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Strophingia fallax: a new species for the Italian fauna properly identified long time after its first finding and record

Francesco POGGI[1], Alessia FARINA[2], Carmelo RAPISARDA[2]
[1]*Missaglia, Italy*
[2]*Applied Entomology Section, Department of Agriculture, Food and Environment, University of Catania, Italy*

Abstract

In 1986, a *Strophingia* sp. (Hemiptera Psylloidea Liviidae) was found in Sardinia whose collected material consisted exclusively of juvenile stages, which was the main reason why it was never identified to specific level. Following the recent collection of adults (both males and females) on the same host plant in a nearby location, the presence of *Strophingia fallax* Loginova is reported for the first time in Italy, previously known only from Madeira. In addition to brief information both on this species and the genus it is ascribed to, brief notes are provided on the identification history of this material. The need to improve taxonomic knowledge on this insect group through appropriate integration of molecular data is also discussed.

Key words: heather-feeding psyllids, Sardinia, taxonomic issues.

Introduction

We present in this note the case of an insect which, despite its interest as a new species for Italy, took more than 35 years to be identified.

In 1986, one of us (CR) collected in Sardinia on *Erica scoparia* L., in a locality that today falls within the Province of Southern Sardinia, seven nymphs of a psyllid clearly belonging to the genus *Strophingia* Enderlein. No adults were collected at that time, and this prevented the complete identification of the species, being the collected nymphs different from any of the only three species of *Strophingia* [*S. cinereae* Hodkinson, *S. ericae* (Curtis) and *S. proxima* Hodkinson] already reported for the Italian fauna and whose morphology of the juvenile stages was known at that time. Therefore, the nymphal material collected in Sardinia was described but assigned to an unidentified *Strophingia* sp., surely new for Italy (Rapisarda, 1991).

The above nymphal material has been reported as the fourth Italian species of *Strophingia*, and named as *Strophingia* sp. (sensu Rapisarda), also in the annotated catalogue of the Italian Psylloidea published a few years later by Conci *et al.* (1993; 1996).

Thirty years later, in 2016, while collecting Sardinian leafhoppers of the family Cicadellidae in a locality belonging to the same Province of Southern Sardinia, the first author (FP) found on *E. scoparia* eight adults of a *Strophingia*, which remained unidentified in Francesco Poggi's collection until he recently contacted CR for taxonomic clarifications on this psyllid material. By matching the two collections, it was finally possible to clarify the taxonomy of, and identify, this Sardinian material.

Materials and methods

The nymphal material collected in 1986 is stored in Carmelo Rapisarda's collection, currently housed at the Department of Agriculture, Food and Environment (Di3A) of the University of Catania (Italy). At the time when the present study was started, this material was all mounted in microscope slides, prepared according to the method described by Rapisarda (1991) and, therefore, included in modified Berlese's liquid. Unfortunately, after more than thirty years from their preparation, the slides containing this material were found to be considerably darkened and their material was impossible to be photographed. Therefore, their disassembly was necessary, which was carried out through a slow and delicate process of hot hydration in distilled water, interspersed with treatments with organic solvents (xylol). Once the softening of the mounting liquid was noted, the coverslip was gently removed and the nymphal material completely recovered and subjected to subsequent washing in distilled water, then dehydrated in an increasing series of ethanol (70%, 80%, 95%), dipped for a few minutes in clove oil and finally reassembled in Canada balsam for being stored again in the microscope slide collection mentioned above. Photos of this material were made with a phase contrast microscope (Olympus BX51TF, equipped with a digital camera Olympus Camedia C30-30 zoom).

As to the adult material collected in 2016, the abdomens were removed from specimens and cleared in cold 10% KOH solution overnight. The cleared material was rinsed with distilled water and stored in glycerine for observation and then in dimethyl hydantoin formaldehyde (DMHF) to take photos. A Laboval-4 microscope was used for viewing, on which a DeltaPix digital camera was mounted to take the photos. Multiple photographs were compressed into final images with DeltaPix InSight 6.4.7.0 (64-bit) software, which was used also for taking measurements. The adults used for this study, prepared as dry specimens mounted on entomological cards, are stored in Francesco Poggi's collection (Missaglia, Italy).

Results

The adult characters, with particular reference to the male terminalia (especially the parameres shape in lateral view and the apical article of the aedeagus) (figure 1c), allow

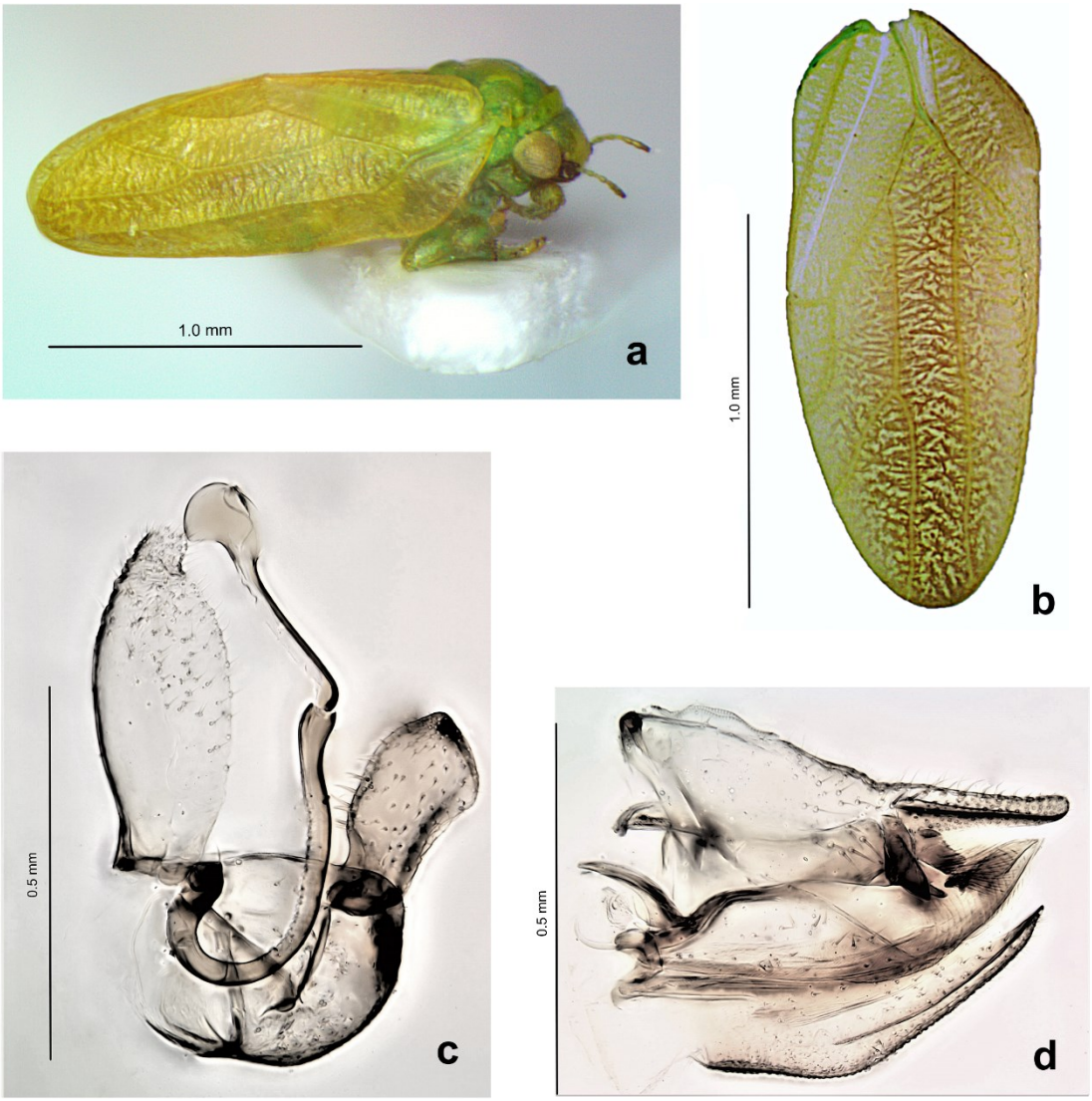

Figure 1. *S. fallax*, adult: (**a**) habitus (female); (**b**) forewing; (**c**) male terminalia (side view); (**d**) female terminalia (side view).

to identify the species collected in Sardinia as *Strophingia fallax* Loginova. Of course, due to their finding on the same host plant and an almost close locality, nymphs collected in 1986 are ascribable to the same species. Brief information is given below on *S. fallax* and the status in Italy of the genus it belongs to.

Genus *Strophingia* Enderlein 1914

The genus *Strophingia* Enderlein is currently ascribed to the subfamily Euphyllurinae of the family Liviidae (superfamily Psylloidea) (Burckhardt *et al.*, 2021). Only 10 species are ascribed to this genus so far (Hodkinson, 1981; Bastin *et al.*, 2023), almost all living on plants of the family Ericaceae (genera *Calluna* Salisb., *Erica* L. and *Vaccinium* L.) and having a wide [*S. cinereae* Hodkinson, *S. ericae* (Curtis) and *S. proxima* Hodkinson] or more restricted (*S. arborea* Loginova, *S. australis* Hodkinson, *S. canariensis* Bastin, Burckhardt et Ouvrard, *S. fallax* Loginova, *S. harteni* Hodkinson and *S. paligera* Bastin, Burckhardt et Ouvrard) distribution in the West Palaearctic and Macaronesia. The only exception is *Strophingia orientalis* (Crawford), known from the Philippines and whose host plant is unknown (Hodkinson, 1983; Navasero and Calilung, 1998). Life cycle is known only for very few species of this genus: *S. cinereae* has one generation per year (Hodkinson and White, 1979), while *S. ericae* shows in England one generation per year at low altitude but in two years at higher altitudes (Hodkinson, 1973a; 1973b; Parkinson and Whittaker, 1975). In all known cases, *Strophingia* spp. overwinter as nymphs; their adults are usually not very active and rarely fly.

Strophingia fallax Loginova 1976

Italian material examined: 7 nymphs, Seui (SU), Montarbu, m 900 a.s.l., 39.836111, 9.353611, 24.V.1986, on *E. scoparia*, leg. C. Rapisarda; 1♂, 7♀♀, Santadi (SU), Pantaleo, m 251 a.s.l., 39.090556, 8.803889, 24.VI.2016, on *E. scoparia*, leg. F. Poggi.

Morphological notes:

Adult (figure 1). Body length of the examined specimens 1.68 mm in the male and 1.76-1.81 mm in females [therefore a little greater than reported by Loginova (1976): ♂ 1.50 mm, ♀ 1.57-1.72 mm]; body entirely green,

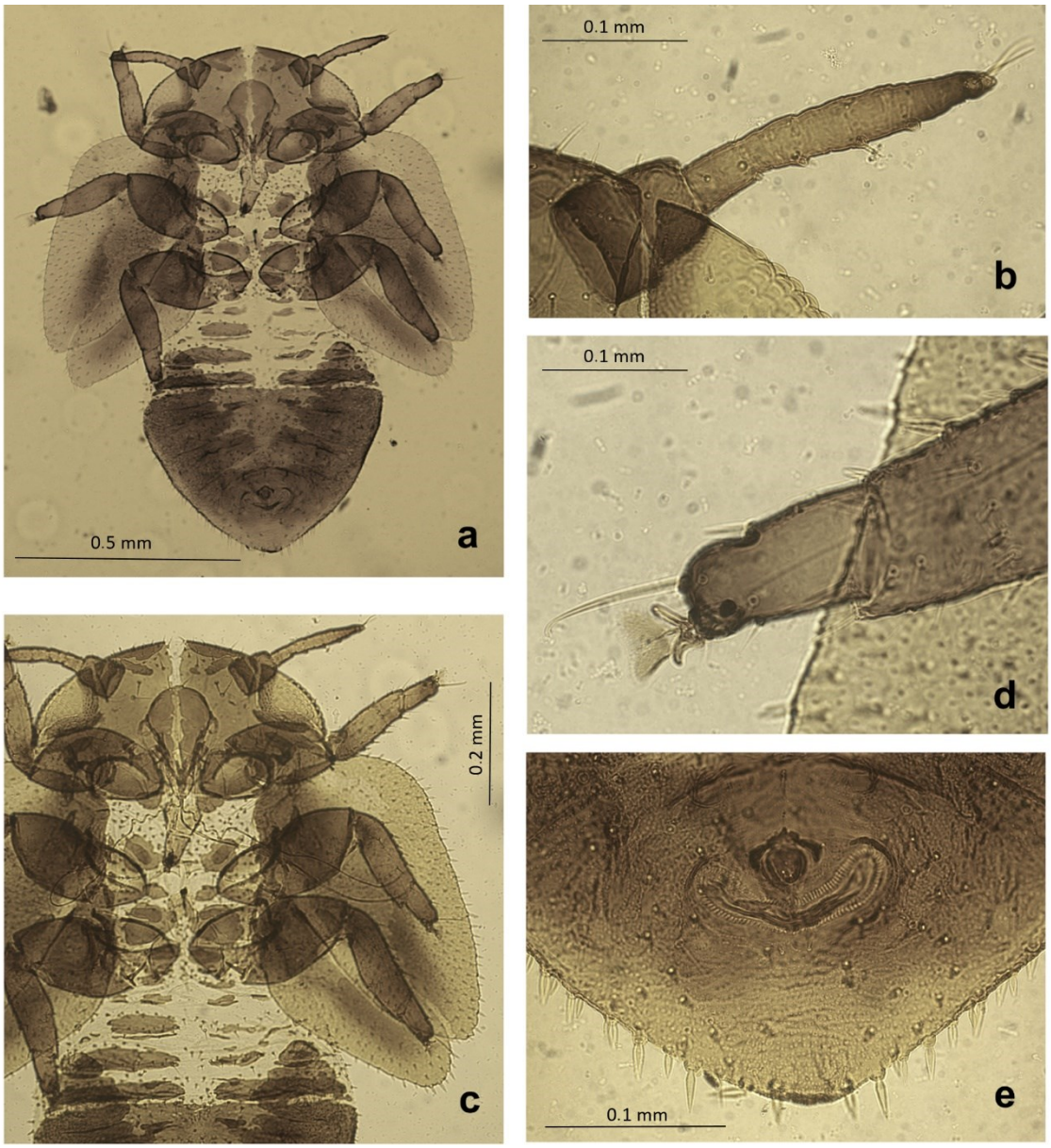

Figure 2. *S. fallax*, fifth instar nymph: (**a**) habitus; (**b**) antenna; (**c**) wing pads; (**d**) praetarsus; (**e**) anal pore and circumanal rings.

with greenish yellow forewings (figure 1a); head with green vertex, toruli and distal half of the genae blackish; antennae green, except the two basal segments and the last one, which are blackish; legs entirely green; forewings (figure 1b) sub-rhomboidal to narrowly oval, with transverse rugosity, cell m_1 large, about twice size of cell cu_1; male terminalia as in figure 1c, paramere with small posterior lobe; female terminalia as in figure 1d. Additional morphological details are provided by Loginova (1976) and by Hodkinson (1981).

Fifth instar nymph (figure 2). Detailed description and drawings have already been provided by Rapisarda (1991); as a supplement, we add here the photos of the main characters.

S. fallax is very close to *S. paligera*, recently described from Canary Islands, and relationships between the two species need further investigation. The adult tends to be smaller in *S. fallax* than in *S. paligera*, although some dimensions of the specimens we collected in Sardinia are somewhat intermediate compared to those reported in the literature for the two species. However, the presence of a notch on the dorsal margin of the female proctiger allows to discern *S. fallax* from *S. paligera*. The fifth instar nymph is visibly smaller in *S. fallax* (body length: 1.10-1.30 mm; forewing pad length: 0.47-0.60 mm) than in *S. paligera* (body length: 1.30-1.50 mm; forewing pad length: 0.60-0.66 mm); moreover, the abdomen is conspicuously slimmer and narrower in the latter species.

Geographical distribution:

S. fallax was known only from Madeira so far (Loginova, 1976; Aguiar and Martin, 2001). Its present record for Italy considerably extends its distribution eastwards, opening the possibility it might be present also in the Iberian Peninsula and other areas of the western Mediterranean.

Biology:

No detailed information is available from the literature. In addition to *E. scoparia* (on which it has been found by us in Sardinia), it is also reported from *Erica arborea* L. (Aguiar and Martin, 2001). Based on the few personal collecting data and those existing in the literature, we can hypothesize that this species develops only one generation per year and overwinters as nymph, with adults flying during summer from June.

Final remarks

Following the findings reported here, the genus *Strophingia* is represented in the Italian fauna by 4 of the 10 described species. The type species of the genus, *S. ericae*, have already been reported from Italy since the end of the 19th century from the territory of Gorizia (Löw, 1888), at that time part of the Austro-Hungarian Empire but today belonging to Italy, in the Friuli-Venezia Giulia region; later findings of this species show its common presence in central-northern Italy (Conci *et al.*, 1993). The findings of two additional species of this genus date back to the 1980s (Conci and Tamanini, 1984; Rapisarda, 1985), with *S. cinereae* very common throughout the country, including the major islands (Sardinia and Sicily), and *S. proxima* (reported under its junior synonym of *Strophingia hispanica* Hodkinson et Hollis) very localized and found only in Tuscany, Sardinia, and Sicily (Conci *et al.*, 1993). *S. fallax*, the fourth Italian species of the genus *Strophingia*, was also found for the first time in the 1980s and reported in the literature as an unidentified *Strophingia* species (Rapisarda, 1991); to date, it can be considered a rather rare species with a very localized distribution, known in Italy only from Sardinia.

Of the remaining 6 species, only *S. arborea* (known in the Canary Islands and Madeira), could still be found in Italy, where its host plants (*E. arborea* and *E. scoparia*) grow (Aguiar and Martin, 2001). On the contrary, finding in Italy is almost unlikely for *S. australis*, *S. canariensis*, *S. harteni* and *S. paligera*, living on Ericaceae [*Erica australis* L., *Erica azorica* Hochst. ex Seub., *Erica canariensis* Rivas-Martinez *et al*. and *Erica platycodon* (Webb et Berthel.) Rivas-Martínez *et al*.] not present in the Italian flora, and for *S. orientalis*, known only for the Far East Asia.

A final reflection deserves the way in which, in the case presented here, the identification of this species has been realised and the time it required. The difficulty (or total impossibility) of identifying many species of psyllids exclusively on morphological bases when only in the presence of their juvenile stages constitutes one of the weaknesses of morphological taxonomy in the study of this insect group. Surely, an easier and more immediate possibility of specific identification can also derive from the contribution of molecular data and barcoding, in full integration and synergy with the elements deriving from classic morphological taxonomy.

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Authors' addresses: Carmelo RAPISARDA (corresponding author: carmelo.rapisarda@unict.it), Alessia FARINA, Dipartimento di Agricoltura, Alimentazione e Ambiente, Università degli Studi, via Santa Sofia 100, 95123 Catania, Italy; Francesco POGGI, via Madonnina 6/B, 23873 Missaglia LC, Italy.

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