium, Luxemburg, France, Spain, Portugal, Sardinia, Sicily, Italy, Austria, Hungary, Romania, Bulgaria, Greece, Cretan (Karsholt and Razowski, 1996); Poland (Malkiewicz, 2016).

Material Examined

Döver village (Antakya-Hatay) (36°07'26" N; 36°08'39" E, 350 m.); 22.IV.2018 2♂, 1♀, 02.V.2018 1♂, 1♀.

Measurements

Body Length ♂: 5-5,5 (5,25) mm, ♀: 6-7 (6,5) mm

Wingspan ♂: 16 mm, ♀: 15-16 (15,5) mm

Male (Figure 1): On the head vertex and frons black brown; long hair-like scales on the head black; face shiny metallic greenish golden colour scaly. Antenna filiform and very long, 18 mm., its length 2,57 times longer than forewing length; base of the antennae is thick and metallic purple golden, distally whitish. Labial palpus well developed, long, strongly recurved upwards and reaches up to frons. All segments of labial palpus are black bristles scales. Eyes with brownish eyes are very large. Haustellum is well developed, basally shiny metallic gold colour scaled. On the head ocelli and chaetosemata absent. Head 1,35 times wider than its height (Figure 2).

On the thorax is shiny metallic bronzy golden and black; underside of thorax shiny metallic greenish golden.

Forewings are narrow and oval-shaped, its length 2,71 times longer than its width. The upper surface of the forewings; with reddish copper violet; at basally bronzy golden scaled and, towards distally more dark; discal region with blackish dark violet cross fascia. Fringe is short and light brownish golden. The ventral surface of the forewings; completely with pale brownish violet.

Hindwings are broad and its length 2,25 times longer than its width. The upper surface of the hindwings are completely with grey brown and with little violet shimmer. Fringe is short and light brownish golden; underside grey brown.

Female moth is similar to male, but antennae shorter and black, about the same length as the forewing. Female has a yellowish head.

The male genital organ is as Figure 3.

Valva short, narrow, sharply constricted at midlength, and apex rounded; with rare short seta; its length 3 times longer than its width. Uncus short and narrow. Saccus quite long and very broad, strongly sclerotized; its length 2 times longer than its width. Aedeagus is long and narrow, its length 20 times longer than its width; with a structure similar to the arrow tip. Juxta broad arrow shaped.

Veins of forewing and hindwing are drawn (Figure 4).

Moths were caught on *Sarcopoterium spinosum* (L.) plant at afternoon (Figure 5).



Figure 1. Adult of *Nemophora fascielle* (Adelidae)

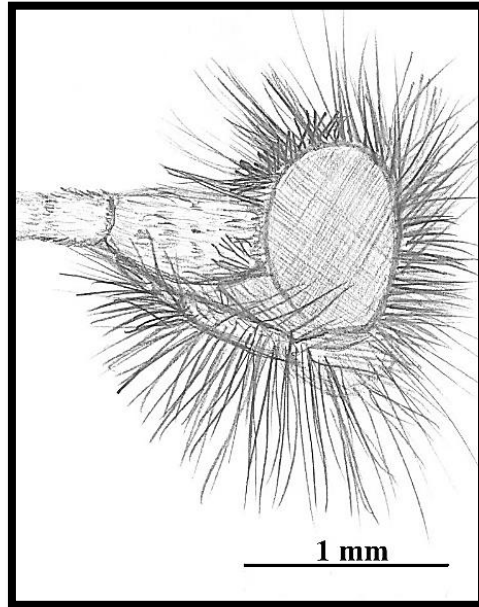


Figure 2. The head structure of *Nemophora fascielle* (Adelidae)

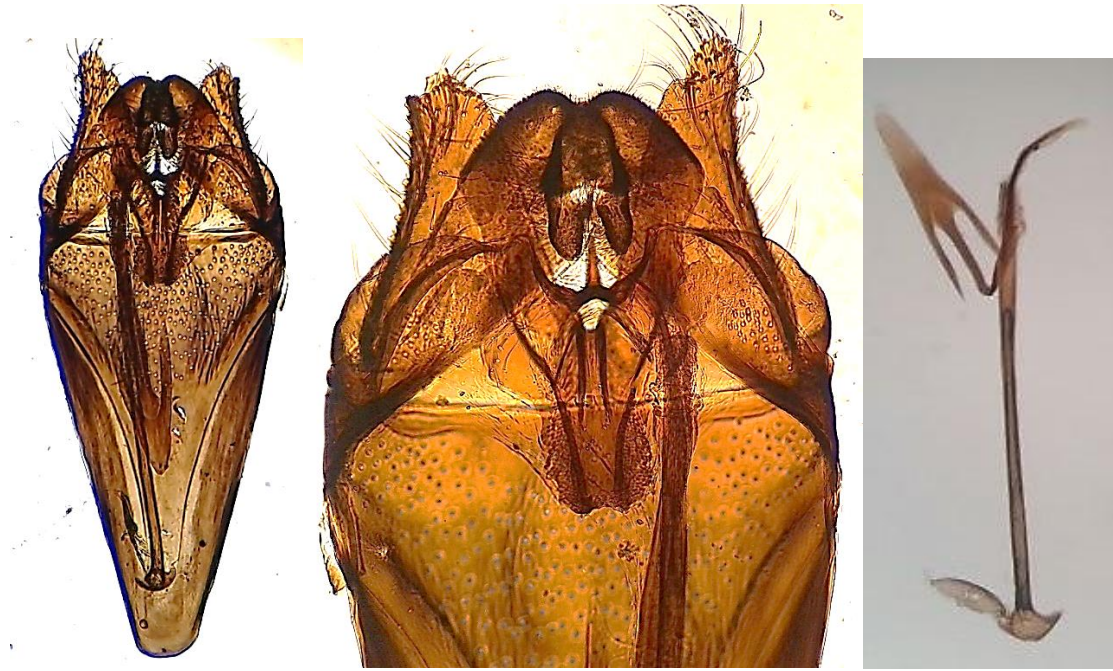


Figure 3. The Male Genitaliae of *N. fascielle* (General Structure; Valva and Uncus; Aedeagus)

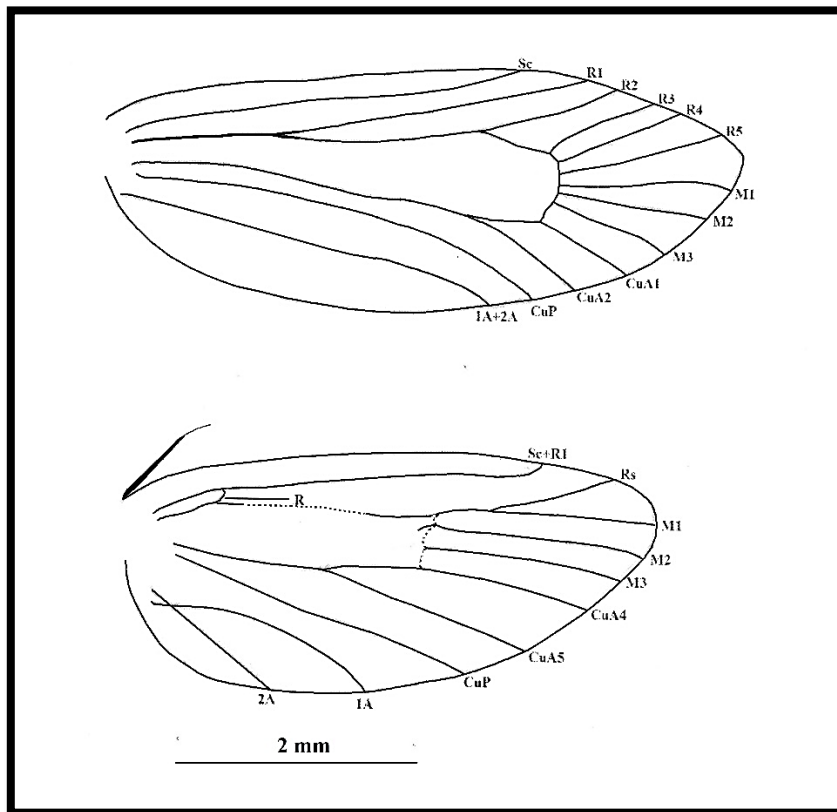


Figure 4. Veins of forewing and hindwing of *Nemophora fascielle*



Figure 5. *Sarcopoterium spinosum* (L.)

Genus *Endothenia* Stephens, 1852 (Lepidoptera; Tortricidae)

Syn: *Orthotania* Stainton, 1859 nec Stt., 1829; *Endothenia* Stephens, 1852; *Taniva* Heinrich, 1926; *Tia* Heinrich, 1926; *Hulda* Heinrich, 1926; *Alloendothenia* Oku, 1963; *Neothenia* Diakonoff, 1973 (Koçak and Kemal, 2009).

***Endothenia sororiana* (Herrich-Schaffer, 1851) (Tortricidae)**

Syn: *sororiana* (Herrich-Schaffer, 1850); *sororiana* (Herrich-Schaffer, 1851); *phlomidana* Staudinger, 1871 (Koçak and Kemal, 2009)

The distribution in Turkey; Amasya (Koçak ve Kemal, 2009).

The distribution in the world; Lithuania, Siciy, Italy, Hungary, Yugoslavia (Karsholt and Razowski, 1996).

Material Examined

Döver village (Antakya-Hatay) (36°07'26" N; 36°08'39" E, 350 m.); 18.IV.2018 2♂; 22.IV.2018 2♂, 1♀; 02.V.2018 1♂.

Moths were caught on *Phlomis longifolia* (L.) plant at afternoon.

Measurements

Body Length ♂: 6 mm, ♀: 7 mm

Wingspan ♂: 13-15 (14) mm, ♀: 16 mm

Male (Figure 6): On the head vertex and frons fuscous pale brown, sometimes speckled with light brown. Antenna filiform, fuscous brown and long, its length 0,46 times longer than forewing length. Labial palpus well developed, dark brown moderately long, strongly recurved upwards,

almost reaches to frons, and third segment advances forward. All segments of labial palpus are covered with smooth scales over them. Eyes with brownish eyes are very large. Haustellum is well developed, basally light brown and dirty white colour scaled. On the head ocelli large, but chaetosemata absent. Head 1,85 times wider than its height (Figure 7).

Thorax and tegulae are fufcous pale brown and light brown; underside of thorax yellowish dirty white and light brown.

Forewings are narrow and almost oval-shaped, its length 2,34 times longer than its width. Ground colour of basal 2/3 of the forewing dark brown, mixed with grayish black, sometimes speckled with white; an irregular ochreous dirty white transverse fascia at 1/3 from base. Postmedian and submargin regions of forewing are with s-shaped dirty white transverse band.

Fringe is short and dark brown. The ventral surface of the forewings; completely with pale brownish. Hindwings are broad and its length 1,75 times longer than its width. The upper surface of the hindwings are completely with pale brown and slightly paler basally. Abdomen is dark grayish brown.

The wing patterns and colors of the female are similar to male.

The male genital organ is as Figure 8.

Uncus thin, long and cylindrical tube, its length 4 times longer than its width, with broad terminal part, oval-shaped, equipped with long several spines and hairs. Socius almost broad and with thin and weak long hairs. Tegumen ;quite broad. Sacculus very short and with spiny lobe. Valva narrow and long, strongly convex, its inner face with thin and weak long hairs. At the basal part of valva presents a thorny formation plume shaped. Saccus small. Aedeagus short and broad, cornutus absent.

Veins of forewing and hindwing are drawn (Figure 9).

Moths were caught on *Phlomis longifolia* plant at afternoon (Figure 10).



Figure 6. Adult of *Endothenia sororiana* (Tortricidae)

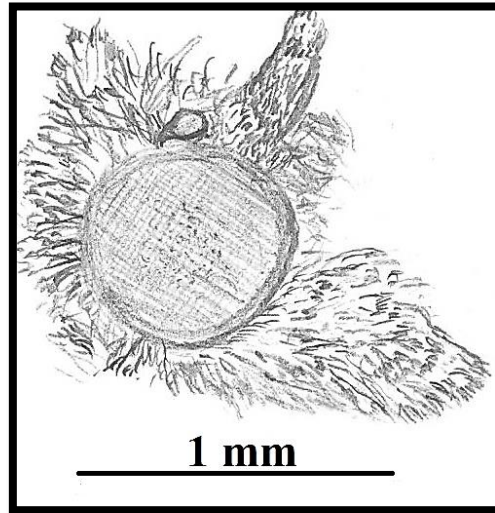


Figure 7. The head structure of *Endothenia sororiana* (Tortricidae)

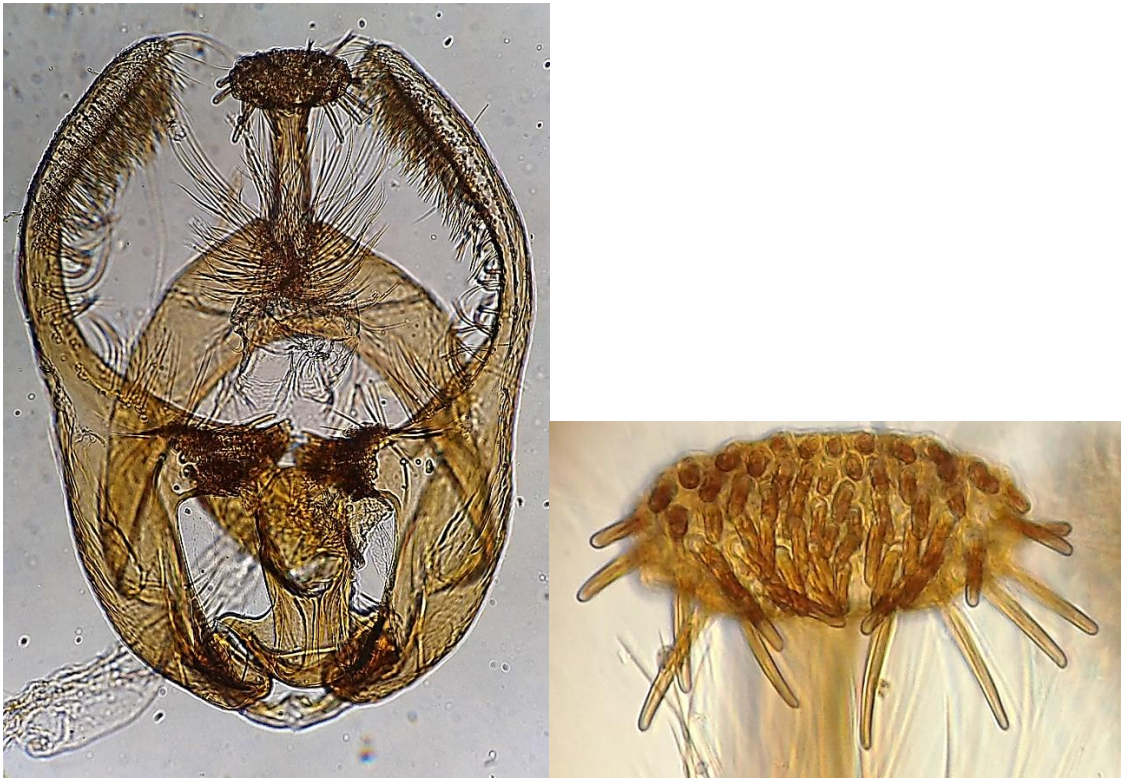


Figure 8. The Male Genitaliae of *Endothenia sororiana* (General Structure; Uncus)

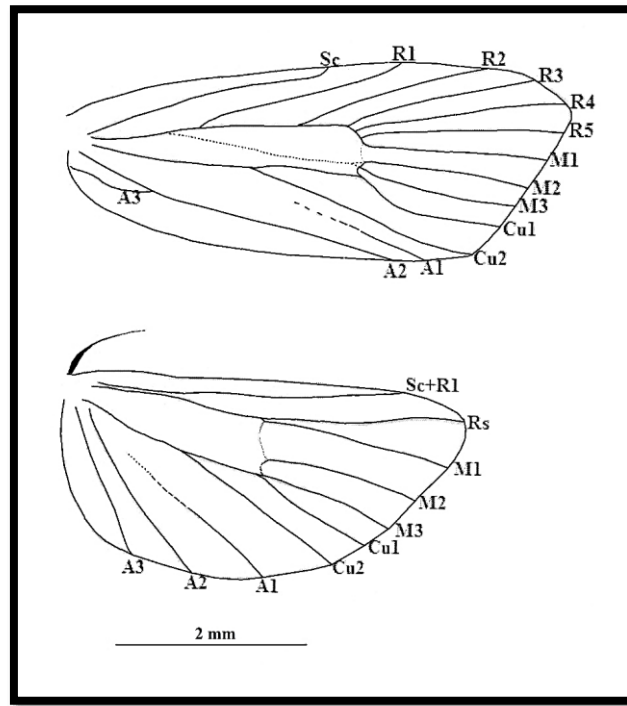


Figure 9. Veins of forewing and hindwing of *Endothenia sororiana* (Tortricidae)



Figure 10. *Phlomis longifolia*

In this study, we described the external and the male genital morphology of *Nemophora fasciella* (Adelidae) and *Endothenia sororiana* (Tortricidae). The important taxonomic characters belong to them were redescribed in detail by comparison of different parameters with each other. Each one of the external and genital taxonomic characters were measured with digital caliper and stereo microscope.

The habitat of these two species is given in Figure 11.

Nemophora fasciella and *Endothenia sororiana* are new record for the the lepidoptera fauna of Hatay. As a result, the Hatay butterfly fauna increased to 523 lepidoptera and 392 moths with the addition of these two species.



Figure 11. Habitat of *Nemophora fasciella* and *Endothenia sororiana*.

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