

New records and updated distribution of Mesembrinellidae (Diptera: Oestroidea) from Mexico

Nuevos registros y distribución actualizada de Mesembrinellidae (Diptera: Oestroidea) de México

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Acta Zoológica Mexicana (nueva serie)

Responsible editor: Magdalena Cruz Rosales

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How to cite:

Gomes, L. R. P., Pérez-Cruz, P. S. (2025)
New records and updated distribution
of Mesembrinellidae (Diptera:
Oestroidea) from Mexico. *Acta
Zoológica Mexicana (nueva serie)*, 41,
1–10.

10.21829/azm.2025.4112817
elocation-id: e4112817

Received: 12 November 2025

Accepted: 2 December 2025

Published: 30 December 2025

ABSTRACT. The family Mesembrinellidae is restricted to the Neotropical region, comprising 53 known species, which are distributed from Mexico to Argentina. In Mexico, six species have been recorded. Here, we present the first records of *Mesembrinella nigrocoerulea* Whitworth, 2019 and *Souzalopesiella facialis* (Aldrich, 1922) from Mexico, as well as new geographical records of *M. bicolor* (Fabricius, 1805) and *M. socors* (Walker, 1861), increasing the number of Mexican species to eight. In addition, we provide images of both males and females, a distribution map for all species recorded in Mexico, and report for the first time *Laneella fuscusquamata* Whitworth, 2019 as a sarcosaprophagous species.

Key words: Biodiversity; Forensic Entomology; Neotropical Region; North America

RESUMEN. La familia Mesembrinellidae se encuentra restringida a la región Neotropical, con 53 especies conocidas, distribuidas desde México hasta Argentina. En México, se han registrado seis especies. En este estudio, presentamos los primeros registros de *Mesembrinella nigrocoerulea* Whitworth, 2019 y *Souzalopesiella facialis* (Aldrich, 1922) en México, así como nuevos registros de *M. bicolor* (Fabricius, 1805) y *M. socors* (Walker, 1861), incrementando a ocho el número de especies mexicanas. Además, proporcionamos imágenes de machos y hembras, un mapa de distribución de todas las especies registradas en México, y el primer reporte de *Laneella fuscosquamata* Whitworth, 2019 como una especie sarcosaprófaga.

Palabras clave: Biodiversidad; Entomología Forense; Región Neotropical; América del Norte

INTRODUCTION

The mesembrinellids are robust flies exclusively distributed in the Neotropics, from southern Mexico to northern Argentina, and occurring mainly in tropical rain and cloud forests (Guimarães, 1977; Peris & Mariluis, 1984; Vargas & Wood, 2009; Cerretti *et al.*, 2017; Dufek & Mulieri, 2023; Michel *et al.*, 2024; Gomes & Solórzano-Kraemer, 2025). The family comprises 53 extant species (Bonatto & Marinoni, 2005; Marinho *et al.*, 2017; Whitworth & Youssef-Vanegas, 2019) and two fossil species preserved in Dominican and Mexican amber (Cerretti *et al.*, 2017; Gomes & Solórzano-Kraemer, 2025). In Mexico, six extant species have been recorded (Jaume-Schinkel, 2021): *Laneella fuscosquamata* Whitworth, 2019; *Mesembrinella mexicana* Whitworth, 2019; *M. bicolor* (Fabricius, 1805); *M. spicata* Aldrich, 1925; *M. xanthorrhina* (Bigot, 1887); and *M. socors* (Walker, 1861). The record of *M. bellardiana* Aldrich, 1922 in Mexico remains doubtful, as no material is available for examination (Jaume-Schinkel, 2021).

Mesembrinellidae is monophyletic based on both morphological (Guimarães, 1977; Rognes, 1997) and molecular evidence (Cerretti *et al.*, 2017; Marinho *et al.*, 2017). Cerretti *et al.* (2017) recommended synonymizing all genera within the family under *Mesembrinella*. Also, Marinho *et al.* (2017) proposed synonyms for some genera, which were accepted by Whitworth and Youssef-Vanegas (2019). In consequence, the family currently comprises three subfamilies (Laneellinae, Mesembrinellinae, Souzalopesiellinae) and three genera (*Laneella*, *Mesembrinella*, *Souzalopesiella*).

Here, we present the first records of *Mesembrinella nigrocoerulea* Whitworth, 2019 and *Souzalopesiella facialis* (Aldrich, 1922) from Mexico, as well as new geographical records of *M. bicolor* and *M. socors*, increasing the number of species recorded in Mexico to eight.

MATERIALS AND METHODS

The studied specimens belong to the Colección de Artrópodos de Interés Forense (CAIF), Escuela Nacional de Ciencias Forenses, and Colección Nacional de Insectos (CNIN), Instituto de Biología, both at Universidad Nacional Autónoma de México (UNAM).

The specimens were identified using the key of Whitworth and Youssef-Vanegas (2019). For the analysis of the male terminalia, the abdomens were removed using dissecting scissors and immersed in 10% cold potassium hydroxide (KOH) for 24 hours to lighten and soften the structures. The terminalia were then transferred to acetic acid for 15 seconds, and finally to

glycerin. Terminalia were placed in microvials filled with glycerine and pinned under the corresponding specimens.

The photographs were taken with a Leica S8 APO stereomicroscope equipped with an MC170 HD camera attached to it. Sequential images were stacked and edited with Adobe Photoshop CS6, and plates were created with Adobe Illustrator CS6. The distribution map was produced using QGIS 3.44.3 software (<http://www.qgis.org/pl/site/>). Approximate coordinates from literature were obtained from Whitworth and Yusseff-Vanegas (2019) and Jaume-Schinkel (2021). *Mesembrinella xanthorrhina* was not included in the map due to the lack of specific locality information. New records were marked with an asterisk (*) in the distribution section of each species.

RESULTS

List of species of **Mesembrinellidae** recorded in Mexico

Laneellinae Guimarães, 1977

Laneella fuscusquamata Whitworth, 2019

(Figs. 1A-B, 3B)

Distribution. Guatemala, Honduras, Mexico (Chiapas, Mexico City, Tlaxcala, Veracruz) (Whitworth & Youssef-Vanegas, 2019; Jaume-Schinkel, 2021; Michel *et al.*, 2024).

Material examined. Mexico. Mexico City. Coyoacán, Cantera Oriente, Ciudad Universitaria [19.32068, -99.17282], 16.vi.2016, C. Pedraza y LEF [leg.], 1 female (CAIF407); same label information, except: 07.vi.2016, 1 female (CAIF643); [unknown date], 1 female (CAIF1052); 17.vi.2016, 1 female (CAIF1099); 12.i.2017, 1 female (CAIF1590); 19.i.2017, 1 female (CAIF1591); 14.iv.2017, 1 male (CAIF1741). Coyoacán, Jardín Botánico [19.31948, -99.19343], 06.i.2017, C. Pedraza y LEF [leg.], 3 females (CAIF2118-2120). Coyoacán, ENaCiF [Escuela Nacional de Ciencias Forenses] [19.32637, -99.17445], 22.vii.2019, Hernández, E. & García, V. [leg.], 2 females (CAIF2340, 2345). Coyoacán, REPSA, Cantera Oriente [19.32068, -99.17282], 10.iv.2017, C. Pedraza [leg.], 1 male (CAIF3251); same label information, except: 11.v.2017, 1 male (CAIF3252); 31.iii.2017, aspirador, 2 males (CAIF); 10.iv.2017, aspirador, 2 males (CAIF); 13.iv.2017, aspirador, 1 male (CAIF); 25.iv.2017, aspirador, 1 female (CAIF), 11.v.2017, aspirador, 2 males (CAIF); 22.v.2017, aspirador, 1 female (CAIF); 11-24.v.2017, pitfall F30, 1 male (CAIF); 11-24.v.2017, pitfall F37, 1 female (teneral) (CAIF); 11-24.v.2017, pitfall FXXXII, 1 female (teneral) (CAIF); 1-26.vi.2017, pitfall H17, 1 female (teneral) (CAIF).

Remarks. Some specimens (11 adults and three teneral) were collected using an aspirator and pitfalls placed around a biomodel of *Sus scrofa domesticus* Linnaeus, 1758 performed in Coyoacán, Cantera Oriente, Mexico City in 2017. Specimens were collected throughout the entire decomposition process, from the fresh stage to skeletonization, confirming its sarcosaprophagous habits and possible forensic relevance. Additional details of this experiment will be presented in a forthcoming manuscript.

Mesembrinellinae Shannon, 1926

Mesembrinella bicolor (Fabricius, 1805)

(Figs. 1C-D, 3C)

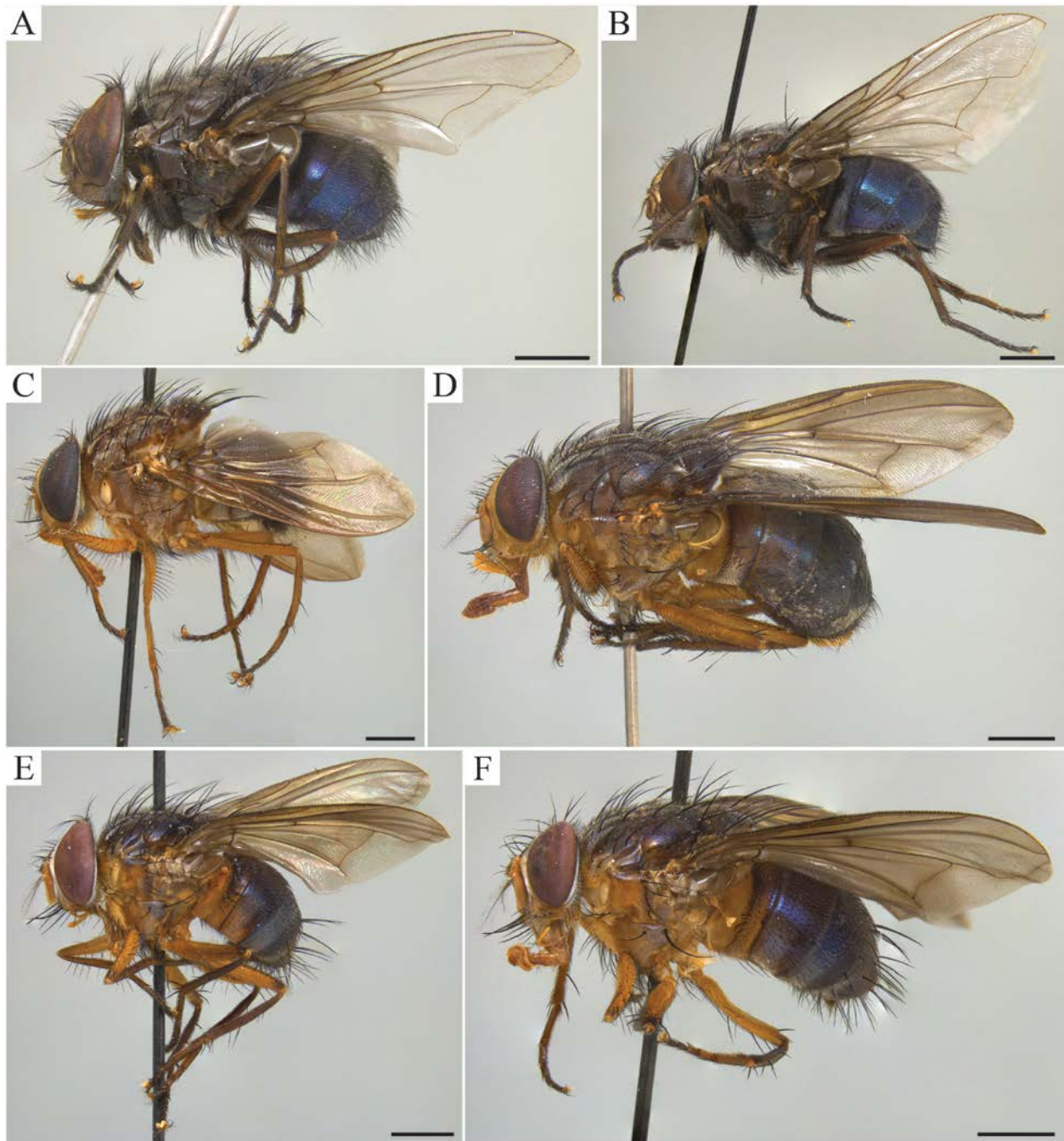


Figure 1. Habitus of Mesembrinellidae species. *Laneella fuscosquamata*: (A) male and (B) female. *Mesembrinella bicolor*, (C) male and (D) female. *Mesembrinella nigrocoerulea*, (E) male and (F) female. Scale bar: 2.0 mm.

Distribution. Argentina, Bolivia, Brazil, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Mexico (Morelos, Oaxaca*, State of Mexico, Tamaulipas, Veracruz), Panama, Peru, Suriname, Trinidad, Venezuela (Whitworth & Youssef-Vanegas, 2019; Jaume-Schinkel, 2021; Dufek & Mulieri, 2023).

Material examined. Mexico. Oaxaca. km 54 Tuxtepec Oaxaca [17.74334, -96.325972], 28.iii.1984, M. García [leg.], 1 female (CNIN); Pto. Eligio Sierra de Juárez [17.57863, -96.67088], 12.ix.1982, A.

Ibarra [leg.], 1 male (CNIN); Metates Sierra de Juarez [17.58001, -96.67088], 16.ix.1982, A. Ibarra [leg.], 1 female (CNIN). Veracruz. San Andrés Tuxtla, Est. de Biol. Los Tuxtlas [18.586389, -95.075278], 166m, Malaise, 8.iii-05.iv.2023, M. Madora [leg.], 2 males and 1 female (CNIN); same label information, except: 08.ii-08.iii.2023, 1 male and 1 female (CNIN); 25.ii.1985, A. Ibarra [leg.], 1 male (CNIN); 20.viii.1988, C. Baoutelspacher [leg.], 1 female (CNIN).

Mesembrinella mexicana Whitworth, 2019

(Fig. 3D)

Distribution. Mexico (Oaxaca) (Whitworth & Yuseff-Vanegas 2019).

Remarks. Species recorded exclusively from its type locality in Oaxaca.

Mesembrinella nigrocoerulea Whitworth, 2019

(Figs. 1E-F, 3E)

Distribution. Costa Rica, Ecuador, Honduras, Mexico* (Oaxaca, Veracruz), Venezuela (Whitworth & Yuseff-Vanegas, 2019; Michel *et al.*, 2024).

Material examined. Mexico. Oaxaca. km 54 Tuxtepec Oaxaca [17.74334, -96.325972], 28.iii.1984, V. Hernández [leg.], 1 male and 1 female (CNIN); same label information, except: A. Ibarra [leg.], 1 male (CNIN); km 55 Carr. Tuxtepec-Oaxaca [17.73826, -96.3278], 14.x.1990, E. Barrera, A. Cadena, E. Ramírez [leg.], 2 females (CNIN). Veracruz. Los Tuxtlas, 10 km, E. Tebanca [18.45124, -95.05745], iv.1981, S. Barrios [leg.], 1 male and 1 female (CNIN).

Mesembrinella socors (Walker, 1861)

(Figs. 2A-B, 3F)

Distribution. Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico (Campeche*, Chiapas, Guerrero*, Jalisco*, Morelos*, Oaxaca*, Quintana Roo*, Veracruz*), Nicaragua, Panama (Whitworth & Yuseff-Vanegas, 2019; Jaume-Schinkel, 2021; Michel *et al.*, 2024).

Material examined. Mexico. Campeche. El Tormento, Escarcega [18.61416, -90.79717], 24.vi.1985, F. Arias [leg.], 1 female (CNIN); same label information, except: 13.vi.1985, 1 female (CNIN); H. Velasco [leg.], 1 male (CNIN); Ixtacumbil-Ixunan, 22.vi.1985, F. Arias [leg.], 1 male (CNIN). Chiapas, Escuintla, Finca Sta. Isabel [15.32217, -92.65856], 900m, 5-7.vii.1988, A. Cadena & L. Cervantes [leg.], 2 males (CNIN); Ocosingo Montes Azules [16.78628, -91.29232], 9-14.vii.1987, F. Arias & L. Cervantes [leg.], 1 female (CNIN); Tapachula, Fca. La Chinita [14.8966, -92.27596], 18.iii.1985, F. Arias [leg.], 1 male (CNIN). Guerrero. Acohuizotla [17.3602, -99.468], 28.i.1982, H. Brailovsky [leg.], 1 male and 1 female (CNIN). Jalisco. Chamela, Estación de Biología, UNAM [19.49848, -105.04449], 18-22.i.1982, A. Pescador [leg.], 1 female (CNIN). Morelos. Alpuyeca [18.74048, -99.25879], 1.ix.1983, A. Ibarra [leg.], 1 male and 1 female (CNIN). Oaxaca. Candelaria de Loxicha [15.9263, -96.49217], 10.ii.1982, M. García [leg.], 1 female (CNIN); km: 206, carr. Oaxaca-Pto. Angel, Finca Pacifico [15.9476, -96.46164], 20.x.1990, E. Ramírez [leg.], 1 male (CNIN); Portillo del Rayo [15.98041, -96.517], 11.ii.1982, A. Ibarra [leg.], 1 female (CNIN); same label information, except: 3-4.vi.1987, L. Cervantes [leg.], 2 females (CNIN); Sta. Rosa [16.76741, -96.69353], 22.iv.1983, A. Ibarra

& M. García [leg.], 1 male (CNIN); Valle Nacional San Mateo Yetla [17.75723, -96.31488], 13.x.1990, E. Ramírez [leg.], 1 male (CNIN). Quintana Roo. L. Chunyaxiche [20.07912, -87.61141], 23.ii.1984, A. Ibarra [leg.], 1 male and 1 female (CNIN); Lag. del Padre [19.57956, -88.04673], 17.vi.1984, R. Lopez [leg.], 1 female (CNIN). Veracruz. Est. Biol. Los Tuxtlas [18.586389, -95.075278], 17-18.iv.1986, E. Ramírez & P. Sinaca [leg.], 1 female (CNIN).

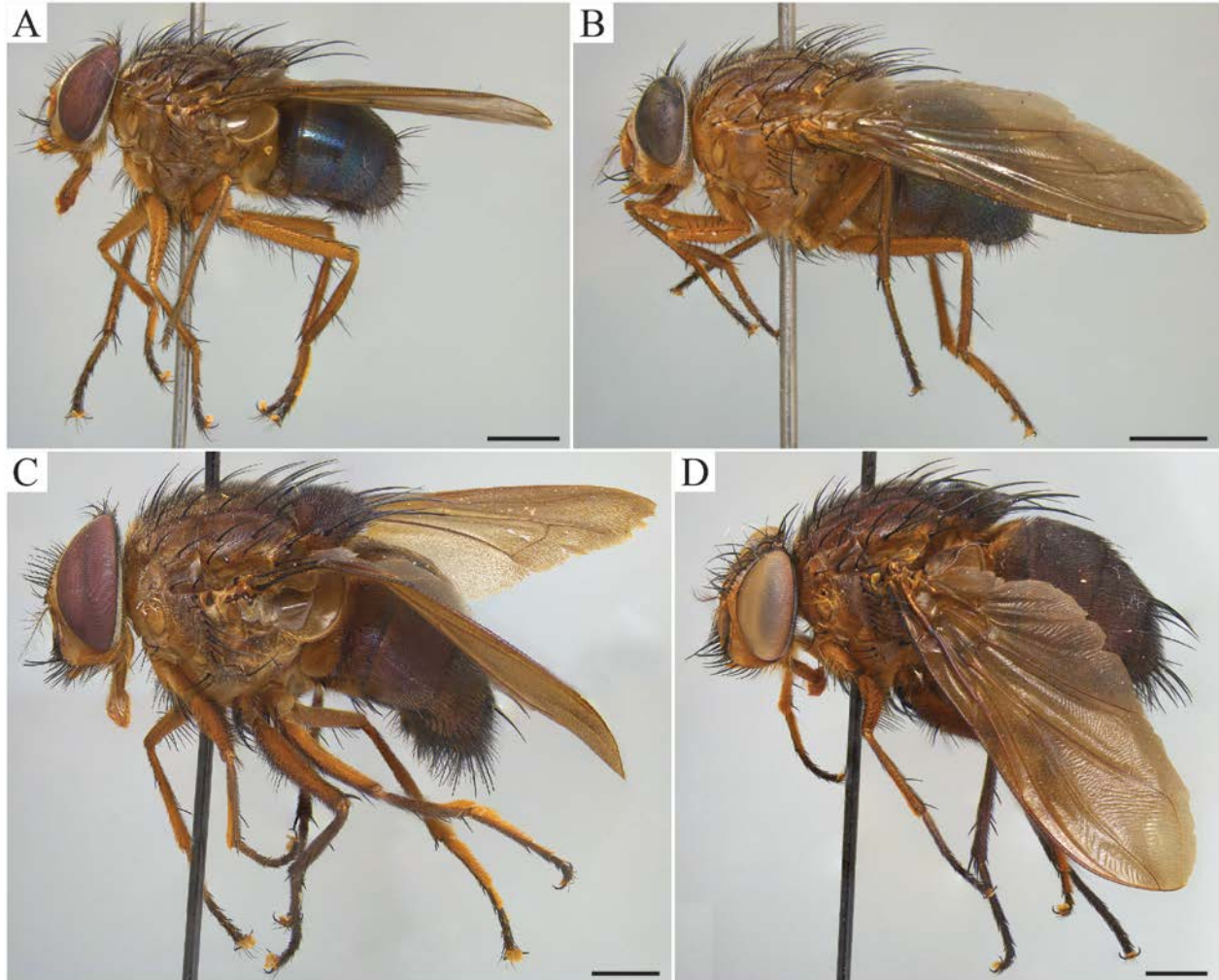


Figure 2. Habitus of Mesembrinellidae species. *Mesembrinella socors*, (A) male and (B) female. *Souzalopesiella facialis*, (C) male and (D) female. Scale bar: 2.0 mm.

Mesembrinella spicata Aldrich, 1925

(Fig. 3D)

Distribution. Costa Rica, Mexico (Chiapas), Panama (Whitworth & Yuseff-Vanegas, 2019).

Mesembrinella xanthorrhina (Bigot, 1887)

Distribution. Mexico (exact locality unknown) (Whitworth & Yuseff-Vanegas, 2019).

Remarks. Male unknown.

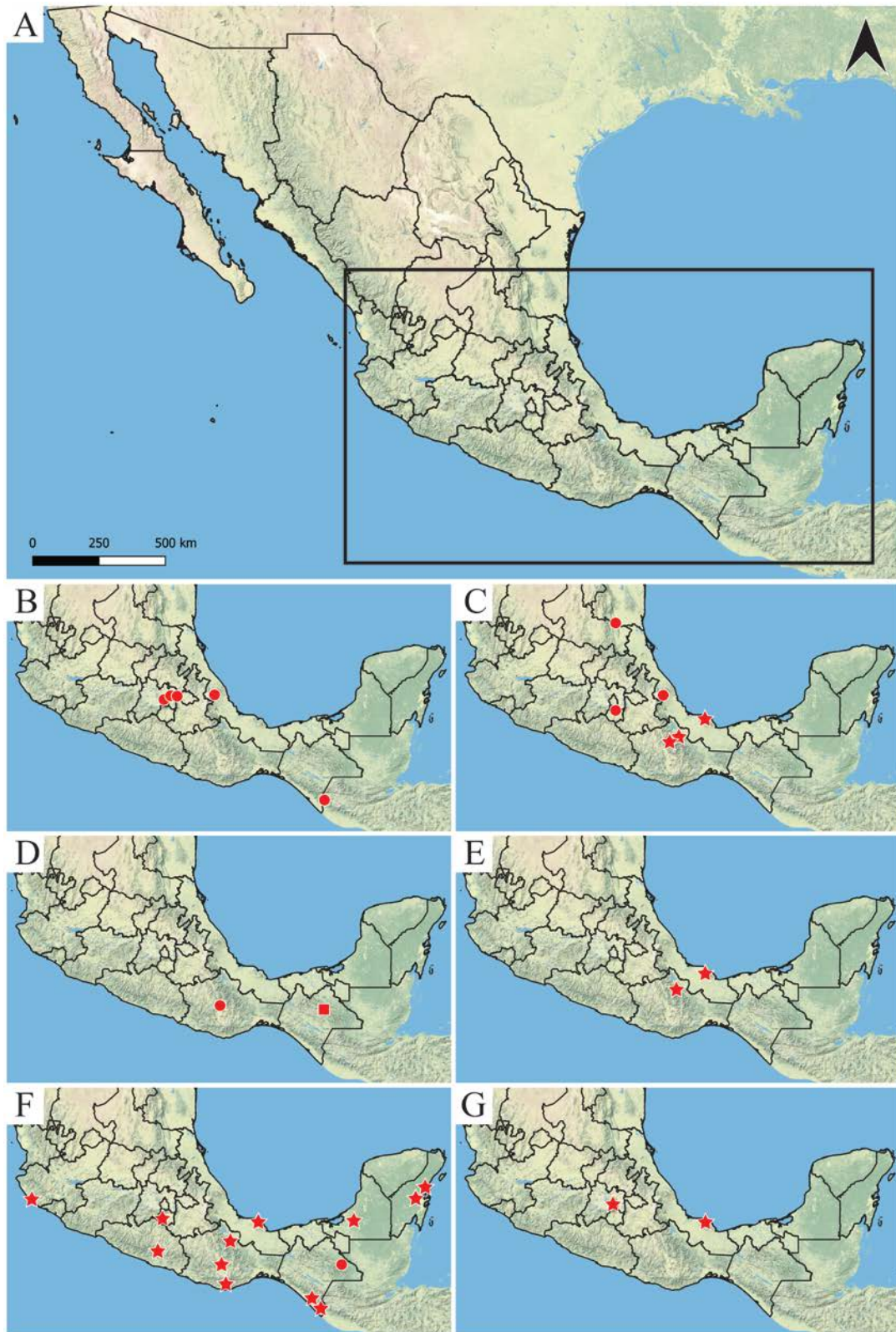


Figure 3. Distributional of Mesembrinellidae species in Mexico. (A) General map of Mexico, (B) *Laneella fuscusquamata*, (C) *Mesembrinella bicolor*, (D) *Mesembrinella mexicana* (red circle) and *Mesembrinella spicata* (red square), (E) *Mesembrinella nigrocoerulea*, (F) *Mesembrinella socors*, (G) *Souzalopesiella facialis*. Red circles: literature records. Red stars: new records. *Mesembrinella xanthorrhina* not included due to the absence of a specific locality data.

Souzalopesiellinae Guimarães, 1977

Souzalopesiella facialis (Aldrich, 1922)

(Figs. 2C-D, 3G)

Distribution. Costa Rica, Ecuador, Panama, Venezuela (Whitworth & Yusseff-Vanegas, 2019), Guatemala, Honduras (Guimarães, 1977), Trinidad (Bonatto, 2001), Mexico* (Mexico City, Veracruz).

Material examined. Mexico. Mexico City. Universidad Nacional Autónoma de México, Edificio de la Escuela Nacional de Ciencias Forenses, Zona Pedregal (REPSA) [19.32637, -99.17445], 21.v.2019, D. Ríos [leg.], 1 male (CAIF3249); same label information, except: A. Gómez [leg.], 1 male (CAIF3250). Veracruz. Est. Biol. Los Tuxtlas [18.586389, -95.075278], 20.vi.1988, V. Hernández & R. Pérez [leg.], 2 males and 1 female (CNIN); same label information, except: 30.xii.1985, L. Cervantes [leg.], 1 male (CNIN); San Andrés Tuxtla, Los Tuxtlas [18.586389, -95.075278], 2.xi.2017, C. Pedraza [leg.], 2 males and 10 females (CAIF1265, 1271, 1276, 1283, 1286, 1289-90, 1292-94, 1296, 1735); same label information except: 13.xi.2017, 3 males and 4 females (CAIF1736-40, 2210-11).

DISCUSSION

The Mexican species of Mesembrinellidae are restricted to the central and southern parts of the country (Jaume-Schinkel, 2021), including both coastal and highland areas. All known records occur in the Neotropical region. In addition, *L. fuscusquamata* and *S. facialis*, also have been reported in the Mexican Transition Zone, specifically in the Transmexican Volcanic Belt province (*sensu* Morrone *et al.*, 2022), a region with only a few studies on Diptera diversity (Gomes & de Carvalho, 2021).

The Mexican Transition Zone is a broad area of overlap between the Nearctic and Neotropical regions (Darlington, 1957), extending from the United States to southern Nicaragua, and has played a significant role in the diversification and dispersal of numerous taxa (Daza *et al.*, 2009; Lamas *et al.*, 2014; Halffter & Morrone, 2017; López-García & Morrone, 2023). In the case of Mesembrinellidae this region appears to act as a barrier for this Neotropical lineage.

It is likely that all mesembrinellid species have broader distribution ranges and further studies are needed to better understand their distribution and to determine the northernmost limit of Mesembrinellidae.

ACKNOWLEDGMENTS. We thank María Cristina Mayorga Martínez (UNAM) and Carlos Pedraza Lara (UNAM) for granting us access to the material from CNIN and CAIF, respectively.

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