

## ***Coleophora grotenfelti* Tabell & Kosorín, a new species belonging to the *C. dianthi* species complex (Lepidoptera: Coleophoridae)**

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**Abstract.** *Coleophora grotenfelti* sp. n., a new species of the *Coleophoridae* family belonging to the *Coleophora dianthi* species complex, is described. According to the genital structures of both sexes, the species is closely related to *Coleophora pseudodianthi* Baldizzone & Tabell, 2006, *Coleophora bucovinella* Nemeş, 1968, *Coleophora albilineella* Toll, 1960 and *Coleophora dianthi* Herrich-Schäffer, 1855. *C. grotenfelti* is diagnosable by genitalia structures and DNA barcodes. Adult male and female, and their genitalia are illustrated, and comparisons to all species in the *C. dianthi* complex are offered.

**Keywords.** Lepidoptera, Coleophoridae, *Coleophora grotenfelti*, *Coleophora dianthi* species complex, DNA barcoding, new species.

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### **Introduction**

Up to now, the *Coleophora dianthi* species complex comprises four different species: *C. dianthi* Herrich-Schäffer, 1855; *C. albilineella* Toll, 1960; *C. bucovinella* Nemeş, 1968; *C. pseudodianthi* Baldizzone & Tabell, 2006. Formally, *C. bucovinella* was upgraded from the synonymy in 2019 by Baldizzone, although its status as a valid species was discussed already in 2006 (Baldizzone & Tabell). In this paper we add one further member to the *C. dianthi* species complex, *Coleophora grotenfelti* Tabell & Kosorín, sp. n.

Initially, the first author found four unknown *Coleophora* specimens from the material collected in Greece in 1981 by Paul Grotenfelt, housed in the Zoological Museum of Helsinki. Subsequently, two specimens of the same species were collected by Timo Nupponen from Hungary in 2007. And recently, studies conducted by the second author revealed still several further specimens from different countries. All specimens studied by us are listed below and supplemented with information received from Giorgio Baldizzone. The material is deposited in private collections of G. Baldizzone (Asti, Italy), F. Buschmann (Jászberény, Hungary), G. Derra (Reckendorf, Germany), F. Kosorín (Hronské Kľačany, Slovakia), K. & T. Nupponen (Espoo, Finland), Ig. Richter (Malá Čausa, Slovakia) and J. Tabell (Hartola, Finland), and in the national museums of Budapest, Copenhagen, Helsinki, Munich, and Vienna.

## Methods

Morphological examination: all genitalia preparations and photographs were made by F. Kosorin, J. Tabell and Ig. Richter unless otherwise noted.

### Abbreviations

DEEUR - prefix for Depressariinae sample numbers managed by Peter Buchner  
 LEASV - prefix for sample numbers managed by Peter Huemer  
 LECOL - prefix for sample numbers managed by Matthias Nuss  
 LEFIJ - prefix for sample numbers of Coleophoridae managed by Marko Mutanen  
 TLMF - Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria  
 MTM - Magyar Természettudományi Múzeum, Budapest, Hungary  
 ZMUC - Zoological Museum of Copenhagen, Copenhagen, Denmark  
 MZH - Finnish Museum of Natural History, Helsinki, Finland  
 ZSM - Zoologische Staatssammlung München, München, Germany

## Taxonomic part

### *Coleophora grotenfelti* Tabell & Kosorin, sp. n. (Figs. 1-5)

Material. Holotype: **Slovakia**, 1 ♀ Štiavnické Vrchy, Rybník, 18 ° 33'30"E, 48 ° 18'31"N, 310 m., 18.6.2012, DEEUR 2137-18 with DNA barcode sample id TLMF Lep 26034 (658 bp [0n]), leg. F. Kosorin, genitalia slide FK / 2995, coll. MZH.

Paratypes: **Bulgaria**: 1 ♂ Nova Lovcha, 22.-23.6.2014, genitalia slide IgR/27786, leg. Z. Tokar, coll. Ig. Richter. **Corsica**: 2 ♂ Ascotal 250 m, M.6.72, leg. Zürnbauer, GP Bldz 2657 and Bldz 2660), coll. Derra; 1, Christiensen Genitalia, ♂ Ascotal, 600 m, A.6.72, Restonicotal, leg. Zürnbauer, GP Bldz 2664, coll. Derra. **France**: 1 ♂ and 1 ♀ Provence, Aups, 475 m, 3.6.2014, leg. R. Seliger, genitalia slide FK/4395 and FK/4396, det. & coll. F. Kosorin. **Greece**: 1 ♀ Lakonia 7 km. SW Monemvasia, 2.4.1979, leg. Christensen, Genitalia Slide 3843, G. Baldizzone, coll. ZMUC; 2 ♀ Peloponisos, Arkadia Vitina, 23.6.1981, Paul Grotenfelt [leg.], GP 6088 J. Tabell, colls. MZH and J. Tabell; 1 ♂ and 1 ♀, idem, but 24.6.1981, GP 4116 and 4115 J. Tabell, coll. MZH; 1 ♀ Pelopones, Diakoftó, 70 m., 19.6.2011, genitalia slide IgR/24178, leg. & coll. J. Skyva; 1 ♂ Peloponnese, Loutra Kyllinis, 37.857913 ° N, 21.111010 ° E, 25 m, 14.5.2009, leg. R. Seliger, LECOL 324-12, with DNA barcode sample id BC KS 00324, (658 bp [0n]), coll. ZSM; 1 ♂ Peloponez, 37.8489 ° N, 21.1067 ° E, 9.5.2019, leg. P. Huemer, LEASV 623-19, with DNA barcode sample id TLMF Lep 27375 (658 bp [0n]), coll. TLMF. **Hungary**: 2 ♀ Kecskemét 20 km E, near Kerekegyháza village, 14.6.2007, T. Nuppenon leg., GP 5272 J. Tabell, LEFIJ5407-16 and LEFIJ5406-16, with DNA barcode sample id MM24987 (609 bp [0n]) and MM24986 (658 bp [0n]), coll. Nuppenon; 1 ♂ Gyöngyös, Sár-hegy, 15.6.2010, leg. F. Buschmann, genitalia slide IgR/16167, coll. MTM; 1 ♀ Jászberény, Újerdő, erdei fenyves, 23.6.2010, genitalia slide IgR/16162; 1 ♂, genitalia slide IgR/16159 and 1 ♀, genitalia slide IgR/16169, det. Ig. Richter, leg. & coll. F. Buschmann; 5 ♀ Örkény, 18.6.2012, leg. & coll. Ig. Richter, genitalia slide IgR / 18648; 1 ♀, Tápióság, Nagy-rét, 21.5.2014, genitalia slide IgR/22542, det. Ig. Richter, leg. & coll. F. Buschmann. **Italy**: 1 ♀ Lazio, Vallemare, 28.6.2012, M. Pinzari leg., GP Bldz 16154, coll. Baldizzone. **Montenegro**: 2 ♀ Podkrš, 16.6.2011, genitalia slide IgR/17367, leg. & coll. Ig. Richter. **Sardinia**: 1 ♀ Sardinia m, GP Bldz 13664, coll. Mus. Berlin.

**Diagnosis.** Habitually *Coleophora grotenfelti* can easily be confused with other similar species of the *C. dianthi* species complex, but unlike other species, it has only a very sporadic black dusting on the forewing. Both *C. albilineella* (wingspan 18-21 mm) and *C. bucovinella* (16-19 mm) are markedly bigger than *C. grotenfelti* (12-15 mm). In *C. grotenfelti* white lines on the forewing are strikingly glossy, but in other species such shininess is not present. In the male genitalia, the main distinguishing characters are the shape of sacculus and cucullus: in *C. grotenfelti* the ventrocaudal angle of sacculus is angular (evenly curved in *C. albilineella* and *C. bucovinella*, in *C. dianthi* with a short protuberance). The horn-shaped protuberance at dorsocaudal angle is slightly tapered in *C. grotenfelti* (parallel-sided in *C. dianthi*, apically bulged in *C. pseudodianthi*, short and broad in *C. albilineella*, narrow in *C. bucovinella*). Furthermore, in *C. pseudodianthi* the sacculus is narrower than in other species of the *dianthi* species complex, and in *C. dianthi* the phallosome rods are armed with apical teeth. In *C. grotenfelti* the cucullus is finger-shaped, almost parallel-sided and broader than in *C. albilineella*, *C. dianthi* and *C. pseudodianthi*. In *C. bucovinella* the cucullus is club shaped.

In the female genitalia, the shape of sterigma is characteristic for each species. In *C. grotenfelti* (Figs. 8e, 9a-g), it is almost parallel-sided, 1.4-1.6 x as long as wide, in *C. albilineella* (Fig. 8a) strongly tapered towards apex, 1.2 x as long as wide, in *C. pseudodianthi* (Fig. 8b) almost parallel-sided, 3 x as long as wide, in *C. dianthi* (Fig. 8c) tapered towards apex, 1.1 x as long as wide, and in *C. bucovinella* (Fig. 8d) slightly tapered towards apex, 1.4 x as long as wide. Furthermore, *C. dianthi* has a large lateral bulge at anterior half of colliculum, and the ostium is situated medially on sterigma. In general, the female genitalia of *C. albilineella* and *C. bucovinella* are much larger and apophyses much thicker than those of *C. grotenfelti*, *C. dianthi* and *C. pseudodianthi*.

**Description.** Imago (Figs. 1, 2). Wingspan 12–15 mm. The head and chest are grey-brown, the tegula is white, a pale-yellow belt stretches at the top of the head and the center of the chest. The second segment of the labial palpus is thicker than the third, with pale hair. The third segment is darker and thinner. The proboscis is creamy brown with pale lateral hair. The antenna is brownish with distinctive pale bristles based on each segment. The segments therefore have a ringed impression. The forewing is yellow brown with white glossy lines along main veins. In the distal half of the wing, there is a small number of black scales, especially on the white middle line. The costa is white up to two-thirds from the base, then passes into creamy to grey fringe to the apex. Other fringe on the forewing is white, tipped with grey. The hindwing is grey with darker fringe. Legs are brown, with pale lateral hair. Abdomen is pale grey, in female with strikingly long papillae anales.



Fig. 1. *Coleophora grotenfelti* sp. n., imago, holotype female, Slovakia, Rybník, 18.6.2012

Fig. 2. *Coleophora grotenfelti* sp. n., imago, paratype male, France, Aups, 3.6.2014



Fig. 3. *Coleophora grotenfelti* sp. n., holotype, female genitalia, genitalia slide FK/2995

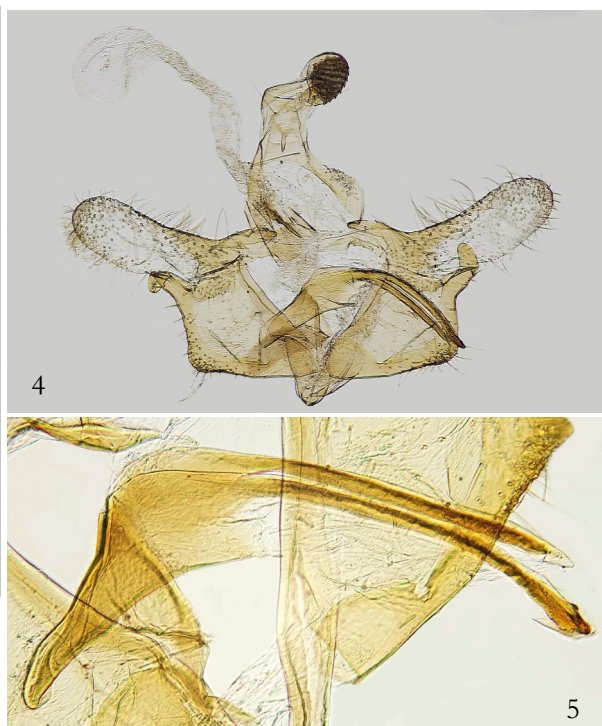


Fig. 4. *Coleophora grotenfelti* sp. n., paratype, male genitalia, genitalia slide FK\_4395

Fig. 5. Detail aedeagus

**Male genitalia** (Figs. 4, 5). Gnathos shape is elliptical, tegumen slim, with broad pedunculum, transtilla long, overlapping. Valvula is triangular, costa is slightly wavy, finger-shaped cucullus expands at the end. Sacculus is widely sclerotized at the periphery, with a slightly concave ventral edge. Ventrocaudal angle is angular, slightly convex. Lateral margin slightly convex, terminated by a robust growth extending beyond half the cucullus. The growth is broad-based, gradually tapering to apex. Aedeagus has a broad sclerotization based on two thin sclerotized rods. The rods are not equally long, the shorter one is sharply terminated, the longer rod is coarsened at the end and terminated into the tip. In the vesica there are 2-3 thin cornuti, grouped into an elongated bundle.

**Female genitalia** (Fig. 3). Papilla analis is elongated with short bristles. Apophysis posterioris is straight and very long. The sterigma is only slightly shorter than the apophysis anterioris, the width of the sterigma being equal to half its length. It is evenly sclerotized along the lateral edge and narrows slightly towards the papillae anales. The central part is transparent, slightly sclerotized. 8th tergite is membrane-like. Ostium bursae is U-shaped and is one-third the length of the sterigma. Colliculum is asymmetrical, the front half is formed by a membrane with a lateral concavity. The posterior half is darkly sclerotized, has a cup-like shape and extends to half the sterigma. Ductus bursae is gradually expanding towards the corpus bursae, with strong coils stretching in the centre. Signum is small, straight, if wide, with a sharp point and a round base.





Fig. 6. Abdomen male of *C. grotenfelti* sp. n.

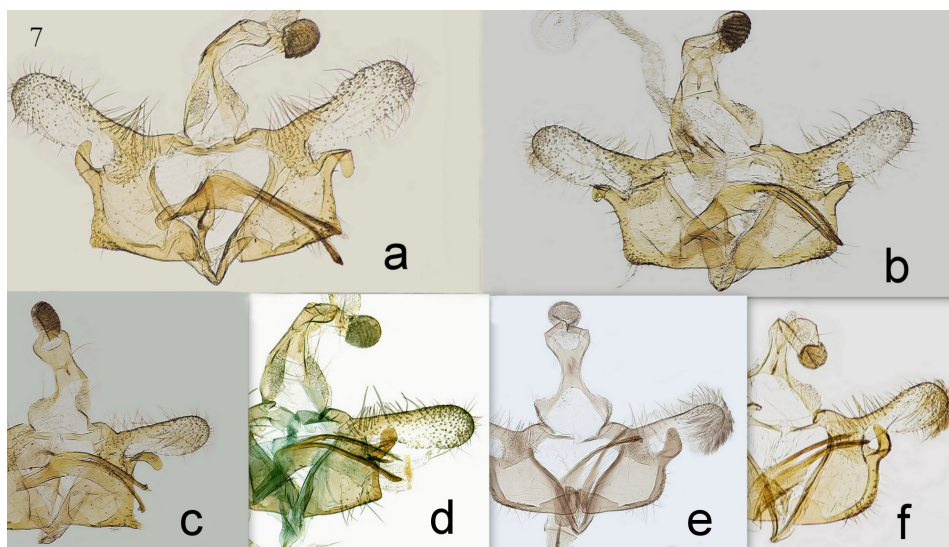


Fig. 7. *Coleophora dianthi* complex, male genitalia: a, b- *C. grotenfelti*, c- *C. dianthi*, d- *C. pseudodianthi*, e- *C. albilineella* (photo Pasi Sihvonen), f- *C. bucovinella*.

**Genetic data.** Five samples of *C. grotenfelti* have been sequenced successfully. The nearest neighbour to *C. grotenfelti* is *C. pseudodianthi*, with a 2.82 % minimum divergence. The barcodes of *C. grotenfelti* exhibit 0.15 % intraspecific variation. Sequence page codes and sample IDs are listed below. Details on the collection sites and sequence types are provided in the type material list (“Material” section). Additional data is accessible through a public dataset.

[http://www.boldsystems.org/index.php/MAS\\_Management\\_DataConsole?codes=DS-DEEUR358](http://www.boldsystems.org/index.php/MAS_Management_DataConsole?codes=DS-DEEUR358).

DEEUR2137-18: TLMF Lep 26034

LEASV 623-19: TLMF Lep 27375

LECOL 324-12: BC KS 00324

LEFIJ5406-16: MM 24986

LEFIJ5407-16: MM 24987

**Distribution.** The new species is known from southwestern Slovakia (Rybník), Hungary (Örkény, Gyöngyös, Tápióság, Jászberény and Kerekegyháza), France (Aups), Italy (Lazio), Corsica, Sardinia, Greece (Peloponnese-Monemvasia, Diakoftó, Loutra Kyllinis), Montenegro (Podkrš), Bulgaria (Nova Lovcha).

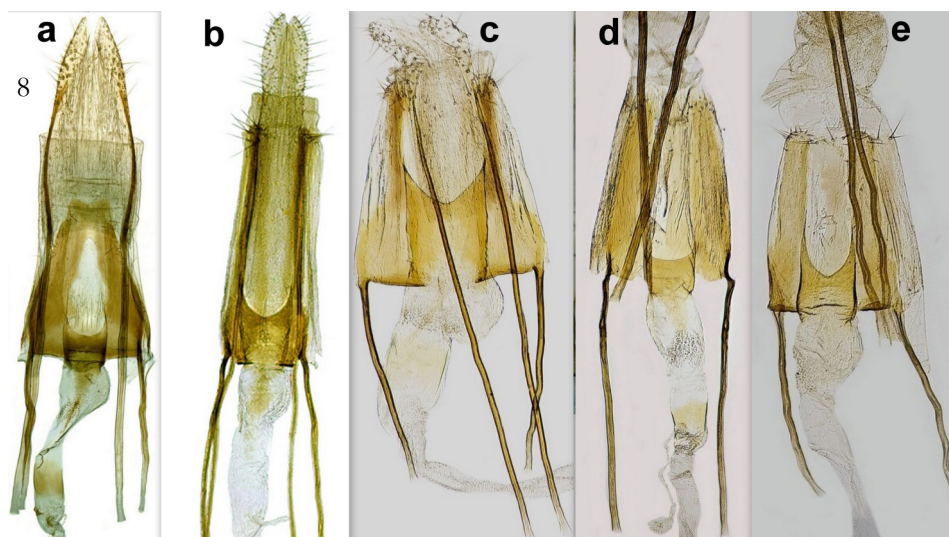


Fig. 8. *Coleophora dianthi* complex, female genitalia, sterigma and colliculum (not in the same scale): a- *C. albilineella*, b- *C. pseudodianthi*, c- *C. dianthi*, d- *C. bucovinella*, e- *C. grotenfelti*

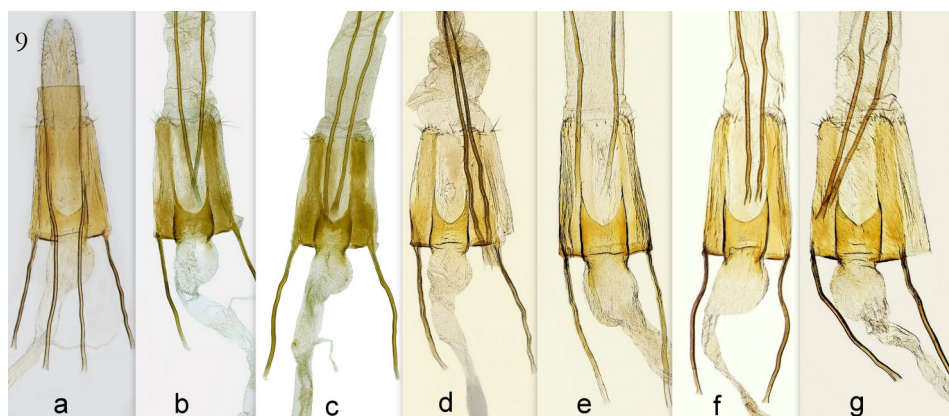


Fig. 9. *Coleophora grotenfelti* sp. n., female genitalia, detail of sterigma and colliculum. a- France, b- Montenegro, d- Slovakia, c, e, f, g- Hungary

**Habitat and Foodplants.** Most specimens (n=26) were collected in June, one in April, three in May and one is without collecting time. Neither the initial stages of this species nor the foodplants are known. We assume that the larva feeds on the seeds of *Dianthus* sp.

**Etymology.** The specific epithet is dedicated to a Finnish amateur entomologist Paul Grotenfelt, who collected a part of the type material, which was crucial in detecting the new species.



Fig. 10. Distribution of *C. grotenfelti* in Europe

**Remarks.** So far altogether 10 males and 21 females are known. Almost all specimens arrived at a light source. The arrival of males is 2 times lower than that of females. On the localities where both *C. grotenfelti* and *C. bucovinella* co-exist, the latter flies about 2-3 weeks earlier. This finding made it easier for us to search for *C. grotenfelti* in collections where several specimens were found, determined wrongly as *C. bucovinella*.

**Thanks.** In particular, we would like to thank Giorgio Baldizzone (Italy), Kari Nuppenen (Finland), Ignác Richter (Slovakia), Ferenc Buschmann (Hungary), Peter Huemer (Austria), Rudi Seliger (Germany), Ján Skyva (Czech Republic) and Zdenko Tokár (Slovakia) for providing paratype material occurrence data. We also thank Peter Hall (England) for checking the English text, Pasi Sihvonen (Finland) for the male genitalia photo of *C. albilineella*, and Peter Buchner (Austria), Marko Mutanen (Finland), Matthias Nuss (Germany) and Peter Huemer for helping to obtain data on DNA analysis.

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