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I've always been here: Clastoptera fuscomaculata Stål, 1854 (Hemiptera: Cercopoidea: Clastopteridae) rediscovered after its original 19th-century description, reported as a new pest of three Lamiaceae species in Brazil

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Abstract

Clastoptera fuscomaculata Stål, 1854 (Hemiptera: Cercopoidea: Clastopteridae) was known until now solely from its original description, based on specimens collected in the state of Minas Gerais, Brazil. Here we report the rediscovery of *C. fuscomaculata* on three Lamiaceae species — *Lavandula angustifolia* Mill. (lavender), *Ocimum basilicum* L. (sweet basil), and *Salvia rosmarinus* Spenn. (rosemary) — in the municipality of Carmo do Rio Claro, Minas Gerais, Brazil. Nymphs and adults were collected from commercial plantations of these three host plants in February and April 2026. Damage is concentrated mainly on buds and shoot tips at the apical portion of host branches, which dry out and wilt, affecting the portions intended for commercialization. Nymphs produce a characteristic spittle mass, providing an early indicator of infestation. Infestations were most severe in the rosemary plantation, where spittlebug attack occurs in patches. *Clastoptera fuscomaculata* should be monitored to inform preventive management and assess infestation risk in other cultivated plants. In particular, Lamiaceae species adjacent to cultivation areas should be monitored, as they may serve as potential spittlebug reservoirs. A brief morphological description of *C. fuscomaculata* adults is provided. This is the second recorded occurrence of *C. fuscomaculata* since its description over 170 years ago. The species is currently known only from the Brazilian state of Minas Gerais.

Introduction

Clastoptera Germar, 1839 (Hemiptera: Cercopoidea: Clastopteridae) includes spittlebugs up to 5.3 mm in length, generally with a broad, globose body. The genus comprises 85 known species distributed from Canada to Argentina (Doering 1928; Thompson et al. 2020; Soulier-Perkins 2026).

Since its first record in Brazil over 170 years ago (Stål 1854), no additional information on *C. fuscomaculata* has been published. Studies on Clastopteridae associated with cultivated plants in Brazil have generally been limited to genus-level identification (*Clastoptera* sp.) (Lima 1942; Silva et al. 1968; Sánchez and Nakano 2004; Azevedo Filho et al. 2009; Froza et al. 2024; Jordão et al. 2024), except for *Clastoptera ochrospila* Jacobi, 1908 on cacao, *Theobroma cacao* L. (Malvaceae), in the state of Pará (Bicelli et al. 1989).

Studies on *Clastoptera* host associations are particularly important given that some species are vectors of *Xylella fastidiosa* Wells et al., 1987 (Overall and Rebek 2017; Thompson et al. 2020), a phytopathogenic bacterium affecting several crops. Azevedo Filho et al. (2009) reported damage by *Clastoptera* sp. on grapevine, *Vitis vinifera* L., in the state of Pernambuco, and noted the possibility of this spittlebug acting as a vector of *X. fastidiosa*. Species-level identification of *Clastoptera* associated with cultivated plants is therefore crucial for pest management and for understanding their potential as phytopathogen vectors.

The family Lamiaceae comprises more than 7,000 species distributed across 236 genera (Uikey 2024). Several species are of horticultural and ornamental importance, with applications in cooking, medicine, and the pharmaceutical industry, including lavender, *Lavandula angustifolia* Mill., sweet basil, *Ocimum*

basilicum L., and rosemary, *Salvia rosmarinus* Spenn. (Lorenzi 2002; Erland and Mahmoud 2016). Although none of these three species is native to the American continent (WFO 2026), they are widely distributed across several regions of the world, including Brazil, where commercial cultivation is still expanding (Reis et al. 2007; Couto et al. 2022; Pin 2025).

Material and methods

In February 2026, spittlebug samples and images from an infested commercial rosemary plantation in Carmo do Rio Claro (20°55'49.15"S; 46°07'08.98"W; 776 m a.s.l.), Minas Gerais, Brazil, were sent to the Instituto Agronômico (IAC), Campinas, São Paulo, Brazil, and subsequently forwarded to the Department of Entomology and Acarology, ESALQ/USP, Piracicaba, São Paulo. The spittlebug was also attacking lavender and sweet basil at the same site. The plantations of these three Lamiaceae species are located near an area of rugged, mountainous terrain with Cerrado fragments and a subtropical climate (Novais and Machado 2023). They lie approximately 400 m from a coffee plantation and several fruit crops, including coconut, *Cocos nucifera* L. (Arecaceae), and pomegranate, *Punica granatum* L. (Lythraceae), as well as weeds such as *Sida* sp. (Malvaceae) scattered randomly throughout the area.

In April 2026, three authors (M.S., N.S.S., and S.S.N.) traveled to Carmo do Rio Claro, collecting spittlebugs from branches and leaves of lavender (Fig. 1a–d), rosemary (Fig. 2a–g), and sweet basil (Fig. 3a–e). Some live spittlebugs were placed in tissue bags, while others were collected from the host plant and transferred to 5.0 mL Eppendorf® tubes containing 99% ethanol, properly labeled with collection data, and transported to the Insect Taxonomy Laboratory, ESALQ/USP, Piracicaba, for identification. Twienty-five spittlebugs (ESALQENT0002516–0002525) were double-mounted (triangle method), labeled, identified, and deposited in the following entomological collections: Museu de Entomologia ”Luiz de Queiroz” (MELQ – ESALQ/USP) (10 specimens); National Museum of Natural History (USNM), Smithsonian Institution, Washington, DC, USA (5 specimens); American Museum of Natural History (AMNH), New York, New York, EUA (5 specimens), and Universidade Federal do Paraná (DZUP), Curitiba, Brazil (5 specimens). Morphological identification was based on a genus-level key (Hamilton 2015), the original species description (Stål 1854), and comparison with photographs of the type specimen deposited at the Swedish Museum of Natural History (Fig. 4d, and e).

Results and discussion

The spittlebugs collected from the three Lamiaceae species were identified as *Clastoptera fuscomaculata* Stål, 1854 (Hemiptera: Cercopoidea: Clastopteridae) (Fig. 4a–e), based on the following adult morphological characters:

Body length 3.45–3.54 mm, width 1.87–2.21 mm; mostly yellow with dark brown markings in some regions. Head yellow, about as wide as pronotum, face convex, with 2 ocelli; vertex with a pair of parallel pale brown stripes; anterior margin with a large dark brown area extending from the gena to the ventral border of the eyes; postclypeus with 6 lateral pale brown stripes on each side of the posterior half;

rostrum with apical segment dark brown, apex with a small yellow area. Pronotum well-developed, yellow (Fig. 4a–c). Scutellum yellow (Fig. 4c–d). Tegmen with dark brown areas in the basal region, more pronounced from the clavus and extending to the costal margin at the middle third (C-shaped); one distinct circular dark brown spot in the apical third (Figs. 4b, d, and e). Legs mostly yellow; fore and mid-tibiae with 3 anterodorsal dark brown spots, the first at the base, the second at mid-length, and the third in the apical third; hind tibia with two lateral spines yellow from the basal to middle region and dark brown in the apical third; tarsomeres mostly brown to dark brown.

The original description of *C. fuscomaculata* was based on a specimen collected in Minas Gerais, with no information on locality or host plant (see Stål 1854). The description by Stål (1854) is superficial, as it is mainly limited to characters such as markings of the head and wings. Given the potential importance of this species as a pest of commercially relevant crops, a redescription of *C. fuscomaculata* is warranted. To date, including the present record, *C. fuscomaculata* is known exclusively from the state of Minas Gerais (Stål 1854; Ball 1927).

Isolated records exist for other *Clastoptera* species nymphs on rosemary in the USA, including *Clastoptera xanthocephala* Germar, 1839 in Hawaii (Kumashiro 1998), *Clastoptera arizonana* Doering, 1928 in Arizona (McCutcheon and Moran 2010), *Clastoptera lineatocollis* Stål, 1854 in California (V.T., observations), and *Clastoptera* sp. in New Mexico (iNaturalist Community 2026). In addition, *Clastoptera stolida* Uhler, 1864 has been reared from rosemary in Cuba (Metcalf and Brunner 1944).

The meadow spittlebug *Philaenus spumarius* L., 1758 (Aphrophoridae), widely distributed in temperate regions (Asia, Europe, North America, and Oceania) (EPPO 2026), has been reported in the nymphal stage in all three Lamiaceae mentioned above (Thompson et al. 2023), and the pan-African/Asian spittlebug *Poophilus costalis* (Walker, 1851) (Aphrophoridae) has been reported as a pest of *L. angustifolia* and *O. basilicum* in Taiwan (Wen et al. 2007). Both *P. spumarius* and *P. costalis* are highly polyphagous. The associations of *C. fuscomaculata* with lavender and sweet basil reported here are, to our knowledge, previously undocumented.

Clastoptera fuscomaculata resembles *Clastoptera* sp. collected on coffee in Piracicaba (Sánchez and Nakano 2004) in the transverse head markings, opaque tegminal coloration, and dark tibial spots. However, adults of *C. fuscomaculata* have a yellow pronotum and scutellum, in contrast to the black pronotum and scutellum of the species collected in Piracicaba. Specimens from the coffee plantation were not found in the collection of what was then the Department of Entomology of ESALQ/USP, where they had reportedly been deposited (Sánchez and Nakano 2004).

Clastoptera fuscomaculata infests branches and shoot tips, exclusively at the leaf bases within the apical third of branches of lavender, rosemary, and sweet basil. Infestation was most severe on *S. rosmarinus* (Figs. 2a, f, and g). Nymphs of various instars were found clustered and enveloped in the characteristic spittle mass they produce on the branches of all three hosts (Fig. 1b–c; Fig. 2b–c; Fig. 3b–d). Adults were also commonly found near nymphs and, occasionally, farther away on branches or on the adaxial surface of the leaf blade. Exuviae were also observed on the abaxial surface of the leaf blade, resulting

from the molt from the fifth instar to the adult stage (Fig. 2d–e). Adults are extremely agile, making hand collection difficult. Particularly on rosemary branches, defoliation and dieback were observed at sites where two to four nymphs were clustered (Figs. 2b, c, and e), with gradual drying toward the apex (Fig. 2f–g). Leaf desiccation at nymph aggregation sites was also observed on lavender (Fig. 1b–c). Infestation by *C. fuscomaculata* on rosemary occurs in patches (Fig. 2a) that stand out within the plantation, particularly where damage is most concentrated. No eggs of *C. fuscomaculata* were observed on any of the three hosts. Eggs are likely deposited singly or in pairs beneath the epidermis of Lamiaceae, as reported by Kuenzi and Coppel (1985) for *Clastoptera arborina* Ball, 1927 on juniper.

According to the herb grower, initial spittlebug infestations have recurred following the first rains of the year over the past four years. Further research is required to elucidate the population dynamics of *C. fuscomaculata* and its impact on cultivated plants, ultimately supporting the development of preventive management strategies. Based on the grower's account and our own observations, *C. fuscomaculata* causes significant injury primarily to rosemary, as the damage affects the portion of the plant intended for commercialization (apical branches). Recently, online media reported the seizure of rosemary lots containing hairs and unidentified live insects, raising concerns about the commercialization of this crop (ANVISA 2026). Additional studies on insects associated with rosemary are warranted due to the expanding commercial production of this crop in Brazil.

Clastoptera fuscomaculata is likely associated with native hosts in Minas Gerais, given that all three Lamiaceae species are exotic. Rosemary and lavender originate from the Mediterranean region and sweet basil from Asia (WFO 2026), while *Clastoptera* species are restricted to the American continent (Doering 1928; Thompson et al. 2020). At the study site, we searched for other potential hosts of *C. fuscomaculata*, including *C. nucifera*, *P. granatum*, and *Sida* sp.; however, the spittlebug was not found on any of these, suggesting a possible preference for, or better adaptation to, Lamiaceae in the region. Surveying plants in the vicinity of plantations of Lamiaceae species to identify native hosts is a critical first step in developing pest management strategies. In Piracicaba, we examined rosemary and sweet basil plants at private residences, as well as coffee and other unidentified plants in urban areas, but no spittlebugs were found.

The earliest records of *Clastoptera* sp. associated with crops in Brazil date from the early 1940s on cotton, *Gossypium* sp. (Malvaceae), in the state of Ceará (Lima 1942). Since then, as noted, all subsequent studies have been limited to occurrence records of *Clastoptera* sp. on various crops (Sánchez and Nakano 2004), grapevine (Azevedo Filho et al. 2009), *T. cacao* (Jordão et al. 2024), and *Olea europaea* L. (Oleaceae) (Froza et al. 2024). Based on the published photographs of the grapevine and cacao species and direct study of the *O. europaea* species by the co-author (V.T.), it is clear that all three species are distinct from *C. fuscomaculata* and probably from one another. The absence of a species-level identification key, particularly for those associated with cultivated plants, hampers the recognition of *Clastoptera* species in Brazil.

We emphasize the importance of depositing voucher specimens in more than one public collection in future studies on *Clastoptera* in Brazil. Most authors who have published records of *Clastoptera* sp. did not do so, and the absence of this material in scientific repositories limits crucial research on these spittlebugs, particularly regarding species identification, host associations, and national distribution.

Our findings underscore the relevance of recording *C. fuscomaculata* on economically important crops of Lamiaceae species (Couto et al. 2022; Pin 2025). We further recommend additional studies in light of the potential role of *Clastoptera* species as vectors of *X. fastidiosa*. The success of such efforts, however, depends on the precise identification of the species present in Brazil and their host associations, which is essential for enabling the preventive management of *C. fuscomaculata*.

Declarations

Ethical Approval

Not applicable

Competing interests

The authors declare no competing interests.

Funding

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Authors' Contributions

N.S.S., A.L.L., E.G.F., S.S.N., R.A.Z., and M.S. conceived the research, wrote and edited the manuscript. N.S.S., and V.T. conducted the morphological study and identification of C. fuscomaculata. M.S., N.S.S., and S.S.N. collected C. fuscomaculata in Minas Gerais State. M.S. T.H.R.P and N.S.S. prepared, edited, and formatted the images for publication. N.S.S., T.H.R.P., M.S., V.T., and R.A.Z. participated in manuscript review and editing. All authors agreed on the final version of the manuscript.

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Data availability

Not applicable.

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Figures

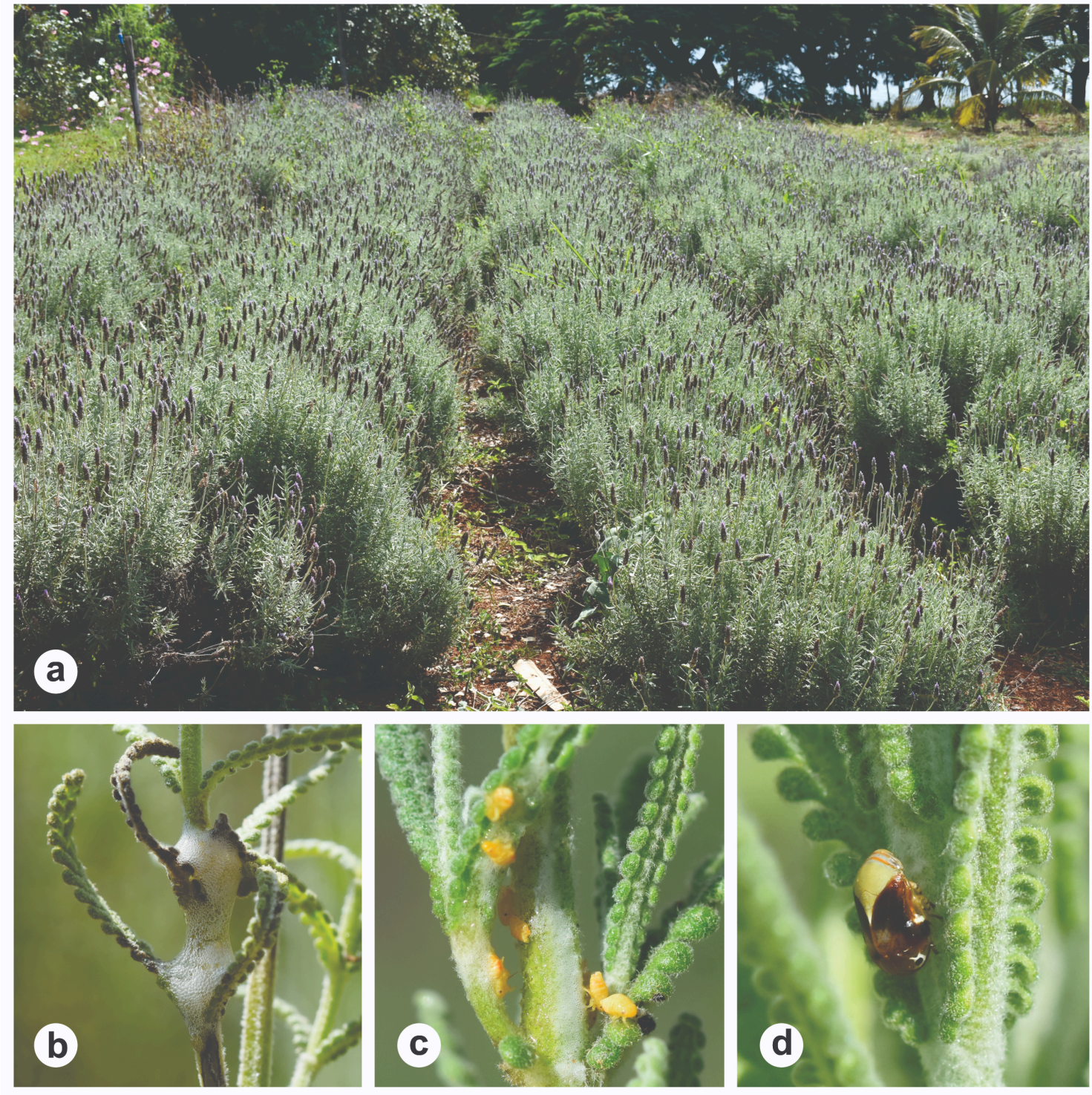


Figure 1

Clastoptera fuscomaculata on *Lavandula angustifolia*: a) area with infestation; b) nymphs and leaf damage; c) nymphs; d) adult.

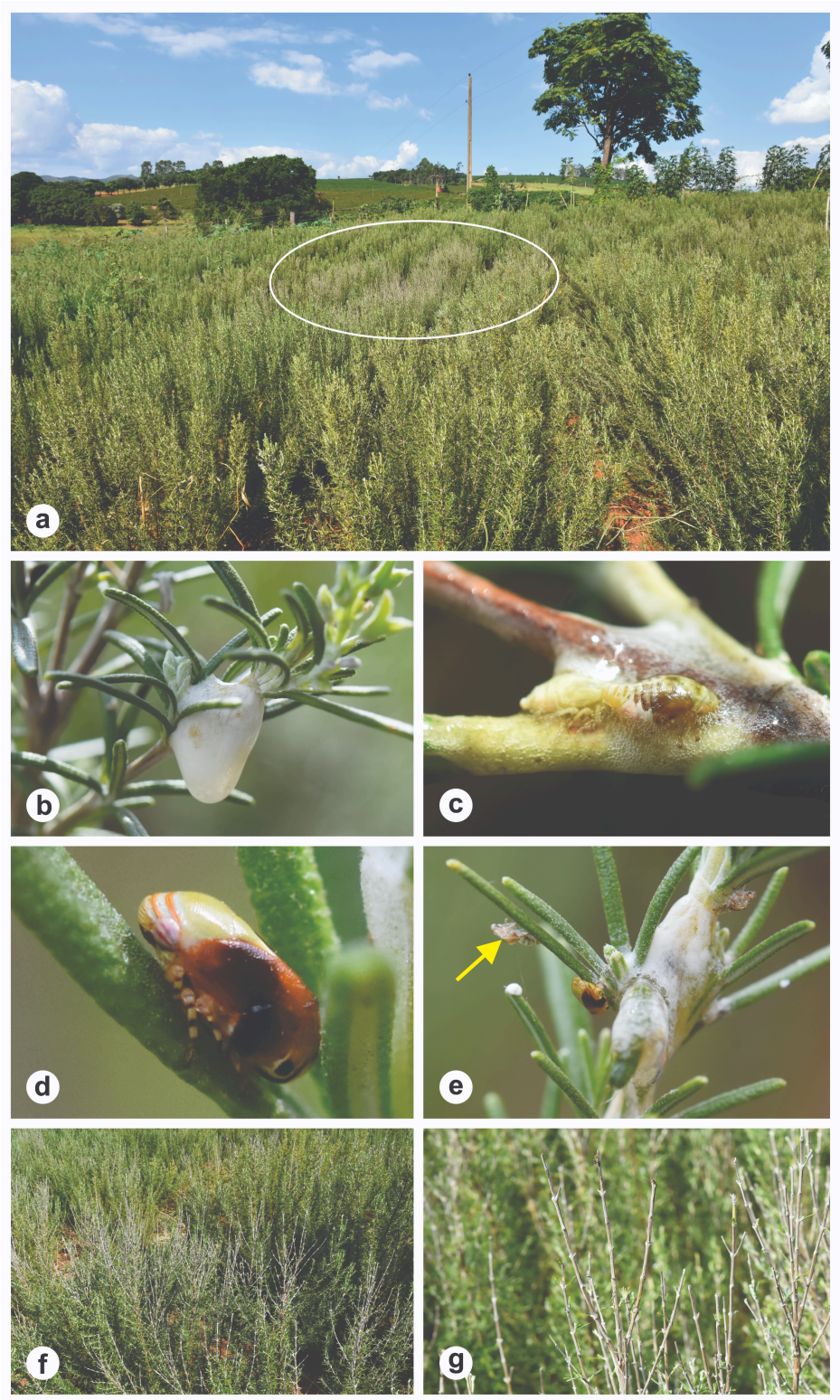


Figure 2

Clastoptera fuscomaculata on *Salvia rosmarinus*: a) area with infestation and patchy attack (white circle); b) spittle mass; c) nymphs; d) adult; e) different life stages with exuvia (yellow arrow) and adult; f–g): apical dieback of rosemary branches.



Figure 3

Clastoptera fuscomaculata on *Ocimum basilicum*: a) area with infestation; b–c) spittle mass; d) nymphs; e) adult.

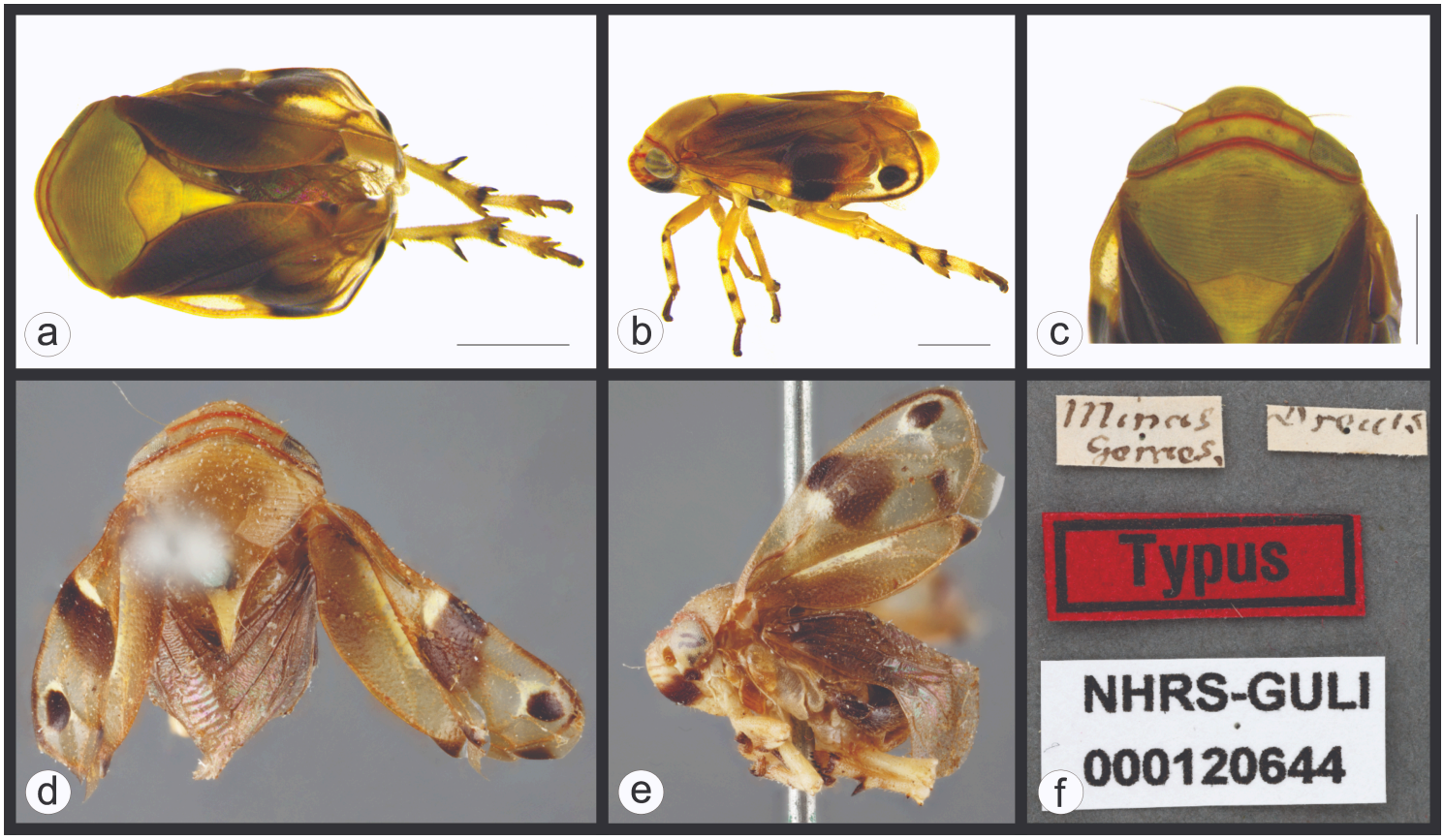


Figure 4

Clastoptera fuscomaculata, adult habitus in dorsal and lateral views: a–b); head and pronotum in dorsal view; c) specimen from Carmo do Rio Claro, Minas Gerais, Brazil (scale bars = 1 mm); d–e) type specimen in dorsal and lateral views, Swedish Museum of Natural History; f) type label.