

Reassessment of the adult *Stevenia signata* (Mik, 1966) (Diptera: Rhinophoridae) from Turkey with comprehensive notes on its morphology, ecology and faunistic limits

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Abstract

Stevenia signata (Mik, 1866) has been recorded for the first time from South Turkey. Herein, the sexual forms of the species are described in detail with notes on their faunistic and ecological data.

Key words: *Diptera, Rhinophoridae, Stevenia signata, morphology, faunistic, South Turkey.*

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Introduction

Rhinophoridae is a small family of calypterate two-winged flies, comprising of 174 species from the world (Pohjoismäki and Kahanpää, 2014) out of which 89 species are known from the Palaearctic region (Cerretti *et al.*, 2014; Cerretti and Pape, 2009; Crosskey, 1977; Herting, 1993; Pape, 1998; Verves, 2005a, b; Zeegers, 2011). The larvae of this group are internal parasitoids of woodlice whereas imagoes feed on the flowering plants (Bedding, 1973; Bürgis, 1991a, b; Bürgis, 1992a, b; Verves and Khrokalo, 2006; Wijnhoven, 2001).

Genus *Stevenia* Robineau-Desvoidy, 1830 consists of 25 species from Palaearctic, Oriental and Afrotropical regions (Cerretti *et al.*, 2014; Cerretti and Pape, 2007; Crosskey, 1977; Herting, 1961, 1993; Peris and González-Mora, 2007; Zeegers, 2008). 6 species are known from several districts of Turkey (Koçak, 2014; Koçak and Kemal, 2015): *S. angustifrons* Villeneuve, 1912; *S. atramentaria* (Meigen, 1824); *S. hertingi* Kugler, 1978; *S. kugleri* Herting, 1961; *S. pallidicornis* (Loew, 1847); *S. signata* (Mik, 1866). The present species, *S. signata* has been recorded for the first time from South Turkey. The current paper deals with the detailed description of the sexual forms of the above mentioned species along with notes on its ecology and zoogeographic distribution.

Materials and Methods

The flies were collected with an entomological net at an altitude of about 100m a.s.l. All flies were examined and photographs were prepared using a stereomicroscope Leica M205C (Leica Microsystems, Wetzlar, Germany) with a Canon EOS 5D Mark II Body camera (Canon Inc., Tokyo, Japan). As the mount was essentially not flat, a series of photographs were taken at different focal depths. They were compiled into one sharp image, in accordance with the criterion of maximal power in the spatial high-frequency domain, with the software Helicon Focus Pro 5.3.14 X64 (Helicon Soft Ltd., Kharkiv, Ukraine).

All specimens are deposited in collection of Department of Ecological Monitoring, Institute for Evolutionary Ecology, National Academy of Sciences of Ukraine, Kyiv.

New Record

Stevenia signata (Mik, 1866)

(Figs 1-7)

Rhinophora signata Mik, 1866: 307 (description of ♂). Type locality: Italy: Mt Czavn nr Görz [= Gorizia] (by original designation).

Stevenia signata: Bürgis, 1991a: 295; Bürgis, 1992a: 50; Bürgis, 1992b: 100 (hosts); Cerretti and Pape, 2007: 37 (male)



Figures: 1-7. *Stevenia signata* (Mik, 1866). 1-2. Male head in profile and frontal view; 3. Male left wing, dorsal view; 4-5. Male abdomen, dorsal view (two different specimens); 6. Male terminalia lateral view; 7. Female abdomen dorsal view.

abdomen dorsally and mid femur posteriorly figured), 39 (in key); Herting, 1961: 26 (short descriptions of ♂♀ and faunistic); Khitzova, 1981: 4 (faunistic; male cerci and surstyli dorsally figured); Koçak, 2014: 347; Koçak and Kemal, 2015: 342 (faunistic); Mihályi, 1980: 340 (faunistic); Peris and González-Mora, 2007: 53 (in key).

Stevenia femoralis (misidentification, not *Stevenia femoralis* Rondani, 1862): Stein, 1924: 188 (faunistic); Villeneuve, 1931: 66 (taxonomical notes).

Material Examined: TURKEY: 6 ♂♂ 4 ♀♀, Antalya Province, Side City, sand waste plot, 36°46'05"N, 31°23'24"E, 10-19.08.2011, Yu. Verves.

Distribution

Albania (Mihályi, 1980); Croatia (Bürgis, 1992a, b); Greece: mainland and Korfu I. (Herting, 1961); Italy: mainland (Mik, 1866); Russia: Astrakhan (Khitzova, 1981); Turkey: Antalya (Koçak, 2014; Koçak and Kemal, 2015).

Redescription of male and female:

Colour: Dark coloured. Head black, slightly silvery-grey dusted; frontal stripe matt black, at vertex with fine pruinescence; ocellar triangle black; antennae black, apex of pedicel light yellowish-brown; palpi yellowish-brown. Occiput shining black, slightly grey pollinated. Thorax entirely black, with fine grey pollination; three matt black longitudinal stripes are distinct before suture only; they separated by a pair silvery gray spots near fore margin of thorax; fore spiracles black, hind ones brownish-black. Legs black. Wings distinctly infuscated in fore part, especially along veins; basicosta and epaulette yellow, tegula black, veins brownish black. Colour of abdomen variable: from entirely shining-black (Fig. 5) to mainly brownish-yellow except black base of 1+2nd tergite, narrow longitudinal median stripes of 1+2nd and 3rd tergites, triangular median spot and fuscous hind border of 4th tergite and completely shining black 5th tergite (Fig. 7); sometimes 3rd tergite with brownish-yellow lateral spots in fore 0.5-0.8 (Fig. 4). All abdominal sternites shining black (♂) or dark brown to black (♀).

Epandrium and female terminalia shining brownish-black.

Head (Figs 1, 2): Frons of both sexes at vertex 0.29-0.32x, at level of antennal base 0.38-0.40x of head-width, at its narrowest point about 0.6-0.8 times as wide as an eye in dorsal view. Frontal stripe almost parallel-sided, slightly widened anteriorly, at level of proclinate *orb* 0.9-1.3x as wide as one parafacial, covered with very short microscopic setae, almost bare; second aristonere about 1.4-1.5x as long as wide. Parafacial, in profile, at level of antennal base 0.17-0.20x, genae 0.28-0.35x as high as compound eye; parafacial distinctly widened than postpedicel. Face with distinct narrow median longitudinal carina separating antennae. Vibrissal angle laterally distinctly placed in front of anterior margin of eye. Palpi short, at apex slightly clavate. Ocellar setae 1+2, strong and reclinate; *vti* very long and strong, *vte* absent; *fr* 6-11, middle long and strong; *orb* 1+1, slightly longer than *fr*; fronto-orbital plate and upper part of parafacial with microscopic setae; hind part of parafacial with a row of 2-3 elongate and several short setae along eye border. The upper part of facial ridge bare, its lower with several strong bristles, among them a pair of the longest angular *vi* present. Genae and occiput with erect black hairs; several pairs of black oral bristles well developed.

Thorax: Covered with short black hairs, bristles well developed; prosternum and proepisternum bare. Humeral callus with three strong setae; *acr* 1-3+1, only prescutellar pair distinctly developed; *dc* 2+3; *ia* 1+2; *npl* 2; *kepst* 2+1; propleuron bare. Scutellum with long, strong parallel apical and lateral bristles, short and fine basal setae; other setae hair-like. Subscutellum distinctly shortened than scutellum.

Wings (Fig. 3): Costal spine very long, about 2.0-2.5 times as long as crossvein *r-m*. Costal vein (*C*) covered with distinct numerous spines from base to the middle of 5th section (*CS5*); second costal portion (*CS2*) with short setulae ventrally. Base of *R4+5* with 3-5 black dorsal and 1-2 ventral setulae; the strongest setulae equals to costal spine in length. Section of *M* between crossveins *r-m* and *dm-cu* distinctly shorter than the section between *dm-cu* and

right-angled bend of *M*. Petiole of cell *r4+5* 0.5-0.9 times as long as fast straight post-angular portion of *M*; *dm-cu* distinctly *s*-liked curved.

Legs: All male tibiae ventrally with short dense spine-like setae. Almost straight elongate claws distinctly longer than tarsomere 5; pulvilli narrow and elongate. Fore leg: tibia with 3-4 anterodorsal and one posterodorsal setae. Mid leg: male femur with posteroventral ctenidium; tibia with 3-4 long anterodorsal and posterodorsal, one posterior, and one anteroventral setae. Hind leg: tibia with 3-4 long anterodorsal and posterodorsal, and one anteroventral setae.

Abdomen: 1+2nd and 3rd tergites with paired elongate median marginal bristles; 4th and 5th tergites with rows of strong marginals; discal setae absent.

Male postabdomen (Fig. 6): 6th and 7th tergites distinctly separated by deep junction; cercus straight, surstylus 2x as long as cercus, in profile slightly curved ventrally, with small apical hook. Paraphallus with a pair of well sclerotised dark ventro-lateral plates; small acrophallus directed dorsally, membranous.

Body length: 6.5-8.0 mm.

Ecology: The larvae are the internal parasites (parasitoids) of woodlice (Isopoda) *Armadillidium frontirostre* Budde-Lund (Bürgis, 1992b), *A. vulgare* (Latr.) (Bürgis, 1991a; Horstmann and Bürgis, 1991), *Philoscia* sp., *Porcellio* sp., *Tracheoniscus* sp. (Bürgis, 1991a, 1992a). The larvae of hymenopteran host *Phygadeuon armadillidii* Horstmann and Bürgis, 1991 (Hymenoptera: Ichneumonidae) are known as hyperparasites of pupae (Horstmann and Bürgis, 1991). Adult flies were collected at altitudes up to 4000 ft a. s. l. [about 1220 m] (Mihályi, 1980; Mik, 1866).

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References

- Bedding, R.A. 1973. The immature stages of Rhinophorinae (Diptera: Calliphoridae) that parasitise British woodlice. Transactions of the Royal Entomological Society of London 125(1): 27-44.
- Bürgis, H. 1991a. Parasitische Hautflügler aus Puparien der in Asseln schmarotaenden Asefliegen. Teil 1: Eine neue Wespe. Mikrokosmos 80: 295-299.
- Bürgis, H. 1991b. Parasitische Hautflügler aus Puparien der in Asseln schmarotaenden Asefliegen. Teil 2: Ein inhaltsreicher Fund. Mikrokosmos 80: 368-371.
- Bürgis, H. 1992a. Parasitische Hautflügler aus Puparien der in Asseln schmarotaenden Asefliegen. Teil 3: Detektivische Ermittlungen. Mikrokosmos 81: 50-52.
- Bürgis, H. 1992b. Parasitische Hautflügler aus Puparien der in Asseln schmarotaenden Asefliegen. Teil 4: Die Asselfliege, Schlussbemerkungen. Mikrokosmos 81: 100-104.
- Cerretti, P. and Pape, T. 2007. Two new species of European *Stevenia* Robineau-Desvoidy (Diptera: Rhinophoridae) and a key to the Palaearctic species. Zootaxa 1624: 31-41.
- Cerretti, P. and Pape, T. 2009. Phylogeny and redefinition of the genus *Melanophora* (Diptera: Rhinophoridae), with description of a new species from Sardinia. Zootaxa 2318: 552-565.
- Cerretti, P., Logiudice, G. and Pape, T. 2014. Remarkable Rhinophoridae in a growing generic genealogy (Diptera: Calyptratae, Oestroidea). Systematic Entomology 12080: 1-31.
- Crosskey, R.W. 1977. A review of the Rhinophoridae (Diptera), and a revision of the Afrotropical species. Bulletin of British Museum (Natural History). Series B. Entomology 36(1): 1-66.
- Herting, B. 1961. 64e. Rhinophoridae. In: E. Lindner (ed.). Die Fliegen der paläarktischen Region 9 (216): 1-36.
- Herting, B. 1993. Family Rhinophoridae. In: Á. Soós and L. Papp (eds.). Catalogue of Palaearctic Diptera 13. Anthomyiidae - Tachinidae. Budapest: Science Herald. 102-117pp.
- Horstmann, K. and Bürgis, H. 1991. Eine neue *Phygadeuon*-Art als Hyperparasit einer Assel (Hymenoptera, Ichneumonidae).

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- Nachrichtenblatt der Bayerischen Entomologen 40 (2): 41-44.
- Khitzova, L.N. 1981. On the fauna of rhinophoride (Diptera, Rhinophoridae) of the south of European part of USSR. VINITI, N 4222-Dep.: 1-7.
- Koçak, A.Ö. 2014. List of the 23773 pterygote species in Turkey based upon the info-system of the Cesa. Priamus 32: 1-877.
- Koçak, A.Ö. and Kemal, M. 2015. Initial results of the entomofauna of SW Asia, based upon the info-system of the Cesa (excl. Lepidoptera). Priamus 35: 1-1186.
- Mihályi, F. 1980. Ergebnisse der Albanien-Expedition 1961 des Deutschen Entomologischen Institutes. 93. Beitrag. Diptera: Calliphoridae, Sarcophagidae, Rhinophoridae. Beiträge zur Entomologie 30(2): 333-341.
- Mik, J. 1866. Beitrag zur Dipterenfauna des österreichischen Küstenlandes. Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 16: 301-312.
- Pape, T. 1998. Rhinophoridae. In: L. Papp and B. Darvas (eds.), Contributions to a manual of Palaearctic/European Diptera. Budapest: Science Herald. 679-689pp.
- Peris, S.V. and González-Mora, D. 2007. A key to the identification to the World genera of Calliphoridae. Subfamilies with stem-vein bare: Subfamily Rhinophorinae (Diptera, Calliphoridae). Boletín de la Real Sociedad Española de Historia Natural (Sección Biologica) 102(1-4): 35-60.
- Pohjoismäki, J. and Kahanpää, J. 2014. Checklist of the superfamilies Oestroidea and Hippoboscoidea of Finland (Insecta, Diptera). ZooKeys 441: 383-408.
- Stein, P. 1924. Die verbreitetsten Tachiniden Mitteleuropas nach ihren Gattungen und Arten. - Archiv für Naturgeschichte 90 A (6): 1-271.
- Verves, Yu. G. 2005a: A checklist of Ukrainian Rhinophoridae (Diptera). Studia dipterologica (2004) 11(2): 609-613.
- Verves, Yu. G. 2005b: Faunistic and taxonomical notes of Rhinophoridae (Diptera) with special reference of Ukrainian fauna. Entomological Problems 35(1): 69-74.
- Verves, Yu. G. and Khrokalo, L.A. 2006. 122. Fam. Rhinophoridae. Key to the insects of Russian Far East 6(4): 9-13.
- Wijnhoven, H. 2001. Biology and ecology of the Dutch woodlouse-flies (*Diptera: Rhinophoridae*). Nederlandse Faunistische Mededelingen 15: 91-109.
- Zeegers, Th. 2008. Order Diptera, family Rhinophoridae. In: A. van Harten, (ed.): Arthropod fauna of the United Arab Emirates 1: 732-740.
- Zeegers, Th. 2011. New and little known Rhinophoridae (Diptera) from Turkey. Stuttgarter Beiträge zur Naturkunde A, Neue Serie 4: 313-320.