A phantom returns: rediscovery of Pelochrista pfisteri (Obraztsov, 1952) (Lepidoptera: Tortricidae) in Germany

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RESEARCH ARTICLE

A phantom returns: rediscovery of *Pelochrista pfisteri* (Obraztsov, 1952) (Lepidoptera: Tortricidae) in Germany

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Abstract

The tortricid moth *Pelochrista pfisteri* (Obraztsov, 1952) has been rediscovered in Germany for the first time since its description over 70 years ago. New records are provided, together with a diagnosis based on wing pattern and male genitalia structures, notes on its habitat and possible biology, and the first *COI* barcode for this species.

Keywords: Baden-Württemberg, diagnosis, DNA barcoding, France, habitat, *Pelochrista subtiliana*, rare species, type locality.

Zusammenfassung

Der Wickler *Pelochrista pfisteri* (Obraztsov, 1952) wurde seit seiner Beschreibung vor über 70 Jahren erstmals in Deutschland wiederentdeckt. Neue Nachweise werden veröffentlicht, zusammen mit einer Diagnose anhand des Flügelmusters und der Strukturen der männlichen Genitalien, Hinweisen zum Lebensraum und der möglichen Biologie, und dem ersten *COI*-Barcode für diese Art.

Introduction

Germany's Lepidoptera fauna is one of the best studied worldwide (e.g., Karsholt & Razowski 1996; Gaedike & Heinicke 1999; Gaedike et al. 2017). Descriptions of new species, especially those not resulting from cryptic species splits, have been rare highlights since the late 18th to early 19th century and are hardly to be expected today. One such highlight was the discovery of an unknown tortricid moth by Bavarian collector Hermann Pfister in mid-May 1951, collected on a dry slope with scattered bushes and an abundance of *Iris variegata* (Iridaeceae), *Scorzonera purpurea* [= *Podospermum purpureum*] (Asteraceae), and other xerophytes (Obraztsov 1952; Pröse 1983). Based on this single male specimen, Nikolaus S. Obraztsov (1952) described this species as *Eucosma pfisteri*, with a pen drawing of the genitalia structure as the only illustration. A first poor, black and white illustration of the holotype was provided by Pröse (1983).

Despite several attempts, neither Pfister nor other collectors succeeded in finding further specimens of this species at the type locality, and the holotype remained the only known specimen (Pröse 1983). Unfortunately, neither Pfister nor Pröse gave precise information about the type locality, which is why it cannot be located exactly today. Also unknown is the time of day of Pfister's find.

It took 63 years until another specimen of this extremely rare species was found by Jean-Charles Grange in northern France, near Manre in the Ardennes department on June 4th, 2015 (Grange et al. 2018). In the following years, individual male specimens were found there repeatedly (Grange, pers. comm. to Erwin Rennwald). However, the female, the caterpillar, and the host plant(s) are still unknown.

On June 3rd, 2022, we conducted a light trapping excursion in Germany on the southern slope of the Hunsenberg, a hill north of Tauberbischofsheim, Baden-Württemberg. Around 2:30 a.m., we caught a medium-sized, distinctly patterned tortricid, which we initially thought to be either *Epiblema similana* ([Denis & Schiffermüller], 1775) or *Rhopobota naevana* (Hübner, [1817]).

The specimen was collected for further examination and, when viewed in daylight, turned out to be a male of *Pelochrista pfisteri* based on photographs posted on Lepiforum (Grange 2018–2021). In 2023, we discovered three more specimens at the same locality (Figs. 1–2).

The genus *Pelochrista* Lederer, 1859 is represented in Central Europe by 12 species, eight of which occur in Germany (Gaedike et al. 2017; Rodeland 2022). The latter authors listed four species for Baden-Württemberg: *P. caecimaculana* (Hübner, [1799]), *P. modicana* (Zeller, 1847), *P. hepatariana* (Herrich-Schäffer, [1851]), and *P. pfisteri*, and referred to literature records for *P. mollitana* (Zeller, 1847) and *P. infidana* (Hübner, [1824]) that have yet to be verified. A fifth species for Baden-Württemberg, *P. subtiliana* (Jäckh, 1960), was found near Blumberg in 2021 by Hans-Peter Deuring (2021). Our review of *Pelochrista* specimens in various collections confirmed the occurrence

of *P. subtiliana* at additional localities in the Swabian Jura (Trusch 2024). These specimens were partially misidentified as *P. caecimaculana* and *P. modicana*.

Here, we present new records of *Pelochrista pfisteri*, representing the first rediscovery of this species in Germany since its description. We illustrate and diagnose the wing pattern and male genitalia structures based on fresh specimens, provide photos and a description of the habitat, and present the *COI* barcode of this species for the first time.

Material and methods

Light traps. Three sets of light traps were placed on an upper slope at distances of 100 to 200 metres from each other. Various superactinic fluorescent tubes from Fritz Weber (Stuttgart) and an EntoLED from Bioform (Nuremberg) were used as light sources.

Morphology. Most species were identified on site and documented photographically. Only microlepidoptera that were difficult to identify were collected, prepared during the following days and, if necessary, the genitalia were examined according to standard methods (Robinson 1976). As species of the genus *Pelochrista* occasionally cause considerable identification problems (Segerer et al. 2013), we compared our specimens to published illustrations (Obraztsov 1952; Pröse 1983; Razowski 2001; Grange 2018–2021). Collection data were recorded with the non-commercial program "Insect IS Version 10.1.0 (1992–2021)", developed by Gerald Seiger (Kraupa), and uploaded to the "Schmetterlingsfauna Baden-Württembergs" database (https://www.schmetterlinge-bw.de/Lepi/Default.aspx?id=2202).

Molecular techniques. For DNA extraction, the whole abdomen of a specimen was used for lysis prior to genitalia dissection (see Hundsdoerfer & Kitching 2010), following the manufacturer's protocol of the DNeasy Blood and Tissue kits (Qiagen, Hilden, Germany). Amplification of the barcode fragment (658 base pairs of the 5' terminus) of the mitochondrial *Cytochrome-C Oxidase I* gene was performed using standard protocols (Ivanova et al. 2006). The PCR amplification product was sent to Macrogen (Amsterdam, The Netherlands) for sequencing.

DNA barcode analysis. Data of the sequenced specimen of *P. pfisteri* are accessible on Barcode of Life Data Systems (BOLD 2024) (Process ID: PLEPI001-23; Sample ID: SMNS_Lep_002357). The *COI* fragment of *P. pfisteri* was compared to available sequences in the BOLD identification engine to search for the genetically nearest neighbour.

Results and discussion

Pelochrista pfisteri (Obraztsov, 1952)

(Figs. 1–7)

Eucosma pfisteri Obraztsov, 1952. Zeitschrift der Wiener Entomologischen Gesellschaft 37 (7–8): 123. Holotype ♂: Germany, Baden, Tauberbischofsheim (Zoologische Staatssammlung München; examined from photographs).

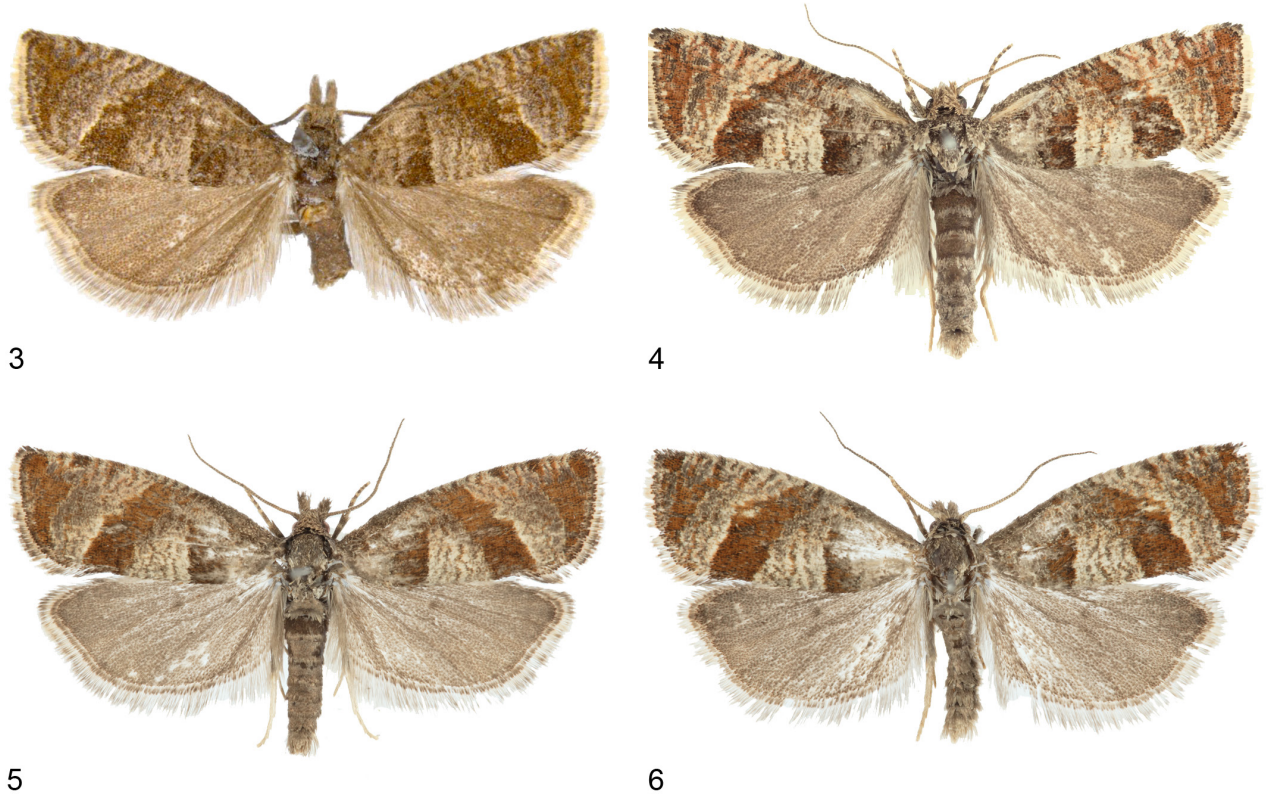
Material examined

New records from Germany (collection time in parentheses): Baden-Württemberg, Tauberbischofsheim, Hunsenberg: 1 ♂, 3.VI.2022 (02:30 a.m.); 2 ♂♂, 22.V.2023 (03:00–04:00 p.m.) (1 ♂, photo only); 1 ♂, 29.V.2023 (00:05 a.m.).

Diagnosis

Males of *P. pfisteri* are about the same size as most congeners, with a wingspan of 15.5–16.5 mm. They can be easily distinguished from all other European species of the genus by the broader wings. The general colouration of the forewing upper side is somewhat darker than in most other European species. Fresh specimens have a clear reddish brown tint, the speculum (ocellar area near the tornus present in many species) is missing, and the dark median fascia (missing in most species) is, in contrast, well developed. This also distinguishes the species from other superficially similar European Tortricidae. In the male

Figs. 1–2. *Pelochrista pfisteri* (Obraztsov, 1952), male from Germany, Tauberbischofsheim, Hunsenberg, 29.V.2023. (Photos Aron Bellersheim)



Figs. 3–6. *Pelochrista pfisteri* (Obraztsov, 1952), male wing pattern. **3**. Holotype, Germany, Tauberbischofsheim. **4–6.** Germany, Tauberbischofsheim, Hunsenberg. – **4**. 3.VI.2022, 15.7 mm. **5**. 22.V.2023, 16.0 mm. **6**. 29.V.2023, 16.5 mm.

genitalia (Fig. 7), *P. pfisteri* is characterized by the rather long socii, which hardly taper distally, the rather short and broad valva (with large and nearly round cucullus) almost completely covered with hair- to bristle-like setae, and the ventrally-pointing thorn of the terminal protrusion.

Behaviour

We discovered four males of *P. pfisteri*: two in the early afternoon and two at night using light traps. The moths observed during the day were startled as we browsed relatively dense stands of goldilocks aster (*Galatella linosyris*, Asteraceae). One specimen settled back in the vegetation after a short flight; the other specimen settled on the low branch of a juniper bush, where it could be photographed but not collected. The two moths caught at night appeared at light at about midnight and at 2:30 a.m., when the temperature was above 20 °C. Since we did not observe any specimens in the late afternoon and towards evening, despite several attempts, we suspect a partial daytime activity for this species. Possibly, the mating flight also takes place during daytime. This was confirmed by Jean-Charles Grange (pers. comm. to Erwin Rennwald), who in France observed more specimens during the day than during the night.

Biology

The larval biology of most *Pelochrista* species is insufficiently known and larval host plants have been recorded for only three species in Europe: *P. caecimaculana* in the roots of various species of *Centaurea* (Asteraceae) (Schütze 1931; Razowski 2001); *P. infidana* in the roots of *Artemisia campestris* (Asteraceae) (Schütze 1931); and *P. hepatariana* in the roots of *Inula conyzae* (Asteraceae) (Razowski 2001). This suggests an endophagous lifestyle on Asteraceae for the other species in the genus, including *P. pfisteri*.

Habitat

The sampling area at the Hunsenberg (Fig. 8) is located on lower shelly limestone on a characteristic south- to southwest-oriented Tauber Franconian dry slope. Vineyards on the southern slope have gradually been abandoned in recent decades, which is why it is now largely covered by fallow land of various ages. Mowing takes place in autumn, sometimes following a mosaic regime. Towards the summit plateau, the southern slope is bordered by a narrow, forest-like strip of planted black pines and individual, interspersed Scots pines. The southwestern slope, which is very steep, especially in the upper part, is occupied by the Hunsenberg Nature Reserve. A detailed

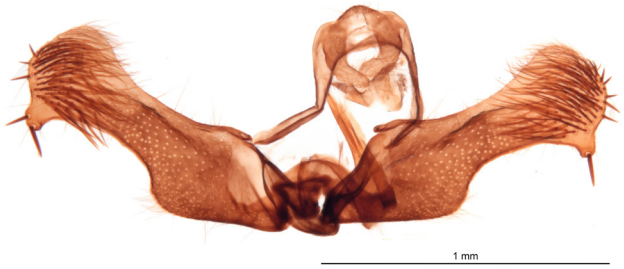


Fig. 7. *Pelochrista pfisteri* (Obraztsov, 1952), male genitalia.

description of the area was given by Jünemann (2002). The orchid-rich semi-arid grasslands of the lower parts of the slope constituting the nature reserve change into fully arid grasslands towards the top. In between, there are partly dense bushes of juniper, blackthorn, barberry, buckthorn, privet, and other species. Along the upper part of the slope, the distinctive "Schaumkalkbank" (oolite) emerges. The collection site of *P. pfisteri* is located in this area, at the transition from the southern to the southwestern slope below the pine stand, and is dominated by goldilocks aster (*Galatella linosyris*).

At that site, the following Asteraceae may represent potential food plants for *P. pfisteri* caterpillars: *Aster amellus* (single individuals), *Lactuca perennis* (single individuals), *Scabiosa columbaria* (single individuals), *Centaurea scabiosa* (single individuals), *Centaurea stoebe* (single individuals), *Centaurea pannonica* (numerous individuals), and several undetermined *Hieracium* species. The note on "*Scorzonera purpurea*" as a potential food plant in the original description is probably a misidentification of *Lactuca perennis*, which is widespread in the Tauber region; the former does not occur in Baden-Württemberg (Wörz et al. 2024). *Galatella linosyris* could be a potential host plant. However, according to INPN (2024) and Jean-Charles Grange (pers. comm.), *G. linosyris* does not occur in the Manre area of France, where multiple specimens of *P. pfisteri* were also recently collected.

DNA barcoding

BIN: BOLD:AFL3048. A comparison of the *COI* fragment of *P. pfisteri* with data from the BOLD database suggests that its nearest neighbours (p-distance) are *P. modicana* at a genetic distance of 8.79% (BIN: BOLD:AAE7175), *P. mollitana* at a genetic distance of

Fig. 8. *Pelochrista pfisteri* (Obraztsov, 1952), imaginal habitat (Germany, Tauberbischofsheim, Hunsenberg, 22.V.2023).

8.88% (BIN: BOLD:AAQ2328), and *P. caecimaculana* at a genetic distance of 9.04% (BIN: BOLD:AAE7175).

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