

First case of partenogenesis in the *Coleophoridae*: *Coleophora parthenogenella* n. sp. (Lepidoptera: *Coleophoridae*), from Denmark and Sweden

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Abstract: *Coleophora parthenogenella* n. sp. is described from Denmark and Sweden and is compared with *Coleophora saturatella* Stainton, 1850, to which the new species is very similar both in habitus and biology, *Coleophora trifariella* Zeller, 1849 and *Coleophora genistae* Stainton, 1857. Adults, genitalia and case of *C. parthenogenella* are figured and the known distribution is mapped. The larva lives in a case on *Cytisus scoparius*. Only females are known and the species is parthenogenetic.

Dansk resumé: *Coleophora parthenogenella* n. sp. beskrives fra Danmark og Sverige og sammenlignes med *Coleophora saturatella* Stainton, 1850, som den nye art ligner både i udseende og biologi, samt *Coleophora trifariella* Zeller, 1849 og *Coleophora genistae* Stainton, 1857. Imago, genitalier og sækken afbildes, og den kendte udbredelse omtales. Larven lever på *Cytisus scoparius* (gyvel). Der kendes kun hunner og arten er partenogenetisk.

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Introduction

In Denmark it has been known for several years that most specimens of *Coleophora saturatella* Stainton, 1850 are females, and in some places only females are known. In the 1980s and 1990s the author reared several specimens from larvae collected on *Cytisus scoparius* from different places in Jutland. From that material both males and females were present, but no attention to that fact were drawn at that time. In July 2007 the author collected a rather worn *Coleophora* species from the island Bornholm. The specimen, a female, seemed to belong to *C. saturatella* but with some differences in the genitalstructure. After consulting Ole Karsholt and a visit to the collections of the Zoologisk Museum of Copenhagen it became clear that the taxon *C. saturatella* in Denmark consists of two different species: *C. saturatella*, with a western distribution, known from Jutland and Funen, and a mainly easternly distributed unknown *Coleophora* species, which appeared to be parthenogenetic.

Abbreviations

GB Collection of Giorgio Baldizzone, Asti, Italy.
ZMUC Zoological Museum, University of Copenhagen, Denmark.
ZML Museum of Zoology, Lund University, Sweden.

***Coleophora parthenogenella* n. sp.**

Type locality: Denmark, Bornholm, Muleby.

Type material: Holotype, female labelled: "Muleby, B. la. 2.6.2008 DK Gyvel [*Cytisus scoparius*], leg. P. Falck", "Gen. Slide 2076 P. Falck", coll. ZMUC.

Paratypes (140 females): (Red labels "*Coleophora parthenogenella*, Falck") **Denmark:** EJ: Øer, 2 ♀, la. 17.vi.1986, *Cytisus scoparius*, leg. P. Falck, 4 ♀, la. 10.vi.1987, 3 ♀, la. 8.vi.1989, 1 ♀, la. 3.vi.1990, *Cytisus scoparius*, leg. H. Hendriksen (ZMUC); LFM: Bøtø, 1 ♀ 16.vii.1957, leg. E. Pyndt, 1 ♀ 3.viii.1962, leg. K. Pedersen (ZMUC); LFM: Gedser, 2 ♀, la. 15.vi.1935, *Cytisus scoparius*, leg. H. P. S. Sønderup, gen. slide Rasmussen 2252 (ZMUC); LFM: Gedesby, 2 ♀, la. 18.v.1975, 2 ♀, la. 24.v.1975, *Cytisus scoparius*, leg. O. Karsholt, gen. slide Karsholt 3507; LFM: Mellemskoven, 1 ♀ 3.vii.1952, leg. E. Pyndt (ZMUC); LFM: Tunnerup Str., 1 ♀, la. 1.vii.1952, leg. E. Pyndt (ZMUC); NEZ: Gadevang, 1 ♀ 16.vii.1978, 5 ♀ 18.vii.1978, 3 ♀ 20.vii.1978, leg. J. Lundqvist, gen. slide Baldizzone 7635 (ZMUC), 3 ♀ 25.vii.1978, leg. K. Pedersen (ZMUC); NEZ: Grib Skov, Ostrupgård, 1 ♀ 20.vii.1962, leg. J. E. Jelnes, gen. slide Rasmussen 2656 (ZMUC); NEZ: Frederiksværk, 1 ♀ 16.vii.1947, leg. E. Kjær, gen. slide Rasmussen, 2218 (ZMUC); NEZ: Hundested, 1 ♀ 10.vii.1945, 3 ♀ 18.vii.1945, leg. N. L. Wolff, gen. slides Lundqvist 2277, Wolff 1222 (ZMUC); NEZ: Kregme, 1 ♀ 12.vii.1944, 5 ♀ 21.vii.1956, leg. N. L. Wolff, gen. slides Baldizzone 7855, Wolff 1221 (ZMUC); NEZ: Solrød Strand, 1 ♀ 9.vii.1959, leg. E. Traugott-Olsen, gen. slide Traugott-Olsen 144 (ZMUC); NEZ: Tibirke, 1 ♀ 1.vii.1978, leg. K. Larsen (ZMUC); NEZ: Melby Overdrev, 2 ♀, la. 13.vi.2009, *Cytisus scoparius*, leg. P. Falck; B: Arnager, 6 ♀ 9.vii.1980, leg. O. Karsholt, gen. slide Baldizzone 7634, 1 ♀ 12.vii.2008 leg. P. Falck; B: Gudhjem, 2 ♀ 6.vii.1949, leg. W. van Deurs (ZMUC); B: Hammeren, 1 ♀ 22.vii.1977, leg. K. Schnack (ZMUC), 7 ♀, la. 1.vi.2008, *Cytisus scoparius*, leg. P. Falck; B: Stampen, 3 ♀ 25.vii.1964, 1 ♀ 4.vii.1966, 3 ♀ 5.vii.1966, 1 ♀ 7.vii.1966, 1 ♀ 8.vii.1966, leg. H. K. Jensen, gen. slide Jensen 538 (ZMUC); B: Slotslyngen, 1 ♀ 9.vii.1966, 1 ♀ 10.vii.1966, 1 ♀ 28.vii.1971, leg. H. K. Jensen, slide Jensen 1186 (ZMUC); B: Muleby 1 ♀ 16.vii.2007, 7 ♀, la. 2.vi.2008, *Cytisus scoparius*, leg. P. Falck, gen. slides Falck 2014, 2 ♀, la. 2.vi.2008, *Cytisus scoparius*, leg. P. Falck, gen. slides Baldizzone 14641 and 14644 (GB), 7 ♀ 5.-6.vii.2008, leg. P. Falck; B: Paradisbakkerne, 2 ♀ 30.vi.2008, 5 ♀ 6.vii.2008, 3 ♀ 14.vii.2008, 20 ♀, la. 24.v.2009, *Cytisus scoparius*, 1 ♀ 29.vi.2009, 2 ♀ 14.vii.2009, leg. P. Falck, 1 ♀ 30.vi.2008, leg. P. Falck, gen. slide Baldizzone 14647 (GB); B: Boderne, 1 ♀ 12.vii.2008, leg. P. Falck.

Sweden: Sk: Benestad, 1 ♀ 23.vii.1917 (ZML), 1 ♀ 16.vii.1919 (ZML); Sk: Kivik, 2 ♀ 7.-8.vii.1934, leg. Benander (ZML); Sk: Ystad, 1 ♀ 30.vi.1943 (ZML); Sk: Trolle Ljungby, 2 ♀ 25.vii.1965, leg. I. Svensson (ZML); Sk: Rinkaby, 1 ♀ 29.vii.1972, leg. I. Svensson (ZML); Sk: Eriksdal, 1 ♀ 25.vii.1993, leg. I. Svensson (ZML); Sk: Landön, 1 ♀, leg. I. Svensson (ZML); Ha: Veinge, 1 ♀ 5.viii.2000, leg. I. Svensson (ZML).

Diagnosis

Coleophora parthenogenella n. sp. (Fig. 7, 9) is very similar to *C. saturatella* Stainton, 1850 (Fig. 8) but the female of *saturatella* is on average slightly smaller, with a wingspan from 11 to 13 mm, and the forewings are darker ochreous-brown from the white streak along the fold to the white costal streak, especially at the base, and it is not so white at base and along dorsum. A fine diagnostic criteria, which can be observed in a microscope without dissection, is differences in the scalefree patches on tergites of abdomen – see below.

Confusion is also possible with *Coleophora trifariella* Zeller, 1849 and *Coleophora genistae* Stainton, 1857, but the former species has the forewings more yellow ochreous and the white lines more prominent, the latter is smaller, with a wingspan from 10 to 11 mm

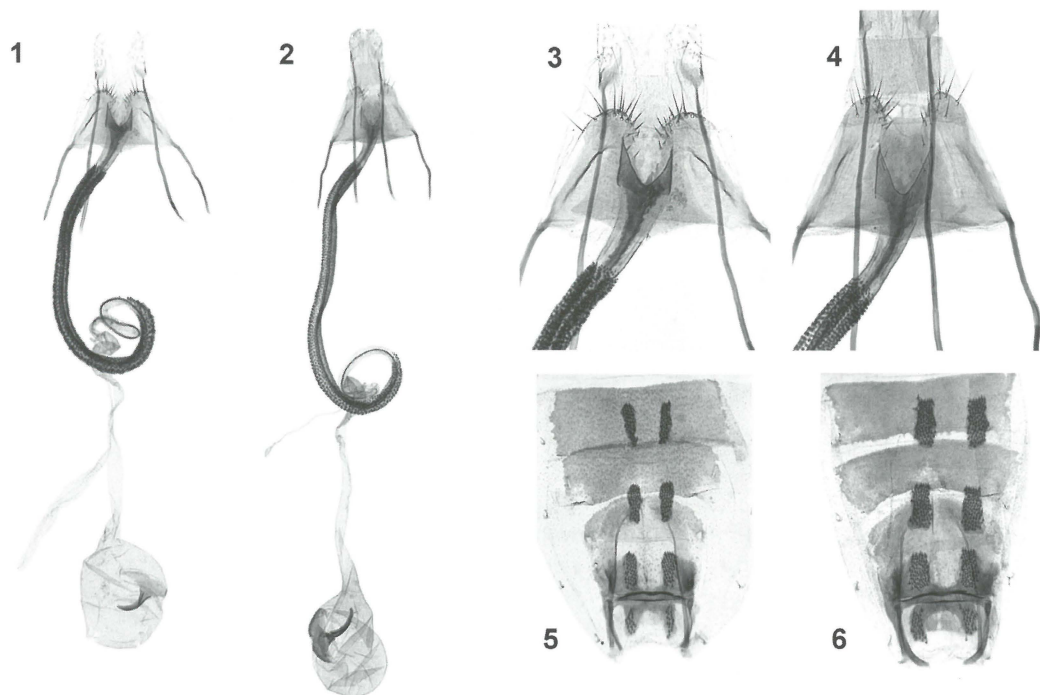


Fig. 1: *Coleophora saturatella* Stt, female genitalia (PG Bldz 14643), Denmark, WJ: Vind, la. 30.vi.1996, leg. P. Falck, coll.GB.

Fig. 3: *idem*, enlarged detail.

Fig. 5: *idem*, abdomen.

Fig. 2: *Coleophora parthenogenella* n. sp., female genitalia (PG Bldz 14641), Denmark, B: Muleby, la. 2.vi.2008, leg. P. Falck, coll. GB.

Fig. 4: *idem*, enlarged detail.

Fig. 6: *idem*, abdomen.

(female), and darker ochreous brown – much like *C. saturatella*; also the spurs of hindlegs are darker especially towards tips.

The female genitalia of *C. parthenogenella* (Fig. 2, 4, 6) resemble some of the other species in this group (Toll: group 9), especially *C. saturatella* (Fig. 1, 3, 5), but differs as follows: colliculum slightly longer, the spinulate part of ductus bursae on average one fifth longer, this is most clearly when the genitalia are not separated from the abdomen; the plates on the tergites of abdomen are about one third broader and the spines on average slightly broader at base, also the tergal disks are larger. The spinulate part of ductus bursae in *C. trifariella* and *C. genistae* are clearly shorter than this part of the genitalia in *C. parthenogenella*.

Description

Female (Fig. 7, 9). Wingspan 12-14 mm. Head white on face and sides, white and yellow ochreous on crown; antenna white ringed fuscous, scape white above greyish, buff below; labial palpus white on inner side, greyish buff on outer side. Thorax white, tegulae white with some yellow ochreous scales. Forewings ochreous brown between discal streak

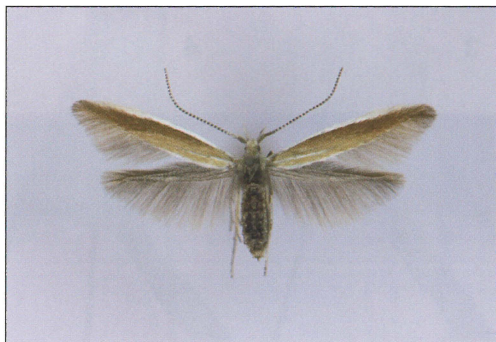


Fig. 7: *Coleophora parthenogenella* n. sp., Denmark, B: Muleby, la. 2.vi.2008, leg. P. Falck.



Fig. 8: *Coleophora saturatella* Stt., female, Denmark, EJ: Hald Ege, la. vi.1987, leg. P. Falck.

and costal streak, ochreous between fold and costal streak becoming yellow ochreous at base and yellow ochreous between fold and white dorsal streak; a rather broad white streak on costa almost to apex; a very indistinct discal streak, frequently obsolete; a narrow streak along fold and one on dorsum; costal fringes white, brownish at apex, dorsal fringes greyish. Hindwing grey, cilia grey. Abdomen grey, last segment with ochreous scales, greyish white below. Hindleg white, tibia with golden ochreous stripe on outer lower edge, tarsal segments dark greyish ringed and spurs white.

Male: unknown.

Genitalia

(Figs. 2, 4, 6) Posterior margin of sterigma rounded at both sides of the incurved ostium bursae, colliculum rather long with parallel sides in proximal part, then tapering directly towards ductus bursae; ductus bursae proximally with a spinulate section, anterior section coiled and transparent, corpus bursae with a big thorn-shaped signa.

Biologi

The larva lives in a case (Fig. 10) very similarly to that of *C. saturatella*, but the case is on average slightly smaller. The host plant is *Cytisus scoparius*, where the larva mines the leaves; it is full-feed in the beginning of June. The case is fixed high up near the tip of a twig or to adjacent herbage such as a stem of grass, where pupation takes place. The species prefer lower plants growing in full sunshine.

The adults occur in July and have been taken flying at dusk and is also attracted to light. Reared specimens, which are kept isolated, will after a few days begin to lay eggs on twigs of *Cytisus scoparius* and after about one week these will produce larvae. This together with the fact that only females are known strongly indicates parthenogenism. As for other parthenogenetic species occurring in Denmark e.g. *Ectodemia argyropeza* Zeller, 1839 and *Dahlia triquetrella* (Hübner, 1813) males are known from other parts of their distribution area – this could also be the case for *C. parthenogenella*.

Distribution

In Denmark the species is known from the districts: EJ, NEZ, LFM and B. In district EJ – eastern Jutland, *C. parthenogenella* and *C. saturatella* are found in the same area. From Sweden all examined specimens from the districts Sk and Ha of "*C. saturatella*" belongs to *C. parthenogenella*; no specimens from the district Vg have been examined.



Fig. 9: *C. parthenogenella* n. sp. resting on *Cytisus scoparius*.



Fig. 10: Case of *C. parthenogenella* n. sp. on *Cytisus scoparius*.

Discussion

C. parthenogenella n. sp. belongs to group 9 in Toll's system (Toll, 1962) and should be placed close to *C. saturatella* Stt. due to similarities in the adult habitus, the genitalia structures and biology. *C. parthenogenella* can be separated from the other species of the group by differences in genitalia structure, habitus, the larval case and hostplant.

In older literature the name *C. bilineatella* Zeller, 1849 has been used for the *Coleophora* species feeding on *Cytisus* in northern Europe, but this was due to misidentification (Baldizzone et al. 2006), and then the name *C. saturatella* Stainton, 1850 is used. According to Baldizzone et al. (2006) *C. tinctoriella* Coverdale, 1885 and *C. spartiella* Coverdale, 1885 are synonyms of *C. saturatella* Stt..

Consulting the database at The Natural History Museum there are any types of *C. tinctoriella* or any specimens of *C. spartiella* present (Thomas Simonsen pers. com.), also the main world collection does not contain any syntypes of Coverdale's taxa (Kevin Tuck pers. com.).

Coverdale's description of *C. tinctoriella* is based on reared specimens from *Genista tinctoria* collected in Brighton by A. C. Vine. In the E. R. Bankes Collection (In The Natural History Museum) there are a series of *C. tinctoriella* labelled identically as "A. Vine, Brighton, 1894, bred", but there is no indication of hostplant, most likely they were reared from *Genista tinctoria* in view of their identification (Kevin Tuck pers. com.). Two of these specimens were examined by the author. Coverdale described *C. tinctoriella* as "Anterior wings rather broad, dark brownish ochreous in the costal region, ochreous towards the inner margin, but varying considerably in intensity of colouring, some specimens being nearly as dark as *Coleophora saturatella*, others almost entirely ochreous.", and later "*C. tinctoriella* Cov. – imago brown". Based on the author's examination and Coverdale's description of *C. tinctoriella* it is most likely that this taxon refers to *C. saturatella*.

In Heinemann's collection there were three specimens reared from *Cytisus scoparius* under the name *C. spartiella*, named by Heinemann himself. Working on his paper Coverdale inspected Heinemann's collection, and became aware, that Heinemann intended

to separate one species from *Genista tinctoria* as *C. bilineatella* and the other from *Cytisus scoparius* as *C. spartiella*. Coverdale included the species in his paper, but already at that time he thought, that *C. spartiella* was synonymous with *C. saturatella* “there seems to be little distinction, and further investigation may induce us to think *spartiella* Hein., as synonymous with *saturatella*, Stt.”.

C. bilineatella broennoeella Strand, 1920, described from Norway belongs to *C. discordella* Zeller, 1849 (Leif Aarvik pers. com.).

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