

Description of the female of *Sattleria sophiae* Timossi, 2014 (Lepidoptera: Gelechiidae)

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Abstract. The female of *Sattleria sophiae* Timossi, 2014 is identified on the basis of DNA barcoding, described, illustrated and its habitat is discussed.

Key words: Alps, barcoding, brachyptery, COI, distribution, Dolomites, endemic, fauna, Italy, moth

Introduction

Sattleria Povolný, 1965 is a European Gelechiidae (Gelechioidea) inhabiting high alpine environments (Pitkin & Sattler 1991). Females of this micromoth genus are brachypterous, difficult to collect, and unknown for half of the 19 species (Pitkin & Sattler 1991; Huemer & Hebert 2011, Huemer & Timossi 2014). Species identification is particularly difficult, and it is almost exclusively based upon male genital structures (Huemer & Timossi 2014). The genus was repeatedly reviewed by Huemer & Sattler (1992), Povolný (2001, 2002a, 2002b), and Huemer & Karsholt (2010). Recently, the use of DNA barcoding has supported the identification of new cryptic taxa, particularly in the south-western Alps (Huemer & Hebert 2011; Huemer & Timossi 2014). Species of *Sattleria* with described females are: *S. angustispina* Pitkin & Sattler, 1991, *S. arcuata* Pitkin & Sattler, 1996, *S. breviramus* Pitkin & Sattler, 1991, *S. dzieduszyckii* (Nowicki, 1864), *S. izoardi* Huemer & Sattler, 1992, *S. melaleucella* (Constant, 1865), *S. pyrenaica* (Petty, 1904), *S. styriaca* Pitkin & Sattler, 1991, *S. basistrigella* (Huemer, 1997) (Huemer & Hebert, 2011). *Sattleria sophiae* Timossi, 2014 was described on the basis of seven males collected in Paneveggio—Pale di San Martino Natural Park (NE Italy) (Huemer & Timossi 2014). Subsequently, after four years of intense collecting and searching at the type locality, a single adult female was discovered. The assignment of the female to *S. sophiae* was achieved through DNA barcoding. This specimen is described in this study and collecting circumstances are provided and discussed.

Material and methods

The specimen cited in this paper is currently deposited in the private collection of the first author, Preganziol (Treviso), Italy.

Genitalia preparation. Genitalia dissection and microscopic slide preparation of the abdomen was performed using the following steps: 1. Detachment of the abdomen; 2. Maceration in boiling 5% KOH solution (15–20 minutes); 3. Cleaning using distilled water and a few drops of glacial acetic acid; 4. staining with chlorazol black; 5. Dissection of genital parts and cleaning in 50% ethanol; 6. Dehydration in absolute ethanol; 7. Embedding of genitalia and abdomen in euparal.

Photographs. For imaging of the pinned specimen, stacks of 40–80 images were taken using a Canon EOS 600D camera and Canon MP E-65 lens and processed using Cognysys StackShot system. The original photographs were mounted with CombineZP software and the resulting image was enhanced with Photoshop CS6 software. For imaging of the slide-mounted genitalia, a Nikon Eclipse E100 microscope was used, equipped with a Sony Colour CCD 5.1 Mp TP 5100 microcamera with X-Entry software.

DNA barcoding. A tissue sample (one dry leg) was sent to and sequenced at the Canadian Centre for DNA Barcoding (CCDB, Biodiversity Institute of Ontario, University of Guelph). DNA sequencing resulted in a barcode fragment of 658 bp. The sequence, named LEASV340-19, is privately stored as part of the project “LEASV-Lepidoptera of the Alps 14” in the Barcode of Life Data Systems (BOLD; Ratnasingham and Hebert 2007). The integrated bioinformatics

platform BOLD was used to assess the identity of the sequence obtained. Furthermore, the sequence was compared to the two sequences of *S. sophiae* freely available in BOLD, namely LEATC054-13 and PHLAH776-12. The pairwise genetic distances between sequences were calculated using MEGA X software, under default settings (Kumar *et al.* 2018).

Description

Sattleria sophiae Timossi, 2014

Material: ♀, Italy, Trentino-Alto Adige, Trento, Pale di San Martino Natural Park, Rifugio Pedrotti 2581 m, 46°26'9" N, 11°8'40.9" E; 27/VII/2017, 22:00. Giovanni Timossi leg. and det.

Habitus (Fig. 1a): Body length 5.5 mm. Head integument covered with long white scales. Head scales partially covering base of haustellum in ventro-lateral view. Labial palp elongated, covered with white scales. Antenna dark brown, covered with dense, greyish-brown scales; scape greyish white ventrally. Thorax covered with greyish-brown scales, posteriorly oriented; patagium not visible; tegula brown, bearing white scales at the posterior apex. Wingspan 11.2 mm; forewing length 5.2 mm. Forewing elliptic with pointed apex; basal two-thirds covered with scales of same greyish brown as on thorax except for a longitudinal patch of black scales on the basal third and between veins 1A+2A and CuA; apical third darkened due to scattered black-brown scales; termen without cilia. Hind wing white, less than one third the length of forewing, lanceolate in shape, slender with sinuous inner margin to falcate apex.

Foreleg greyish brown; median and hind legs greyish white with darkened tarsomeres. Abdomen covered with white-greyish and brown scales, all posteriorly oriented. Inner spur of metatibia about twice the length of outer one.

Genitalia (Fig. 1b): eighth segment dorsally membranous, sternite with small pockets at anterior margin; posterior apophysis about three times the length of the anterior (Fig. 1c); anterior apophysis with reduced and strongly sclerotized base, bearing a horn-shaped anterior process (Fig. 1c); ostium bursae large; antrum as long as anterior apophysis, irregularly sclerotized; ductus bursae short; corpus bursae oval, without signum (Fig. 1b). Papillae anales membranous (Fig. 1d).

Diagnosis. The reduced black scales on the forewing, with exception of the black basal fascia, makes *S. sophiae* at first glance easily distinguishable from all the other currently known congeners. However, due to the worn condition of this single female, this may be flawed. The distinctive black basal fascia of the forewing is only shared with a few other species, namely *Sattleria basistrigella* (Huemer, 1997), *S. styriaca* Pitkin & Sattler, 1991 and *S. dzieduszyckii* (Nowicki, 1864). The presence of a horn-shaped anterior process of the anterior apophysis of the female genitalia is a unique feature found only in *S. sophiae*. Since the existence of a cryptic species in sympatry with *S. sophiae* could not be excluded, DNA barcoding was used to match the female to known males. The comparison of LEASV340-19 sequence in BOLD showed a 99.85% similarity with *S. sophiae*. Distance analysis of the sequences between the female and two *S. sophiae* males confirms that it belongs to the aforementioned species: 0.153% between LEASV340-19 and LEATC054-13; 0.306 % between LEASV340-19 and PHLAH776-12.

Habitat and bionomics. Currently *S. sophiae* is known only from the type locality, in the eastern Dolomites (Italy). The locus typicus is a rocky limestone plateau at an altitude of 2,500 m in the Pale di San Martino mountain range. The biology and early stages of this species are unknown. However, in analogy to other species of *Sattleria* (*cf.* Pitkin & Sattler 1991) it is likely that *S. sophiae* is associated with *Silene* sp. (Caryophyllaceae) and/or *Saxifraga* sp. (Saxifragaceae). Since the original description, more than 30 males have been collected using an 18-watt Wood's light. Most males exhibited a peak flight activity after sunset following a drop in temperature, with flight activity decreasing after 22:00H. The flight activity of males appears not to be influenced by the presence or absence of wind. At the time of capture, the female was resting on a large limestone rock, at the bottom of one of the numerous crevices that occur in this kind of substrate. This hiding behavior has also been observed in another female of a currently unidentified species of *Sattleria* from the Marmolada massif. It is possible that this concealing strategy help females to remain accessible to males for mating while ensuring protection from sudden gusts of wind.

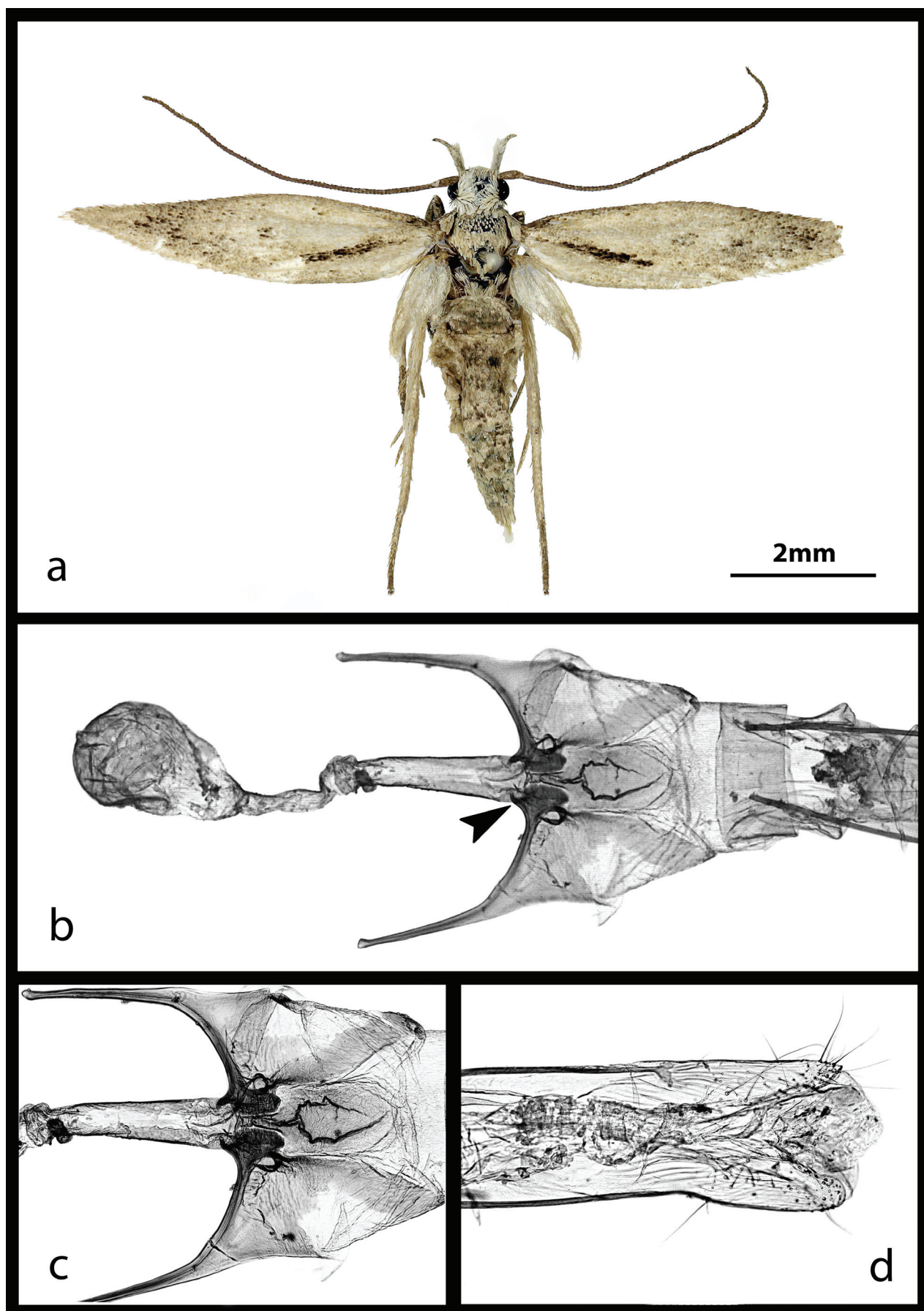


FIGURE 1. *Sattleria sophiae* Timossi, 2014, female: A. Dorsal habitus; B. Genitalia, general view; black arrow pointing at horn-shaped anterior process; C. Detail of genitalia highlighting the sclerotized apophyses. D. Papillae anales.

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