

## *Coleophora variicornis* Toll, 1952 stat. rev. is a distinct species occurring in Central Europe (Coleophoridae)

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**Abstract.** *Coleophora variicornis* Toll, 1952 formerly treated as a synonym of *C. hieronella* Zeller, 1849 is recognised as a distinct species after investigation of the type specimens. Diagnoses are given to distinguish these two species from the other members of the *Coleophora trifolii* species group and to distinguish *C. variicornis* from *C. hieronella*. Their external and genitalia features are described and figured. According to our investigations, *C. variicornis* is known by specimens from Albania, Bulgaria, Croatia, Germany, Italy, Macedonia, Turkey, and Turkmenistan. *Coleophora variicornis* is recorded for the first time from Central Europe by specimens collected in historical and recent times from the German state of Brandenburg. *Coleophora hieronella* is so far known from Spain, France, Italy (Sicily), and Croatia.

**Key words.** *Coleophora trifolii* species group, *variicornis*, *hieronella*, taxonomy, nomenclature.

### Introduction

Vives-Moreno (1988) listed about 1000 species for the genus *Coleophora* Hübner, 1822 world wide, of which 174 species occur in Germany (Gaedike & Heinicke 1999). When we revised the faunistic inventory of the species of *Coleophora* Hübner, 1822 from eastern Germany we found altogether six species distinguished by their metallic green coloured forewings. However, until that time only five species with this character had been known from Germany (Gaedike & Heinicke 1999). These are *C. frischella* (Linnaeus, 1758), *C. mayrella* (Hübner, [1813]), *C. alcyonipennella* (Kollar, 1832), *C. trifolii* (Curtis, 1832), and *C. deauratella* Lienig & Zeller, 1846 for which Emmet *et al.* (1996) proposed the *C. trifolii* species group (which excludes *C. alcyonipennella* which is not known from the British Isles, but includes the Mediterranean *C. fuscicornis* Zeller, 1847 which is recorded from North Essex in Great Britain).<sup>1</sup> So far as known, the larvae of these species feed on the seeds of legume species of the genera *Melilotus*, *Trifolium*, and *Vicia* (Emmet *et al.* 1996).

We checked the literature for other species related to this species group (e.g. Baldizzone 1986, 1990a, b; Vives-Moreno 1988; Nel 1993; Emmet *et al.* 1996) and traced about 30 names (including synonyms) available for metallic-green *Coleophora* species. However, we could not identify our German specimens with the available literature and started to check the type specimens. During this process, we found that *C. variicornis* Toll, 1952 which has been treated as a synonym of *C. hieronella* Zeller, 1849 (Toll 1961; Baldizzone 1986; Vives-Moreno 1988) is a distinct species conspecific with specimens from Germany. In the following, we redescribe the two species, figure their genitalia and give a list of the examined material.

<sup>1</sup> According to Gaedike & Heinicke (1999), there is another metallic-green *Coleophora* species known from Germany, *C. paripennella* Zeller, 1839. However, this species does not belong to the *C. trifolii* species group due to different morphological features of the genitalia and a different life history (cf. Emmet *et al.* 1996: 300–301, figs. 52b, 78d, pl. 15 fig. 28).



**Fig. 1.** *Coleophora variicornis*, adult from Germany, Brandenburg, Jänschwalde/ Ost, 23.vi.2002, Stübner leg. Note the flagellum which is thickened along the basal third, chequered black and white along the distal two thirds.

**Abbreviations.** DEI – Deutsches Entomologisches Institut, Eberswalde; BMNH – The Natural History Museum London; GU – Genitaluntersuchung (genitalia slide); MNHU – Museum für Naturkunde der Humboldt-Universität zu Berlin; MTD – Staatliches Museum für Tierkunde, Dresden; ISEZ – Polish Academy of Sciences, Institute of Systematics and Evolution of Animals, Department of Invertebrate Zoology, Krakow; ZSM – Zoologische Staatssammlung, München.

## Results

Externally, *C. variicornis* (Fig. 1) and *C. hieronella* present the same morphological features and can not be distinguished from each other. The forewing length (measured from the base of the wing to the tip of the apical fringe) is 4–5.5 mm in *C. variicornis* and 5.5 mm in the holotype of *C. hieronella*. Head vertex and frontoclypeus covered with metallic olive-green scales, shining metallic copper to bronze; compound eye black-brown, shining metallic violet, not distinctly edged; labial palpus metallic olive-green, basio-ventrally creamy-white; proboscis basally scaled creamy-white. Antenna about three quarter as long as forewing; scape flat and enlarged, covered with elongated metallic violet-brown scales projecting ventrally; first third to first half of flagellum thickened by dark metallic brown to violet coloured scales, remaining distal part entirely chequered black and white. Thorax dorsally and ventrally covered with metallic olive-green scales; legs metallic olive-green

to brown, shining orange to violet; dorsal surface of forewing basally scaled metallic olive-green, changing to metallic brown and violet distally, ventral surface shining silver (changing to brown in older collection specimens); hindwing lanceolate, greyish-brown, not metallic. Abdomen metallic silver, ventrally with some olive shine.

Though *C. variicornis* and *C. hieronella* can not be distinguished externally from each other, they differ by their characteristic scaling of the antennae from all other metallic-green *Coleophora* species we examined. Some species of the *C. trifolii*-group have a basally slender flagellum without elongated scales (*C. alcyonipennella*, *C. frischella*, *C. fuscicornis*, *C. trifolii*, *C. etrusca* Baldizzone, 1990) while the flagellum of the remaining species of the *C. trifolii* group is basally thickened by elongated scales (*C. deauratella*, *C. hieronella*, *C. mayrella*, *C. paramayrella* Nel, 1993, *C. variicornis*). Among the five species with a basally thickened flagellum, the remaining part of the flagellum is black with a white tip (*C. deauratella*), chequered black and white with a white tip (*C. mayrella*, *C. paramayrella*), or entirely chequered black and white (*C. variicornis*, *C. hieronella*). However, we also found *C. mayrella* specimens which have the antennae entirely chequered black and white up to the tip. Those specimens need to be identified by their genitalia. For the identification of *C. mayrella* (= *Porrectaria spissicornis* Haworth, 1828), we here refer to Baldizzone (1986) and Emmet *et al.* (1996).

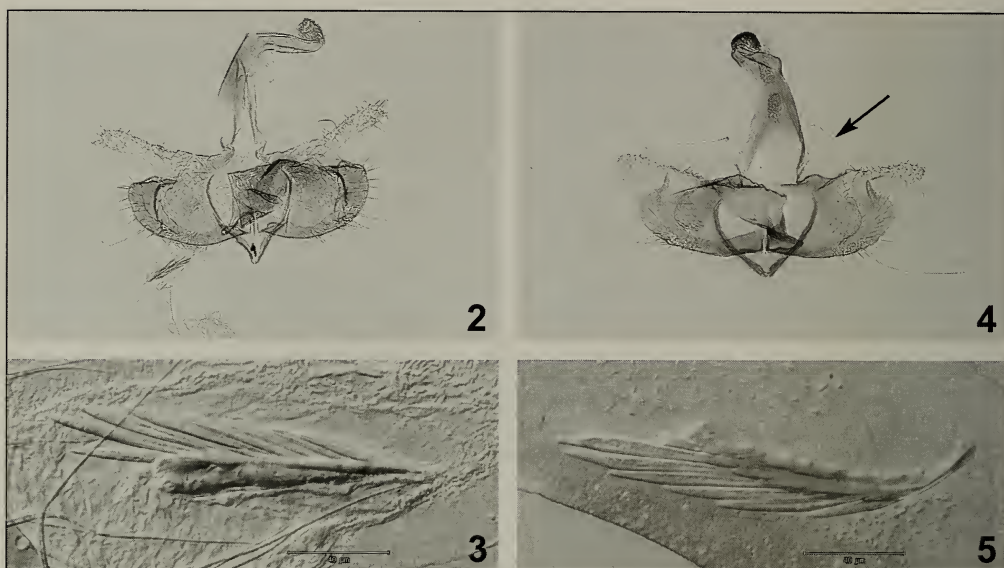
***Coleophora variicornis* Toll, 1952: 28, fig. 21, stat. rev.**

(Figs. 1–3, 6, 7)

**Material.** Holotype ♂ with labels: “Typus” (red paper, printed in black); “Holotypus” (red paper, printed in black); “*fabriciella* | *Amasia*” (*handwritten* with pencil on light green paper); “Präparat | No. 39 | Gr. v. Toll” (on white paper *handwritten* and printed in black); “*Coleophora* | *variicornis* Toll | *Typus*. | Gr. v. Toll det.” (*handwritten* and printed in black ink), MNHU. Paratypus: ♂ same data as holotype, ISEZ. ♂ **Albania**, Borschi, south of Vlora, 14–27.v.1961; ♂ Albania, Uji Ftohte, south of Tepelena, 200 m, 29–31.v.1961; 4♂, Albania, west of Poliçan, Tomor, 500 m, 2–12.vi.1961; 4♂ Albania, Iba below Krraba, 400 m, 17–22.vi.1961; 3♂ Albania, Daiti, Shkall Prisk, 850 m, 27.vi.–2.vii.1961; all specimens at light, Albania expedition DEI, coll. DEI. ♂ **Croatia**, Dalmatia mer., environment of Gravosa, 15–31.v.1939, Klimesch leg., ZSM. ♂ **Macedonia**, Matka, Treska valley, 19–29.v.1955, Klimesch leg., ZSM. ♂ **Italy**, Lucania, Vulture Va! d’Ofanto, 20–30.iv.1966, Klimesch leg., ZSM. ♀ **Bulgaria**, Pirin mts., Liljanovo, 800 m, 26.v.–21.vi.1981, leg. Eichler, coll. DEI. 25♂, ♀ **Germany**, Brandenburg, Jänschwalde/Ost, 2.viii.1996, 26.vi.1998, 16., 28.vi., 13.vii.1999, 11.vi., 1.vii., 1.viii.2000, 29.vi., 1, 3, 23.vii.2001, 13, 17, 23.vi.2002, 14.vi., 7., 14.vii.2003; 4♂ Jänschwalde, power station, 15, 16, 22.vi.2002, all specimens A. Stübner leg., coll. Stübner, MTD. ♂ Potsdam-Wilhelmshorst, 10.vii.[19]43, coll. Ernst, MTD. 1♂ **Greece**, Delphi, Parnass, 500 m, 28–30.iv.1980, Cox leg., coll. van der Wolf. 3♂ **Turkmenistan**, western Kopet Dag, 40 km east of Garrygala (= Kara Kala), 800 m, 4, 15, 19.v.1993, Sruoga leg., coll. van der Wolf.

**References.** Toll 1961: 280 (syn. of *hieronella*); Patzak 1974: 319: (*C. variicornis* as *bona* sp.); Baldizzone 1986: 3, 9, figs. 15, 18, 24–26 (as *C. hieronella*); Vives-Moreno 1988: 82 (syn. of *hieronella*); Razowski 1990: fig. 407 (as *C. mayrella*).

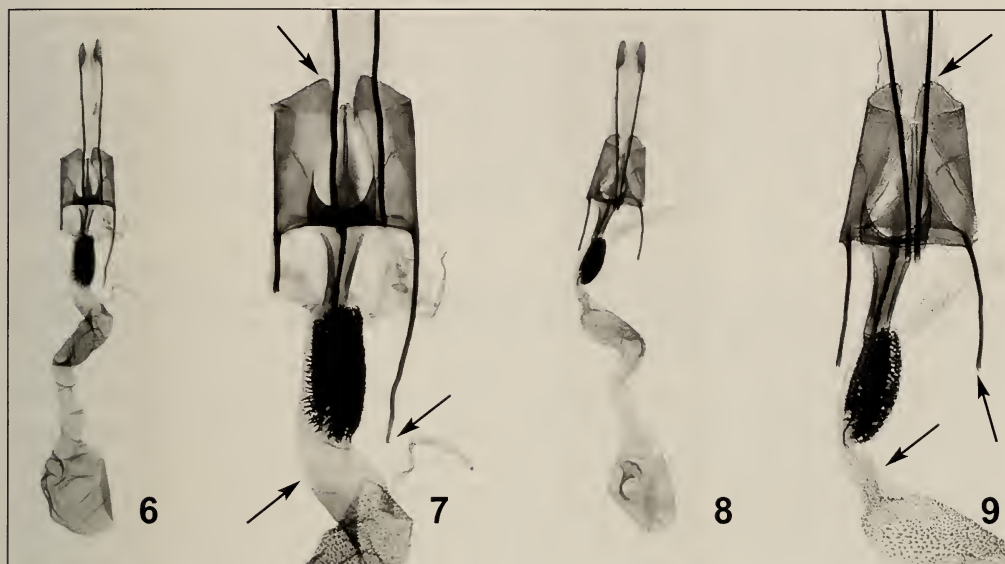




**Figs. 2–5.** Male genitalia. **2.** *C. variicornis* (GU Stübner 860), cornuti (interference contrast and extended focus option with 41 planes, interplanal distance 0.55 µm, object depth 22.2µm) scale bar 40µm. **3.** *C. variicornis* (GU Stübner 860), cornuti (interference contrast and extended focus option with 62 planes, interplanal distance 0.74 µm, object depth 45,6 µm) (one cornutus is broken off) scale bar 40µm. **4.** *C. hieronella*, holotype (genitalia slide BM Microlep. 2363). **5.** *C. hieronella*, holotype (genitalia slide BM Microlep. 2363), cornuti (interference contrast and extended focus option with 62 planes, interplanal distance 0.74 µm, object depth 45,6 µm) (one cornutus is broken off) scale bar 40µm.

♂ genitalia (Figs. 2, 3). As is characteristic for the genus *Coleophora*, an uncus is not present and the distal part of the gnathos is an ovoid structure bearing many spines; tegumen narrow, without any special features; vinculum slender, V-shaped; costal part of valva weakly sclerotised, finger-shaped, without macroscopic setae dorsally; sacculus strongly sclerotised, dorsal edge more strongly sclerotised and terminating in a dorso-distal thorn, with one macroscopic seta ventro-anally; aedeagus caudally forming a sclerotised ring with a dorso-caudal elongated projection, vesica with a group of 8–10 cornuti, which arise from a broad, straight sclerotised base, which can be plate-like and enlarged; each cornutus straight.

♀ genitalia (Figs. 6, 7). Bursa copulatrix ovoid with minute scobinate patches in its wall, signum crescent-shaped and with a sclerotised hook directed inwardly; ductus bursae membranous and straight on anterior third, slightly angled beyond and along the second third with numerous sclerotised spines in wall, angled at insertion of ductus seminalis, posterior third straight and membranous; colliculum forming an ovate sclerotised shield with strongly sclerotised spines; antrum strongly sclerotised, funnel-shaped, with a smooth wall; VIIIth segment entirely sclerotised, surrounding ostium bursae ventrally; membrane VIII-IX elongated; apophyses posteriores twice as long as apophyses anteriores; papillae anales separated, each pointed distally.



**Figs. 6–9.** Female genitalia. **6.** *C. variicornis* (GU Stübner 1407). **7.** *C. variicornis* (GU Stübner 1407), detail of posterior ductus bursae and segment VIII. **8.** *C. hieronella* (GU van der Wolf 6242). **9.** *C. hieronella* (GU van der Wolf 6242), detail of posterior ductus bursae and segment VIII. (a.a.: apophyses anteriores; c: colliculum; d.b.: ductus bursae; d.s.: ductus seminalis; VIII: segment VIII)

**Diagnosis.** *Coleophora variicornis* is distinguished from *C. hieronella* in the male by the absence of a macroscopic seta from the costa of the valva and in the female by the more pointed posterior tips of segment VIII, the longer apophyses anteriores, and the thicker ductus bursae between the ductus seminalis and colliculum.

**Distribution.** Known from Germany, Italy, Croatia, Macedonia, Albania, Bulgaria, Greece, Turkey, and Turkmenistan.

**Life history.** The male adults have been attracted by lights, the female has been netted from *Trifolium pratense* flowers in day time. Surprisingly, *C. variicornis* is at least in some areas of eastern Germany the most common species of the *C. trifolii* species group.

### *Coleophora hieronella* Zeller, 1849: 203

(Figs. 4, 5, 8, 9)

**Material.** Holotype (by monotypy) ♂ “Syracuse | SIZILY | 29.iv.1844 | Zeller.” (handwritten with black ink on white paper), “*Hieronella* Z. | 29/4 44. Syracus. | Mayrella Is. 47, 883” (handwritten with black ink on white paper, edged with black ink), “B.M. ♂ | Genitalia slide | No. 2363” (printed in black and handwritten in red ink), “*Coleophora* | *hieronella*, Z. | *Lin. Ent. IV. 203. (1849)* | = *C. \* mayrella*, Z. Is. 1847.883-4 | Type ♂-unique-desr.” (handwritten and printed with black ink on white, black edged paper), (drawer label: “Holo- | type”), BMNH. ♂, ♀ [paratypes of *C. variicornis*!] **Spain**, Chiclana, iv–v.1912, Korb leg., ISEZ; 4♂ Huelva, El Rompido, 13.v.1981, coll. van der Wolf; 4♂ Sierra Morena, Sta. Elena, Jaen, 10.v.1983, J. B. Wolschrijn, coll. van der Wolf; ♂ Almeria, Las Menas de Seron, 1500 m,

1–2.vi.2003, leg. et coll. van der Wolf; ♂ Huelva, Mazagon, 8–10.iv.1994, leg. et coll. van der Wolf; 2♂ Ventade, Azuel, Cortoba, 17.v.1981, coll. van der Wolf; ♂ Marabella, Malaga, 5.v.1981, coll. van der Wolf; ♂ Salamanca, Belena, 8.v.1979, coll. van der Wolf; ♂ Sevilla, Ronquillo, 15.v.1981, coll. van der Wolf; ♂ Granada, 2.v.1978, coll. van der Wolf; ♂ Periana, Malaga, 24.iv.1978, coll. van der Wolf; ♂ Andalusia, province Malaga, Camino, de Ojen, 150 m, 17.iv.1980, E. Traugott-Olsen leg., ZSM; ♂ Granada, 5 km north of Otivar, 600 m, 17.iv.1987, Coenen & de Prins leg., coll. van der Wolf. ♂ France, Corse sept., Calvi, 12–20.v.1967, Klimesch leg., ZSM; ♂, ♀ Corse, Ste Lucie de Porto Vecchio, 7, 11.v.1996, K. J. Huisman leg., coll. van der Wolf. ♂ Italy, Sizily, Palermo, S. Martino d. Scale, 20–31.v.1954, Klimesch leg., ZSM. ♂ Croatia, Istrien, Moscenice, 300 m, 5.vi.1970, A. Speckmeier leg., ZSM

References. Toll 1961: 280; Patzak 1974 b: 319 (syn. of *spissicornis*); Baldizzone 1983: 225, 227; Kaltenbach & Roesler 1985: 49, 83, 84, 93, 104; Baldizzone 1986: fig. 14 (male genitalia of holotype of *C. hieronella*); Vives-Moreno 1988: 82; Baldizzone 1990 a: 43; Baldizzone 1994: 83; Baldizzone 1995: 110; Baldizzone 1997: 223.

♂ genitalia (Figs. 4, 5). As is characteristic for the genus *Coleophora*, an uncus is not present and the distal part of the gnathos is an ovoid structure bearing many spines; tegumen narrow, without any special features; vinculum slender, V-shaped; costal part of valva weakly sclerotised, finger-shaped, with one macroscopic seta dorsally; sacculus strongly sclerotised, dorsal edge more strongly sclerotised and terminating in a dorso-distal thorn, and with one macroscopic seta ventro-anal; aedeagus caudally forming a sclerotised ring with a dorso-caudal elongated projection, vesica with a group of seven cornuti, which arise from a sclerotised, slender and elongated base which is bent on the side where the smaller cornuti arise (entire length of cornuti group: 180 µm); each cornutus slightly bent.

♀ genitalia (Figs. 8, 9). The features of the ♀ genitalia are very similar to those of *C. variicornis*, with the following exceptions: the posterior tips of segment VIII are less pointed, more rounded, the apophyses anteriores are shorter, and the ductus bursae is narrower posterior to the ductus seminalis.

Diagnosis. *Coleophora hieronella* differs from *C. variicornis* in the male by the presence of a seta at the costa of the valva, in the female by the more rounded posterior tips of segment VIII, the shorter apophyses anteriores, and the narrower ductus bursae between the ductus seminalis and colliculum.

Distribution. Known from France, Spain, Italy (Sicily), and Croatia.

Remarks. After we identified a male of *C. hieronella* collected on May 11, 1996 at “Ste Lucie de Porto Vecchio” on Corsica, we concluded that a female from the same locality collected on May 7, 1996 might be conspecific with it. Subsequently, we investigated the differences of *C. hieronella* and *C. variicornis* in female genitalia and found that they are very little. However, the result is supported by the fact that the two paratypes (♂, ♀) of *C. variicornis* from Spain appeared to be true *C. hieronella*, and all characters correspond with that species. According to these results, Baldizzone (1986) figured under ‘*C. hieronella*’ a female of *C. hieronella* on figures 24 and 25 (from Andalusia), but *C. variicornis* on figure 26 (from Eolie Islands, Lipari).



## Discussion

Baldizzone (1983–1997) records '*C. hieronella*' from a number of localities in the Mediterranean Region. Since this species has been confused with *C. variicornis* formerly, we do not repeat those records for the distribution of *C. hieronella* here. It will be necessary to re-investigate those records and to verify whether the specimens belong to *C. hieronella* or to *C. variicornis*.

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