

## The small *Notoschoenomyza sulfuriceps* Malloch, 1934 (Diptera: Muscidae) from the Pampean province in South America

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**Abstract:** The genus *Notoschoenomyza* Malloch is a small group of predaceous muscids endemic to South America. Currently, the genus includes eight species, of which only *N. immaculate* (Walker) and *N. costata* Snyder are listed for Argentina. This study presents a redescription of *N. sulfuriceps* Malloch based on male and female specimens, with detailed images of the terminalia, and includes notes on its habitat, new distributional records, and a key to the species recorded from Argentina.

**Key words:** Coenosiinae, taxonomy, Argentina, killer flies

**Resumen:** La pequeña *Notoschoenomyza sulfuriceps* Malloch, 1934 (Diptera: Muscidae) de la provincia pampeana en Sudamérica. El género *Notoschoenomyza* Malloch es un pequeño grupo de múscidos predadores endémicos de Sudamérica. Actualmente, el género incluye 8 especies de las cuales solo *N. immaculate* (Walker) y *N. costata* Snyder se encuentran registradas para Argentina. Este trabajo presenta una redescipción de *N. sulfuriceps* Malloch sobre especímenes macho y hembra con detalles de la terminalia, e incluye datos sobre hábitat, nuevos registros de distribución y una clave para las especies de Argentina.

**Palabras clave:** Coenosiinae, taxonomía, Argentina, moscas asesinas

### INTRODUCTION

The biogeographic region known as the Pampean province includes a wide area of grassland in central-eastern Argentina, Uruguay, and south-eastern Brazil (Morrone, 2006), and some mountain systems that slightly exceed 1,000 m.a.s.l. This region has progressively become one of the most significant areas for beef and grain production in the world, consequently reducing natural grasslands (Bilenca & Miñarro, 2004) and causing the loss or alteration of native biodiversity (Kim, 1993). Native species usually sensitive to these changes include those of the family Muscidae. Although the saprophagous fauna of Muscidae in the Pampean province has been explored (Patitucci *et al.*, 2013), little is known about the subfamily Coenosiinae, whose adults are predators of other insects (Patitucci & Couri, 2018). This subfamily includes the genus *Notoschoenomyza* Malloch, 1934, a small group endemic to South America, distributed from coastal environments to highlands. Species of this genus present frons wider than long, a unique

synapomorphy shared with *Spathipheromyia* Bigot, *Schoenomyza* Haliday, and *Schoenomyzina* Malloch (Couri & Pont, 2000).

The genus *Notoschoenomyza* was erected by Malloch (1934) with two new species, *Notoschoenomyza chrisiceps* Malloch, 1934 from Chile and *Notoschoenomyza sulfuriceps* Malloch, 1934 from Uruguay, and one known species *Notoschoenomyza immaculate* (Walker, 1836) from Argentina and Chile. Later, Hennig (1955) and Snyder (1957) added two new species, *Notoschoenomyza kuscheli* Hennig, 1955 from the archipelago Juan Fernández, Chile, and *Notoschoenomyza costata* Snyder, 1957, collected in the province of Tucumán, Argentina. After that, two species previously placed in the genus *Schoenomyza* were transferred to *Notoschoenomyza* through the observation of type specimens (Pont, 1972). More recently, Couri and Marques (2004) presented a new species *Notoschoenomyza diminuta* from Chile, and showed male and female terminalia from four known species (Marques & Couri, 2004). Currently, the genus includes eight species, of

which only *N. immaculate* and *N. costata* are recorded from Argentina (Patitucci *et al.*, 2020). The immature instars remain unknown.

Since, *N. sulfuriceps* was described only with male specimens collected in Montevideo, Uruguay (Malloch, 1934), the aim of this contribution is to present the redescription of *N. sulfuriceps* based on male and female specimens, with detailed images of the terminalia. This contribution includes notes on its habitat, new distributional records, and a key to the *Notoschoenomyza* species of Argentina.

## MATERIALS AND METHODS

Specimens were identified using the original descriptions (Malloch, 1934) and photographs of type specimens. To study the morphology of terminalia, the abdomen of selected specimens was detached and transferred to 90% lactic acid at room temperature for two weeks. After clearing, the genital structures were removed and temporarily mounted on concave glass slides in glycerin. After the study, the dissected parts were placed in a plastic microvial with glycerin and pinned with the respective specimen. The terminology used for the external morphology follows Cumming & Wood (2017).

The labels of the type specimens examined are cited verbatim, lines separated by a slash, different labels by semicolon, and comments are given in brackets. Digital photographs were taken using an Olympus DP 25 digital camera mounted on an Olympus SZX 16 stereomicroscope, and a Brunel digital camera mounted on a Motic optical microscope. Images were processed with the Olympus cellSens Standard software and Combine ZM. Measurements were digitally obtained with the Leica Application Suite EZ software Version 2.1.0. Maps were created with the QGIS software 2.18.3 (<http://www.qgis.org/pl/site/>) and edited with Adobe Illustrator CS6. The shapefile used is available at <http://www.ign.gob.ar>.

All the specimens studied belong to the Instituto y Fundación Miguel Lillo, Tucumán, Argentina (IFML), and Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, Argentina (MACN). High-quality images of type specimens deposited at the Natural History Museum, London, United Kingdom (BMNH) were examined. The key was elaborated based on high-quality images of *N. immaculata* (Walker) (<https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255->

[c38a-40c9-b657-4ccb55ab2feb/record/8675423](https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/8675423)) (BMNH) and the type specimens of *N. costata* Snyder (IFML) (Patitucci *et al.*, 2011).

## RESULTS

### *Notoschoenomyza sulfuriceps* Malloch, 1934

#### Redescription

For a complete list of references, see the catalogue by Carvalho *et al.*, (2005). Information subsequent to this catalogue: Couri & Marques, 2004 (key); Löwenberg-Neto *et al.* 2011 (biogeography); Löwenberg-Neto & Carvalho, 2013 (checklist).

Male (Fig. 1A). Length. Body: 3.58–3.69 mm, wing: 2.95–3.25 mm.

Head (Fig. 1B). Black. Dichoptic, frons at vertex 1/3 of the head width; eyes bare. Frons, fronto-orbital plate, parafacial and face with golden pollinosity, gena with silver-grey pollinosity; ocellar triangle black, 3–4 pairs of frontal setae and 1 pair of reclinate orbital setae. Ocellar setae longer than the ocellar triangle and strong. Inner vertical seta reclinate, outer vertical seta divergent. Gena with a ventral row of black setae. Antenna black; in lateral view inserted close to the mid-level of the eye; arista swollen at base, with microtrichia shorter than the width of the base of the arista. Palpus black, slightly dilated at apex.

Thorax (Fig. 1C). Grey, with a brown vitta between dorsocentral and acrostichal row of setae, and a brown vitta between dorsocentral and intra-alar row of setae; anterior and posterior spiracles dark brown, anepisternum grey with a triangular dark-brown spot. Chaetotaxy: acrostichals biseriate; dorsocentrals 1+3; basal postpronotal setae 2; intra-alars 1+1; supra-alars 1+1; notopleurals 2, posterior one shorter than anterior one. Prealar absent. Scutellum with a long basal pair of seta and a long apical pair of setae. Anepisternum with a series of 4–5 strong setae, with several setulae close to the triangular brown spot; katapisternals 1+1+1, forming an equilateral triangle, and with short setulae; anepimeron, katepimeron, and meron bare; proepisternals 1–2 upwards; proepimeral one upward seta. Prosternum bare.

Wing (Fig. 2D-E). Hyaline, with white spots. Transverse cross-veins straight; vein R<sub>4+5</sub> and vein M parallel; veins bare. Both calypters hyaline with white margins; lower calypter glossiform, same length as the upper calypter; halter and knobs yellow.

Legs. Black with grey pollinosity, apex of the all

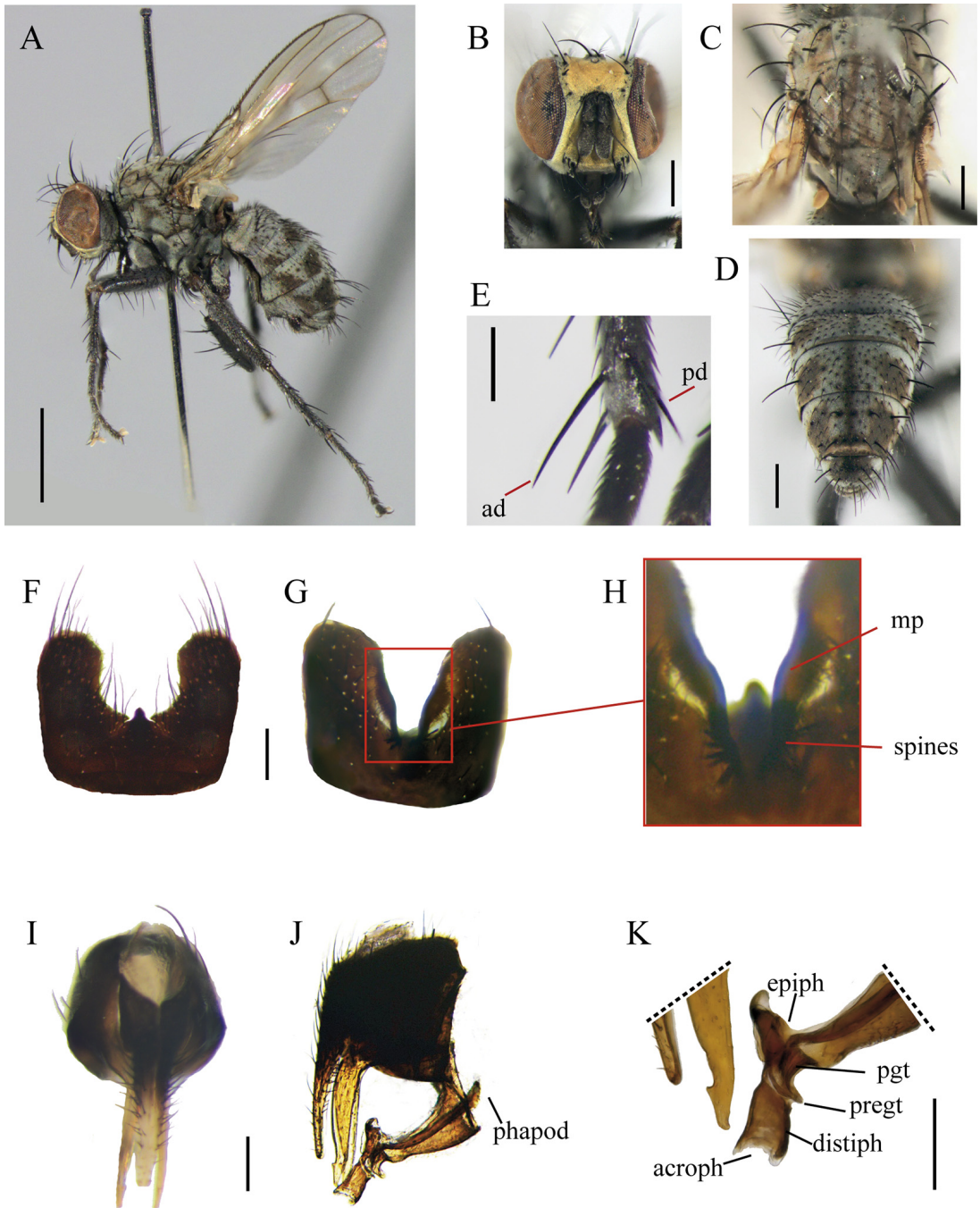


Fig. 1. *Notoschoenomyza sulfuriceps* Malloch, 1934. Male: A. Lateral view. B. Head, frontal view (scale bar: 1 mm). C. Thorax, dorsal view. D. Abdomen, dorsal view (scale bars: 0.5 mm). E. Preapical setae of hind tibia (scalebar: 0.3 mm). F. Sternite 5, outer view. G. Sternite 5, inner view. H. Detailed of inner view of sternite 5. I. Cercal plate, posterior view. J. Cercal plate and surstylus, lateral view. K. Phallic complex detailed, lateral view (scale bar: 0.2 mm (Abbreviations: acroph, acrophallus; ad, anterodorsal; distiph, distiphallus; epiph, epiphallus; mp, median process; pd, posterodorsal; phapod, phallapodeme; pgt, postgonite; pregt, pregonite.)

femora dark brown. Fore femur with an anteroventral and a posterodorsal rows of setae; fore tibia with two anterodorsal setae and one posterodorsal seta in middle third, four preapical setae. First tarsomere with one seta at base. Mid femur with 3–4 short setae in basal third on anteroventral surface; a row of setae on anterodorsal and posteroventral surfaces, 1 preapical seta on posterior surface; mid tibia with two anterodorsal setae and two posterodorsal setae in middle third, and 3–4 preapical setae. Hind femur with an anterodorsal row of setae, a posteroventral row of setae, and 4–5 setae on anteroventral surface; hind tibia with one median and one supra-median anterodorsal setae, 3–4 setae on posterior surface, and one anteroventral seta in the apical third, 2 preapical setae (anterodorsal and posterodorsal surfaces) (Fig. 1E).

Abdomen (Fig. 1D). Grey, with a brown central stripe, brown triangular spots on dorsal surface, and one round spot on lateral surface on tergites 3–5. Sternite 1 bare. Sternite 5 square shaped and two apical lobes, sclerotized; with several long setae on the whole plate. Basal margin straight; apical margin “U” shape with a pointed process in the middle line of the plate (Fig. 1F). Inner surface with two median prolongations and 4–5 strong sclerotized spines (Fig. 1G–H).

Terminalia. Cercal plate longer than wide, setulose, strongly sclerotized, with apical margin concave, and an incision on basal margin (Fig. 1I). Surstylus longer than wide, surpassing the apical end of cercal plate in lateral view; several microscopic setulae on lateral surface and with curved preapical process. Hypandrium tubular, longer than wide, the lateral wall narrows to the distal end exposing the phallapodeme. Aedeagus with phallapodeme curved strongly sclerotized, dilated at apex, with bifurcated base that articulates with epiphallus, and longer than hypandrium in lateral view (Fig. 1J); pregonite developed, kidney-shaped, ventrally fused with the hypandrium; postgonite developed; epiphallus sclerotized and distiphallus tubular, strongly sclerotized and surrounding the acrophallus (Fig. 1K).

Female (Fig. 2A). Length. Body: 3.85–4.66 mm, wing: 3.43–3.87 mm.

Differs from male as follows: Head. Parafacial and face with white-grey pollinosity. Legs. Mid femur with 3–4 short setae in basal third on anteroventral surface and a row of setae on anterodorsal surfaces, 1 preapical seta on posterior surface. Hind tibia with one median and one supra-median anterodorsal setae, 3–4 setae on

posterior surface, and two anteroventral setae in the apical third. Terminalia. Segments wider than long. Tergites 6 and 7 with 2 broad sclerotized plates fused at middle line; tergite 8 with 2 parallel plates; epiproct triangular; cercus longer than epiproct with sclerotized flange (Fig. 2B). Sternites 6 and 7 long and rectangular; sternite 8 divided into 2 small and linear sclerotized plates, each with 2 setae on distal margin; hypoproct triangular, setulose (Fig. 2C). Three spermathecae.

**Type material.** *Notoschoenomyza sulfuriceps*: holotype male, pinned, in good condition (BMNH). <https://data.nhm.ac.uk/dataset/56e711e6-c847-4-f99-915a-6894bb5c5dea/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/8675380>

**Material examined. ARGENTINA. Buenos Aires:** Campana, R.N.E. Otamendi, -34.235, -58.891, 22.VII.2015, Patitucci leg., 2 females, 1 male (MACN-En 13185 al 187); Ea. San Claudio, -35.944, -61.204, 17.XI.2016, Mulieri leg., 1 female (MACN-En 13188); Mar del Plata, -38.055, -57.537, XI.2007, Mulieri leg., 1 female (MACN-En 13189); Saldungaray, Arroyo Sauce Grande, -38.231457, -61.76900, I.2017, Patitucci leg., 3 females, 1 male (MACN-En 13190 al 194); Villa Ventana, Ao. Bellisario, 402 m.a.s.l., -38.090190, -61.933210, 27.X.2016, Olea leg. 1 female (MACN-En 33631).

**Distribution** (Fig. 3): Buenos Aires, Argentina (new record); Montevideo, Uruguay.

**Remarks.** *Notoschoenomyza sulfuriceps* is distinguished from its congeners by the black colour of palpi and legs (with reddish only at apex of fore femur); and wings with white spots. Females of this species present a face with silver pruinosity, while males have golden pruinosity on face. Male 5 sternite with a pointed process in the middle line in the apical margin, and several spines on inner surface, cercal plate longer than wide and with a long basal incision on basal margin; surstylus with a curved preapical tip; and phallus with a strongly sclerotized plate surrounding the acrophallus.

**Note.** Specimens were captured with hand net over vegetation close to different aquatic water environments (rivers, streams, flood areas), alongside specimens of *Spithipheromyia*.

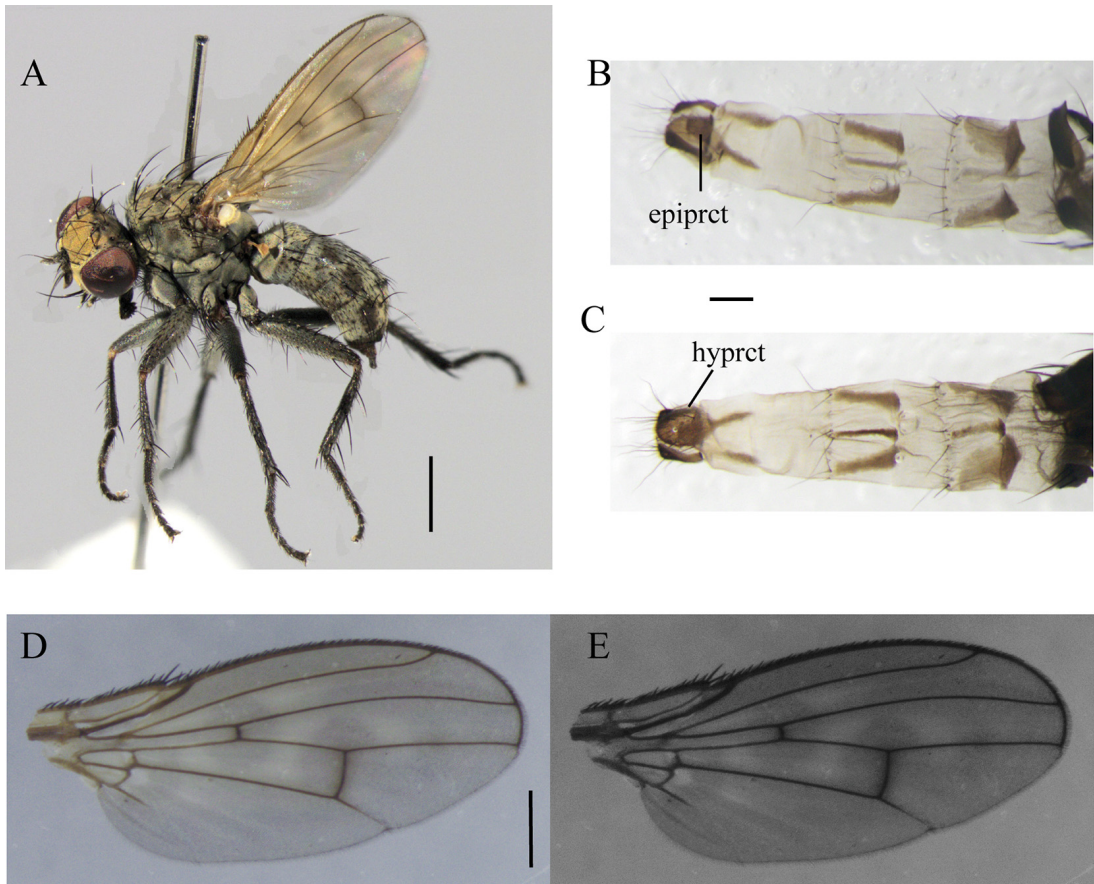


Fig. 2. *Notoschoenomyza sulfuriceps* Malloch, 1934. Female: A. Lateral view (scale bar: 1 mm). B. Ovipositor, dorsal view. C. Ovipositor, ventral view (scalebar: 0.2 mm). D. Wing, dorsal view (colour picture). E. Wing, dorsal view (black and white picture) (scale bar: 0.5 mm). (Abbreviations: epiprct, epiproct; hyprct, hypoproct)



Fig. 3. Geographical distribution of *Notoschoenomyza sulfuriceps* Malloch, 1934. (Purple circle: new records; black square: previous distribution).

Key to *Notoschoenomyza* species of Argentina

1. Palpus fulvous, the base slightly brownish, tibiae yellow to fulvous ..... *N. costata* Snyder  
 -. Palpus black, tibiae black ..... 2
2. Wings with white spots, abdomen with a central stripe and spots on tergites 3-5 .....  
 ..... *N. sulfuriceps* Malloch
- . Wings without white spots, abdomen with a central stripe and spots on tergites 3-5 not sharply defined ..... *N. immaculata* (Walker)

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