

# New records of the Neotropical genus *Phaonantho* Albuquerque (Diptera: Anthomyiidae)

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**Abstract.** The genus *Phaonantho* Albuquerque (Anthomyiidae) comprises three species: *P. mallochi* (Curran), *P. benevola* Couri, and *P. sordilloae* Pamplona & Couri. These species are distributed in the neotropics. In this study, we updated the distributional knowledge for *Phaonantho* species, including the first record of the genus in Bolivia, Paraguay, Peru, and Mexico, and additional new records to Brazil.

**Keywords.** Biodiversity; Checklist; Distribution; Flies; South America.

## INTRODUCTION

*Phaonantho* Albuquerque is a neotropical genus comprising three species (Pamplona & Couri, 1993), distributed from Central America to southern Brazil. This distribution pattern is exceptional compared to most genera of anthomyiids, which are scarce or absent in warm lowland forests (Michelsen, 1996). Albuquerque (1957) previously classified *Phaonantho* as Muscidae, with anthomyiid flies considered a subfamily of Muscidae; the author indicated that the genus was an intermediary form between Phaoniinae and Anthomyiinae, both members of the Muscidae at that time. Cilia on the ventral apex of the scutellum, interfrontal setae on females, three anterodorsal setae on hind tibia, and general appearance resembling Anthomyiidae are present in this genus. However, characters such as lower calypters longer than upper ones, a short vein A<sub>1</sub> (not reaching the wing margin), and a posterodorsal calcar on hind tibia resembling Phaoniinae flies (Muscidae) are also present.

Limited studies have addressed the taxonomy of *Phaonantho* (Curran, 1934; Albuquerque, 1957; Couri, 1979; Pamplona & Couri, 1993). This genus has been indicated as the sister group of *Coenosopsia* Malloch based on morphological (Michelsen, 1991; Gomes & de Carvalho, 2023) and molecular evidence (Gomes *et al.*, 2021). The origin of the clade *Coenosopsia* + *Phaonantho* dates back to the Oligocene/Miocene boundary (c. 23 Ma).

In contrast, the diversification of *Phaonantho* species occurred during the Pliocene (c. 3 Ma) (Gomes *et al.*, 2021). Michelsen (1991) suggested that the clade *Coenosopsia* + *Phaonantho* is the sister group of the remaining Anthomyiidae; however, this hypothesis has been contested through phylogenetic analyses based on both morphological (Nihei & de Carvalho, 2004; Bortolanza *et al.*, 2006; Gomes & de Carvalho, 2023) and molecular data (Gomes *et al.*, 2021).

*Phaonantho* is monophyletic based on three synapomorphies: two proclinate orbital setae on females, two median setulae on pregonite, and epiphallus absent. Additionally, *Phaonantho* exhibits six homoplasies: one reclinate orbital seta on females, a narrow prosternum, lower calypter longer than the upper one, cerci distally with a quadrangular margin, two long distal setulae on pregonite, and pregonite length equal to that of the postgonite (Gomes & de Carvalho, 2023).

With the present study, we significantly contribute to the understanding of *Phaonantho* species' distribution pattern. In addition, we present an updated identification key and discuss the collection methods and the distribution pattern of this genus.

## MATERIAL AND METHODS

The studied material is deposited in the following institutions: Centro de Coleções Taxonômicas,

Universidade Federal de Minas Gerais, Belo Horizonte, Brazil (CCT-UFMG); Colección Nacional de Insectos, Ciudad de Mexico, Mexico (CNIN); Coleção Zoológica do Maranhão, Caxias, Brazil (CZMA); the Canadian National Collection of Insects, Ottawa, Canada (CNC); Padre Jesus Santiago Moure Entomological Collection, Curitiba, Brazil (DZUP); Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA); Museu Nacional do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ); Museu Paraense Emílio Goeldi, Belém, Brazil (MPEG); Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP); Museo de Historia Natural Noel Kempff Mercado, Santa Cruz, Bolivia (UASC); and the United States National Museum, Washington D.C., United States of America (USNM).

Morphological terminology followed Cumming & Wood (2017). The images of the specimens were captured using a NIKON D610 digital camera coupled to a LEICA M165 C stereomicroscope. These images were obtained through sequential captures across different focal planes, and subsequently stacked and edited using Adobe Photoshop CS6. The distribution map was produced using the QGIS software (available at <https://www.qgis.org/en/site>). Distribution data was based on Curran (1934), Albuquerque (1957), Couri (1979), Linhares (1981), Oliveira (1986), D'Almeida (1992), Pamplona & Couri (1993), Nihei & de Carvalho (2004), and Riccardi *et al.* (2022). First records are highlighted by asterisks (\*).

## RESULTS

### Taxonomy

#### *Phaonantho* Albuquerque, 1957

**Type species:** *Phaonantho devia* Albuquerque, 1957.

**Diagnosis:** Male holoptic (Figs. 1A, 2A, 3A) and female dichoptic (Figs. 1D, 2D, 3D). Male frons at the narrowest point with contiguous fronto-orbital plates (Figs. 1A, 2A, 3A). Two pairs of frontal setae. Gena, proboscis, and antennae are light to dark brown. Arista plumose. Palpi filiform. Females with a pair of interfrontal setae, two pairs of proclinate orbital setae (the upper one being very short), and one pair of reclinate orbital setae (Figs. 1D, 2D, 3D). One to two anterior anepisternal setae. The prealar seta shorter than the posterior notopleural seta. The apex of the scutellum is setulose ventrally. Prosternum bare. Dorsocentral setae 2+3. Katepisternal setae 1+2, lower and upper katepisternal setae, similar in length in males. Wings hyaline or brownish without spots. Veins bare, except for the presence of microtrichia, also present on the wing membrane. Vein  $A_1$  short, not reaching the wing margin (Figs. 1C, F). Lower calypter twice as long as the upper calypter. Male fore tibia with a median seta on the posteroventral surface. Female fore tibia with a median seta on the anterodorsal and posteroventral surfaces. Hind tibia with a submedian anterodorsal seta, three anterodorsal setae, and a median

posterodorsal seta (calcar) twice the tibial width. Fore and hind basitarsi, with a conspicuous ventrobasal seta. Abdomen light brown, basally yellowish. Tergites with marginal setae developed, the laterals longer. Sternite one setulose. Male terminalia: surstyli bifurcated, shorter than cerci; cerci wide and rounded, length equal to that of the epandrium width in lateral view; pregonite covered by long setae.

#### Key to *Phaonantho* species updated from Pamplona & Couri (1993)

1. Thorax yellowish with golden pruinose (Figs. 2B, C, E, F); five to six posterior setae on anepisternum; wing hyaline.... *P. mallochi* (Curran, 1934)  
— Thorax dark brown with gray pruinose (Figs. 1B, C, E, F; 3B, C, E, F); at most four posterior setae on anepisternum; wing brownish ..... 2
2. Palpi light brown; wing brownish, darker between  $R_{4+5}$  and the Costal vein (Figs. 1B, E); male with sternite 5 and cerci covered by several long setae ..... *P. benevola* Couri, 1979  
— Palpi yellow; wing slightly brownish, darker between  $R_{4+5}$  and the Costal vein (Fig. 3B), females usually have darker wings (Fig. 3E); male with sternite 5 and cerci not covered by several long setae .....  
..... *P. sordilloae* Pamplona & Couri, 1993

#### *Phaonantho benevola* Couri, 1979 (Figs. 1, 4)

**Diagnosis:** Thorax dark brown with yellow pruinose (Figs. 1B, C, E, F). Palpi and antennae light brown (Figs. 1A, D). Wings brownish (Figs. 1B, C, E, F). Calypters dark brown. Cerci and sternite 5 covered with several long setae (males) (Fig. 1C).

**Type-material examined:** Holotype. Male. **BRAZIL, Mato Grosso**, Sinop, BR-163, km 500-600, 12°31'55"37"W, X.1975, Alvarenga & Roppa leg. (MNRJ). Paratypes. Same as holotype, except: III.1976, 3♀, MNRJ; X.1975, 1♂, MNRJ.

**Material examined:** **BOLIVIA. Cochabamba**, San Antonio-Cotacajes [−16.85973, −66.75930], 900 m, Pruett, Rogg & Cuellar leg., 26.VIII.1992, 1♂, DZUP; **La Paz**, Palos Blancos, Alto Beni [−15.583164, −67.252984], 600 m, L.E. Pena leg., 11-15.I.1976, 1♀, DZUP; **Santa Cruz**, Ichilo, P.N.A. Río Cheio [−17.798140, −64.211760], 645 m, Paulo Bettella leg., 09.II.1990, 1♀, UASC; Potrerillo del Guenda, clearing [−17.67074, −63.45763], 401 m, B.D. Sutton, A.L. Norrbom & E. Quisberth leg., 09-17.X.2014, 2♂, DZUP, USNM, and 1♀, USNM. **BRAZIL. Acre**, Bujari, FES Antimary [−09.333611, −68.321388], Malaise trap, E.F. Morato & J.A. Rafael leg., 18-31.VII.2017, 1♂, DZUP; same label information, except: 22.IX-06.X.2016, 2♀, INPA; **Amazonas**, Manaus [−02.999727, −59.939081], Shannon trap, M.C. Castilho & E. Bindá leg., 14-17.V.1988, 1♂ and 1♀, INPA; Est. do Aleixo [−03.092208, −59.924512], E.V. Silva leg., 04.VII.1969, 1♀, INPA; Barcelos, Rio Aracá, Comuni. Bacuquara [−00.154861, −63.1764440], S.S. Oliveira, J.T. Camara, J.A. Rafael & V. Linard leg., 12-14.VI.2010, 1♂, DZUP; Rio Abacaxis, Flona P. Rosa [−05.2525, −58.6977],

Light trap, J.A. Rafael leg., 29-29.V.2008, 2♀, DZUP; Manaus, Reserva Ducke [−02.999727, −59.939081], Light trap, Norman Penny leg., 02.V.1978, 1♀, DZUP; same label information, except: L.P. Albuquerque leg., 26.IV.1978, 1♂, INPA; L.P. Albuquerque leg., 24.I.1978, 1♀, INPA; L.P. Albuquerque leg., 11.III.1978, 1♀, INPA; J.A. Rafael & J. Vidal leg., 07-21.XI.1994, 1♀, DZUP; C. Univers., Malaise trap, J.A. Rafael leg., 29.VI.1982, 1♀, DZUP; A. Faustino leg., V.1968, 1♀, INPA; A. Faustino leg., 29.VII.1970, 1♀, INPA; AM-010, km 31 [−02.999727, −59.939081], Shannon trap, L. Albuquerque & J.E. Binda leg., 02.I.1991, 1♀, INPA; Tefé, Terra Firme [−03.421944, −64.615055], Malaise trap, J.A. Oliveira, D.M.M. Mendes & J.A. Rafael leg., 20-31.XII.2016, 1♀, INPA; same label information, except: 05-17.IX.2016, 1♂, DZUP; Novo Airão, Rod. AM-352, km 68, Igarapé Mato Grosso [−02.816111, −60.921666], J.A. Rafael & F.F. Xavier Fº leg., 03-17.VII.2017, 1♀, INPA; **Maranhão**, Carolina PARNA Chapada das Mesas, Riacho Sucuruí [−07.118222, −47.308777], 240 m, Malaise trap, J.A. Rafael *et al.* leg., 01-10.I.2014, 1♂ and 1♀, CZMA; same label information, except: 01-10.VII.2013, 4♀, CZMA; 10-20.IX.2014, 1♀, CZMA; Carolina PARNA Chapada das Mesas, Riacho Sucuruí [−07.073388, −47.090333], 288 m, Malaise trap, J.A. Rafael *et al.* leg., 20-30.VI.2014, 1♂ and 1♀, CZMA; same label information, except: 20-31.VIII.2014, 1♂, CZMA; 10-20.VI.2014, 1♂, CZMA; 01-10.IX.2014, 1♀, CZMA; Carolina PARNA Chapada das Mesas, Riacho Sucuruí [−07.118222, −47.308694], Malaise trap, F. Limeira-de-Oliveira leg., 01-10.III.2014, 1♂, DZUP; Carolina PARNA Chapada das Mesas, Riacho Cancela [−07.112277, −47.299111], 225 m, Malaise trap, J.A. Rafael & F. Limeira-de-Oliveira leg., 20-31.X.2013, 1♀, CZMA; same label information, except: 14-30.VI.2013, 1♀, CZMA; C.N. Maranhão REBIO – Res. Biol. Gurupi [−03.234722, −46.6833], F. Limeira-de-Oliveira & D.W.A. Marques leg., 01-06.III.2011, 2♀, CZMA; same label information, except: 07-15.I.2011, 1♂, CZMA; Caxias, Zona Rural, Pov. Olho D'Água das Moças [−04.661944, −43.053611], J.A. Rafael *et al.* leg., 24.VII.2012, 1♂ and 2♀, CZMA; Caxias, Caxias, Reserva Ecol. Inhamum [−04.906666, −43.438888], Malaise trap, F. Limeira-de-Oliveira *et al.* leg., 10-20.IX.2017, 2♂ and 3♀, CZMA; same label information, except: 20-30.VI.2017, 1♂, CZMA; 20-28.II.2017, 1♀, CZMA; Mirador Parque Est. Mirador Base da Geraldina [−06.623611, −45.868888], Malaise trap, F. Limeira-de-Oliveira *et al.* leg., 13-19.X.2012, 2♀, CZMA; same label information, except: 14-18.VIII.2012, 7♂ and 7♀, CZMA; J.C. Silva & M.M. Abreu leg., 07-14.V.2010, 1♂, CZMA; 02-26.X.2006, 1♀, CZMA; Mirador Parque Est. Mirador Base da Geraldina [−06.808055, −45.109444], F. Limeira-de-Oliveira & D.W.A. Marques leg., 27.IX-02.X.2011, 1♂, CZMA; **Mato Grosso**, Chapada dos Guimarães [−15.464939, −55.750653], Exc. Dep. Zool. UFPR, 06.XII.1983, 1♀, DZUP 099215; **Pará**, Belém, Mocambo [−02.234902, −53.854075], M.F. Torres leg., 21.III.1978, 1♂, MPEG; Belém, Bosque Rodrigues Alves [−01.430348, −48.456654], F.S. Carvalho-Filho leg., 30.X.2005, 1♂ and 1♀, MPEG; Jacundá [−04.614514, −49.182549], 17.III.1981, 1♂, INPA; Monte Dourado [−00.868158, −52.538813], T. Gardner leg., V.2005, 1♂, DZUP; Morro do Senador

[−03.989722, −49.745833], Malaise trap, J.A. Rafael & J. Vidal leg., XII.2001, 1♂, INPA; Novo Repartimento, Vicinal [−04.445, −49.906944], Malaise trap, J.A. Rafael & J. Vidal leg., 28.XI.2001, 1♂ and 1♀, INPA; same label information, except: [−04.364166, −50.030277], 27.XI.2001, 4♂ and 4♀, INPA; Tucuruí [−03.712826, −49.729370], Nunes de Mello leg., 06.VIII.1980, 31♂ and 4♀, INPA; same label information, except: 04.VIII.1980, 4♂ and 4♀, INPA; 17.VIII.1980, 1♂ and 1♀, INPA; **Piauí**, Piracuruca, P.N. de Sete Cidades, Posto do ICMBio [−04.099166, −41.709444], J.A. Rafael & F. Limeira-de-Oliveira leg., 19-24.IV.2012, 2♀, CZMA; **Rio de Janeiro**, Petropolis [−22.420340, −43.162778], 900 m, E.G.I. & E.A. Munroe leg., XI.1971, 1♀, CNC; **Rondônia**, Vilhena [−12.739081, −60.132936], C. Elias leg., 29.X.1986, 2♀, DZUP 099216-17; same label information, except: 23.XI.1986, 2♀, DZUP, DZUP 099218; 09.X.1986, 1♀, DZUP; 15.X.1986, 1♀, DZUP; **Roraima**, Caracará, PARNA Viruá [01.489722, −61.003333], J.A. Rafael & R. Boldrini leg., 24.XII.2015, 1♂, DZUP2020A12; Pacaraima [04.478494, −61.147079], Shannon trap, J.A. Rafael leg., 05-08.III.1988, 1♀, DZUP; Rio Uraricoera, Ilha de Maraca [03.413441, −61.277408], J.A. Rafael & L.S. Aquino leg., 19-24.VII.1987, 1♀, DZUP 463155; same label information, except: 18-28.VIII.1987, 1♀, INPA. **PERU**, **Cusco**, Estacion Biologica Villa Carmen [−12.894166, −71.403888], 540 m, A.L. Norrbom & B.D. Sutton leg., 12-14.XII.2013, 1♂, USNM; Quincemil [−13.530514, −71.955476], 700 m, L. Pena leg., 01-15.XI.1962, 1♀, CNC; **Madre de Dios**, Avispas [−12.163910, −70.896098], 400 m, L. Pena leg., 10-20.IX.1962, 1♂, CNC; same label information, except: 400 m, L. Pena leg., 01-15.IX.1962, 1♀, CNC; CICIA, Trail 2 [−12.56104, −70.10645], Malaise trap, 267 m, T. Perez leg., 17-24.XII.2013, 1♂, DZUP.

**Distribution:** Bolivia\* (Cochabamba\*, La Paz\*, Santa Cruz\*), Brazil (Acre\*, Amazonas\*, Maranhão\*, Mato Grosso, Pará\*, Piauí\*, Rio de Janeiro, Rondônia\*, Roraima), Peru (Cusco\*, Madre de Dios) (Couri, 1979; Nihei & de Carvalho, 2004; Riccardi *et al.*, 2022).

**Remarks:** Some specimens were collected with Malaise traps, light traps, and Shannon traps, using dead fish and feces as bait.

### ***Phaonantho mallochii* (Curran, 1934) (Figs. 2, 4)**

**Diagnosis:** Thorax yellowish with silver pruinose (Figs. 2B, C, E, F). Palpi and antennae yellow (Figs. 2A, D). Wing hyaline (Figs. 2B, C, E, F). Calypters whitish. Cerci and Sternite 5 not covered by several long setae (male) (Fig. 2C).

**Type-material examined:** Paratypes. **BRAZIL**, **Rio de Janeiro**, Represa da Cabeça, Corcovado [−22.951993, −43.211569], D. Albuquerque leg., 28.VII.1946, 1♂, MNRJ Nº 5212 and 1♀, MNRJ Nº 5217.

**Material examined:** **BRAZIL**, **Bahia**, Una [−15.294652, −39.076150], Shannon trap, D.S. Amorim & C. Vasconcelos



leg., 07-25.X.1986, 1♂ and 1♀, DZUP; **Espírito Santo**, Ibitirama, Pq. Nac. Caparaó, Trilha da toca de São Jorge [−20.465833, −41.745], Malaise trap, C.O. Azevedo & F.B. Fraga leg., 16-23.III.2013, 1♂, DZUP L16; 2♂ MZUSP; **Goiás**, Corumbá [−15.926315, −48.811015], M.F. Farretto leg., XI.1946, 1♀, DZUP; **Minas Gerais**, Callado, Rio Doce [−19.336594, −41.232695], 12-15.II.1939, 1♀, MNRJ Nº 5251; Cambuquira [−21.849743, −45.289764], Lopes & Soares leg., III.1941, 1♀, MNRJ Nº 5252; São Gonçalo do Rio Abaixo, Estação Ambiental de Peti [−19.880277, −43.368611], 603-808 m, Malaise trap, A.F. Kumagai leg., 21.VI.1987, 1♂, CCT-UFMG IDI 1600459; same label information, except: 25.X-01.XI.2002, 2♀, CCT-UFMG IDI 1701023, 1701052; 27.IX.2002, 1♀, CCT-UFMG IDI 1702519; 17.I.2003, 1♀, CCT-UFMG IDI 1702569; [−19.880277, −43.368333], 04.IX.2002, 3♀, CCT-UFMG IDI 1702551, 1704050, 1702535; 17.I.2003, 1♀ (CCT-UFMG IDI 1702561); Belo Horizonte, Campus CCT-UFMG, Estação Ecológica [−19.875, −43.972222], 842 m, 05.V.1999, 1♀, CCT-UFMG IDI 1701034; Viçosa [−20.754781, −42.878557], P.F. Ferreira leg., 19.XI.1984, 1♀, DZUP 099214; same label information, except: 20.X.1984, 1♀, DZUP 099238; **Paraíba**, João Pessoa, Mata do Buraquinho [−07.139444, −34.860277], R.C.A.P. Farias leg., 09.IX.2009, 1♂, DZUP 463085; same label information, except: 10.IX.2009, 2♂, DZUP 463086, 463092; 04.IX.2009, 1♂, DZUP 463087 and 1♀, DZUP 463095; 01.IX.2009, 2♂, DZUP 463088-89 and 1♀, DZUP 463097; 09.IX.2009, 2♂, DZUP 463090-91; 07.IX.2009, 1♂, DZUP 463093; 03.IX.2009, 2♀, DZUP 463094, 463096; 11.III.2010, 1♂, DZUP; 19.VIII.2010, 2♂, DZUP; 05.IX.2009, 1♂, DZUP; **Paraná**, Antonina, Reserva Sapitanduva [−25.439498, −48.746125], Light trap, Lev. Ent. PROFAUPAR, 03.XII.1986, 2♀, DZUP; Reserva Natural da Guaricica [−25.313611, −48.704166], 244 m, Entom. UFPR 2017, 27.X.2017, 1♀, DZUP; Fênix, Reserva Est. ITCF [−23.912610, −51.959757], Malaise trap, Lev. Ent. PROFAUPAR, 06.IX.1986, 1♀, DZUP 099163; same label information, except: 14.IX.1987, 1♀, DZUP 099182; 20.VI.1988, 1♀, DZUP 099183; 22.XII.1986, 1♀, DZUP; 15.XII.1986, 1♀, DZUP; Guarapuava, Est. Águas Sta. Clara [−25.632814, −51.964977], Malaise trap, 22.IX.1986, 3♀, DZUP 099165-67; same label information, except: 06.IV.1987, 1♀, DZUP 099168; 10.XI.1986, 1♀, DZUP 099169; Jundiá do Sul, Fazenda Monte Verde [−23.423531, −50.281910], Malaise trap, Lev. Ent. PROFAUPAR, 16.XI.1987, 1♂, DZUP 159783 and 2♀, DZUP 099180-81; same label information, except: 09.V.1988, 1♂, DZUP 159784; 23.V.1988, 1♂, DZUP 159785; 25.I.1988, 1♂, DZUP 159786; 02.XI.1987, 1♂, DZUP 159787; 24.XI.1986, 1♂, DZUP 159788 and 1♀, DZUP 099152; 08.IX.1986, 1♀, DZUP 099157; 11.IV.1988, 1♀, DZUP 099158; 09.XI.1987, 1♀, DZUP 099159; 13.X.1986, 1♀, DZUP 099160; 03.XI.1986, 2♀, DZUP 099161-62; 25.VIII.1986, 2♀, DZUP 099153-54; 27.X.1986, 1♀, DZUP 099155; 01.IX.1986, 1♀, DZUP 099156; 12.X.1987, 1♀, DZUP 463136; Telêmaco Borba, Res. Biol. Samuel Klabin [−24.297941, −50.618785], Malaise trap, Lev. Ent. PROFAUPAR, 26.X.1987, 1♂, DZUP 159789; same label information, except: 03.VIII.1987, 1♂, DZUP 159790 and 3♀, DZUP 159856-58; 24.VIII.1987, 1♂, DZUP 159791 and 1♀,

DZUP 099173; 02.XI.1987, 14♀, DZUP 099178-79, 159793, 463121, 463124-33; 26.X.1987, 7♀, DZUP 099170-71, 159794, 159849-51, 463098; 14.III.1988, 1♀, DZUP 159795; 08.II.1988, 2♀, DZUP 159796-97; 25.I.1988, 2♀, DZUP 159798-99; 18.I.1988, 1♀, DZUP 159800; 11.I.1988, 1♀, DZUP 159801; 04.I.1988, 1♀, DZUP 159802; 21.XII.1987, 3♀, DZUP 159803-05; 14.XII.1987, 6♀, DZUP 159806-11; 07.XII.1987, 7♀, DZUP 159812-18; 12.X.1987, 6♀, DZUP 099177, 159819, 159824-26, 159847; 30.XI.1987, 5♀, DZUP 159820-23, 159848; 08.XII.1986, 1♀, DZUP 159827; 05.X.1987, 6♀, (DZUP 159829, 159868-72; 04.VII.1988, 1♀, DZUP 159830; 31.VIII.1987, 1♀, DZUP 159831; 19.X.1987, 15♀, DZUP 159832-46; 07.IX.1987, 4♀, DZUP 159852-55; 17.VIII.1987, 8♀, DZUP 099174-76, 159859-63; 14.IX.1987, 4♀, DZUP 159864-67; 28.IX.1987, 1♀, DZUP 099172; 07.IX.1987, 1♀, DZUP 099426; 18.VIII.1986, 2♀, DZUP 159873-74; 29.IX.1986, 1♀, DZUP 159875; 25.VIII.1986, 1♀, DZUP 159876; 03.XI.1986, 4♀, DZUP 159877-80; 10.XI.1986, 3♀, DZUP 159881-83; 24.XI.1986, 4♀, DZUP 159884-86; 17.XI.1986, 4♀, DZUP 159887-90; 01.XII.1986, 1♀, DZUP 159891; 13.X.1986, 2♀, DZUP 159892-93; 27.X.1986, 4♀, DZUP 159894, 099147-49; 29.XI.1986, 1♀, DZUP 099150; 20.X.1986, 1♀, DZUP 099151; 21.IX.1987, 10♀, DZUP 463099, 463102-04, 463111-13, 463116-18; 23.XI.1987, 6♀, DZUP 463100, 463114, 463119-20, 463122-23; 16.XI.1987, 7♀, DZUP 463101, 463105-07, 463109-10, 463115; 09.XI.1987, 1♀, DZUP 463108; Colombo, EMBRAPA Br476 km 20 [−25.321620, −49.159959], Malaise trap, Lev. Ent. PROFAUPAR, 25.VIII.1986, 1♂, DZUP 159792; same label information, except: 18.VIII.1986, 5♀, DZUP 099184-88; 08.IX.1986, 2♀, DZUP 099189-90; 20.X.1986, 1♀, DZUP 099191; 01.IX.1986, 1♀, DZUP 099192; 10.XI.1986, 1♀, DZUP 099193; 11.VIII.1986, 1♀, DZUP 099194; 04.VIII.1986, 1♀, DZUP 099195; 06.X.1986, 1♀, DZUP 099196; 08.IX.1986, 1♀, DZUP; **Rio de Janeiro**, Mangui [−22.940901, −43.230452], C.L. de Paula leg., IV.1986, 2♂, DZUP 099220-21; Nova Friburgo [−22.287228, −42.528854], 900 m, Wygod. leg., I.1946, 2♂, MNRJ Nº 5213-5214; same label information, except: 1♂, MNRJ Nº 5225; 5♀, MNRJ; Rio de Janeiro [−22.932896, −43.222349], Serviço Febre Amarela, M.E.S., IV.1938, 1♂, MNRJ Nº 5237; same label information, except: VI.1938, 2♂, MNRJ Nº 5238-5239; 3♂, MNRJ Nº 5240-5243; Rio de Janeiro, Grajaú [−22.928777, −43.269320], S. Lopes leg., 06.X.1939, 1♂, MNRJ Nº 5245; same label information, except: 01.VIII.1939, 1♂, MNRJ Nº 5244; 22.IX.1937, 1♀, MNRJ Nº 5249; Angra dos Reis [−22.987371, −44.294816], Travassos, VII.1934, 1♂, MNRJ Nº 5216; Palmeiras [−22.760337, −43.018443], S. Lopes leg., 07.I.1939, 1♂, MNRJ Nº 5246; Petrópolis, Alto da Mosela [−22.493368, −43.203059], D. Albuquerque leg., I.1956, 2♂, MNRJ Nº 5247-5248; Porto Flores [−22.932896, −43.222349], Riho Rillo, V.1944, 1♂, MNRJ Nº 5215; Miguel Pereira [−22.459719, −43.481009], H.S. Lopes leg., V.1933, 1♀, MNRJ Nº 5221; **Rio Grande do Sul**, Tenente Portela [−27.370133, −53.757764], J.R. Ipure leg., 02-05.XII.1985, 1♀, DZUP 099164; **Santa Catarina**, Nova Teutônia [−27.183333, −52.383333], F. Plaumann leg., V.1967, 1♂, MZUSP; same label information, except: XII.1967, 1♂,



MZUSP; XI.1970, 1♂, MZUSP; **São Paulo**, Botucatu, Fundort [−22.887674, −48.445284], I.G. Gottsberger leg., 20.IX.1977, 1♂ and 1♀, DZUP; [unknown locality and collector], 20.XII.1984, 1♀, DZUP 099213; H. Florestal, Chapadão [−23.550130, −46.635242], F. Lane leg., VIII.1946, 1♀, MNRJ Nº 5223; Ilha Seca [−23.550130, −46.635242], Com. Inst. Osw. Cruz, 19-26.1940, 1♀, MNRJ Nº 5250; Jundiaí, Serra do Japi [−23.230670, −46.955961], A.X. Linhares leg., 21.II.1999, 1♀, DZUP 159828; same label information, except: 24.II.1999, 1♀, DZUP; Peruíbe, Est. Ecol. Juréia-Itatins [−24.366666, −47.016666], Shannon trap, M.L. Cavallari leg., 03.V.2011, 2♀, DZUP; Ribeirão Preto, Campus USP, Secondary semideciduous Forest [−21.1625, −47.86], Malaise trap, D.A. Amorim leg., 01-08.VII.2017, 1♀, DZUP2020A13; **PARAGUAY**, **Canindeyú**, Reserva Natural del Bosque Mbaracayú, Jejuí-mí [−24.122513, −55.446990], Malaise trap, A.C.F. Costa leg., 18-28.VII.1996, 1♂, DZUP 099222; same label information, except: 24-30.IV.1996, 2♂, DZUP 099223-24; 17-23.IV.1996, 1♂, DZUP 099225, 2♂, DZUP, 2♀, DZUP 099201, 099210 and 1♀, DZUP; 29.V-11.VI.1996, 11♂, DZUP 099226-36, 1♂, DZUP and 4♀, DZUP 099200, 099202-04, 099211; 18-28.VII.1996, 1♂, DZUP 463139 and 3♀, DZUP 099212, 463137-38; 20-27.VI.1996, 2♂,

DZUP 463140-41; 11-18.VII.1996, 2♂, DZUP 463143-44, 1♂, DZUP; 12-19.VI.1996, 2♀, DZUP 099197-98, 2♀, DZUP; 01-15.V.1996, 2♀, DZUP 099199, DZUP and 1♀, DZUP; 26.VII-08.VIII.1996, 1♀, DZUP 099205, 2♀, DZUP; 01-08.V.1996, 1♀, DZUP 099206; 09-15.V.1996, 1♀, DZUP 099207; 12-19.VI.1996, 1♀, DZUP 099208; 25.VII-08.VIII.1996, 1♀, DZUP 099209; 24-28.V.1996, 1♀, DZUP 099212; 28.VI-03.VII.1996, 6♂ and 1♀, DZUP; 25-30.III.1996, 1♀, DZUP; 04-18.VII.1996, 6♂ and 1♀, DZUP; 29.III-09.IV.1996, 1♀, DZUP; 10-16.IV.1996, 1♀, DZUP; 10-18.VII.1996, 1♀, DZUP.

**Distribution:** Brazil (Bahia\*, Espírito Santo\*, Goiás\*, Minas Gerais, Paraná\*, Paraíba\*, Rio de Janeiro, Rio Grande do Sul, Santa Catarina\*, São Paulo), Panama (Canal Zone), Guyana (Cuyuni-Mazaruni) Paraguay\* (Canindeyú\*) (Curran, 1934; Albuquerque, 1957; Linhares, 1981; Oliveira, 1986; D’Almeida, 1992).

**Remarks:** *Phaonantho devia* Albuquerque is a junior synonym of *Phaonantho mallochi* (Couri, 1979). Some specimens were collected with Malaise traps, light traps, and Shannon traps, using garbage, feces, and carcasses of *Sus scrofa* as bait.



**Figure 1.** *Phaonantho benevola* Couri, 1979. Male: (A) Head, frontal view. (B) Habitus, dorsal view. (C) Habitus, lateral view. Female: (D) Head, frontal view. (E) Habitus, dorsal view. (F) Habitus, lateral view. Scale bar: 1.0 mm.



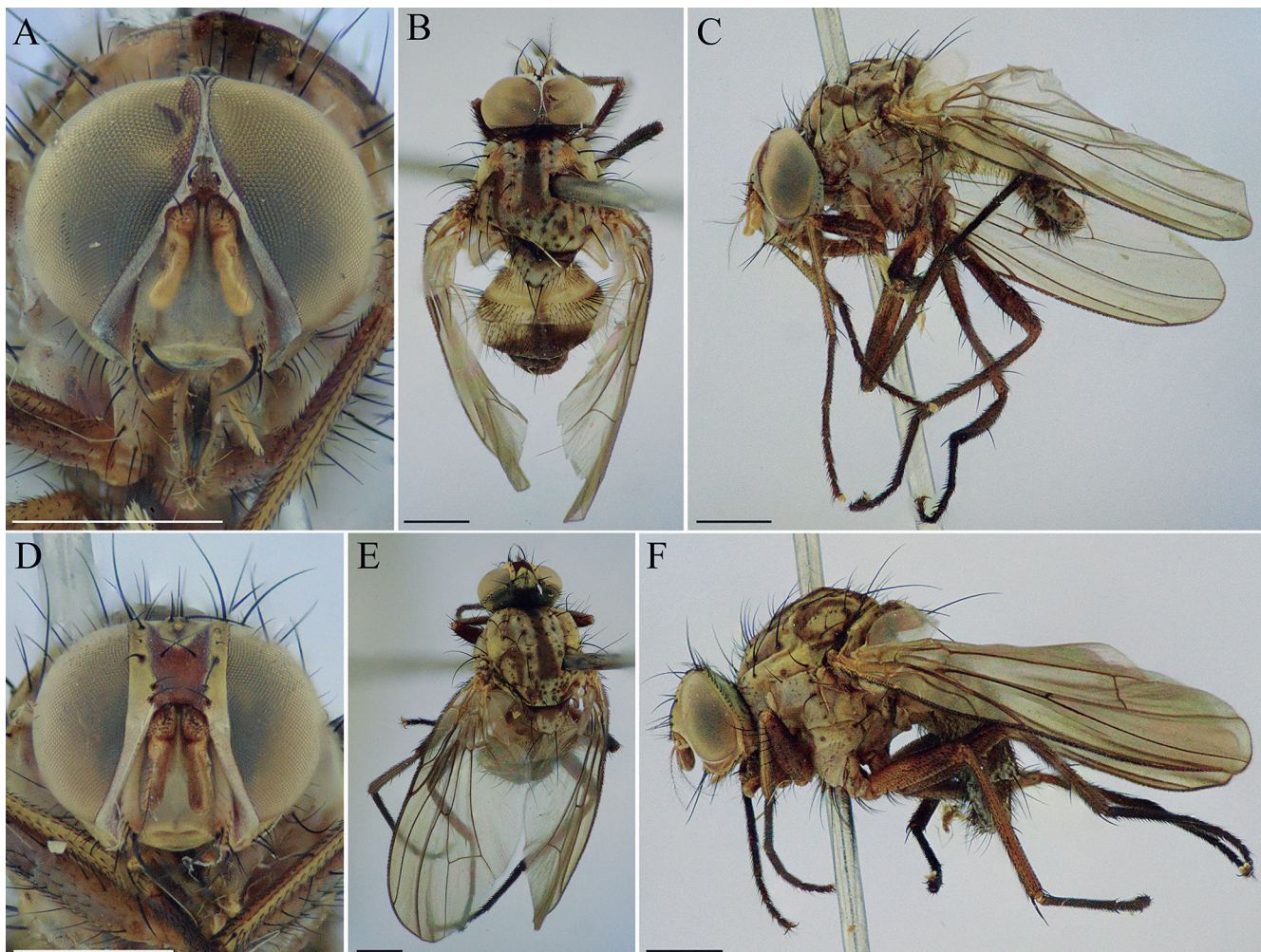
***Phaonantho sordilloae* Pamplona & Couri, 1993  
(Figs. 3, 4)**

**Diagnosis:** Thorax dark brown with silver pruinose (Figs. 3B, C, E, F). Antennae yellow and palpi light brown with yellow apex (Figs. 3A, D). Wings brownish (Figs. 3B, C, E, F). Calypters light brown. Cerci and Sternite 5 not covered by several long setae (males).

**Type-material examined:** Holotype. Male. **BRAZIL, Rio de Janeiro**, Floresta da Tijuca [−22.950479, −43.291535], C.M.O. Sordillo leg., X.1988, MNRJ. Paratypes. Same as holotype, except: Rio de Janeiro [−22.932896, −43.222349], XI.1988, 1♂ and 7♀, MNRJ; IX.1988, 1♀, MNRJ; XII.1988, 1♀, MNRJ; I.1989, 1♂, MNRJ.

**Material examined:** **BRAZIL, Acre**, Sen. Guimard, F.E. Catuaba [−10.074444, −67.616666], Malaise trap, REDE BIA, E.F. Morato & J.A. Rafael leg., 15-31.XII.2016, 1♂, DZUP; same label information, except: 10-30.X.2016, 1♂, DZUP; 06-26.IX.2016, 1♂, DZUP and 1♀, INPA; 08-23.VIII.2016, 1♀, INPA; VIII-IX.2017, 3♀, INPA; **Amazonas**, Campus Universitário [−03.094779, −59.967742], Marcia Castilho & J. Elias Binda leg., 28.VII-05.VIII.1988, 2♀, INPA; Itacoatira [−03.134500, −58.438473], J.F. Vidal leg.,

26.XI.1999, 1♀, INPA; Manaus, R. Ducke [−02.999727, −59.939081], 24 m, Y. Camara & J.E. Binda leg., 06.X.1988, 1♂, INPA; Marãa, R. Japurá, Manguari [−01.818081, −65.354387], J. Dias leg., 11-17.X.1988, 1♂, MPEG; **Goias**, SHMO, Mimoso [−15.037935, −48.183726], Bonaléia, M.P.S. leg., 01.X.1986, 1♀, DZUP; **Maranhão**, Açailândia, Fazenda Itabaiana [−05.090833, −47.099444], J.A. Rafael & J. Vidal leg., 07.XII.2001, 1♀, DZUP; Carolina, Pedra Caída [−07.043916, −47.44125], J.A. Rafael & J.T. Câmara leg., 10-13.VI.2013, 1♂, DZUP and 1♀, INPA; Carolina, Rio Lages [−07.161955, −47.292480], Rafael, Oliveira & Vidal leg., XII.2001, 1♂, DZUP; São Pedro da Água Branca [−05.118611, −48.255277], J.A. Rafael, F. Oliveira & J. Vidal leg., 06.XII.2001, 1♂, INPA; Ribamar Fiquene, Rio Tocantins [−05.941388, −47.424166], J.A. Rafael & J. Vidal leg., 13.XII.2001, 1♀, INPA; **Mato Grosso**, Cáceres, Polonoroeste [−16.084034, −57.675011], C. Elias leg., 03.XII.1984, 1♂, DZUP 099219; same label information, except: 03.XII.1984, 1♀, DZUP 099237; Chapada dos Guimarães. P.N. Chapada dos Guimarães [−15.406055, −55.835416], 788 m, Malaise trap, Lamas, Nihei & eq. leg., 01-22.XII.2011, 2♂, MZUSP; Chapada dos Guimarães. P.N. Chapada dos Guimarães, Trilha Vêu da Noiva [−15.409361, −55.831916], Patiu & Patiu leg., 19.I.2012, 1♂ and 2♀, MZUSP; **Pará**, Benevides [−01.362384, −48.256175], R.B. Neto leg., 18.II.2001, 4♀,



**Figure 2.** *Phaonantho mallochi* (Curran, 1934). Male: (A) Head, frontal view. (B) Habitus, dorsal view. (C) Habitus, lateral view. Female: (D) Head, frontal view. (E) Habitus, dorsal view. (F) Habitus, lateral view. Scale bar: 1.0 mm.



MPEG; C. Araguaia [−09.501409, −50.809044], Malaise trap, J.A. Rafael leg., 19-31.I.1983, 1♂, INPA; Paragaminas, Faz. Cachoeira do rio vermelho [−03.003606, −47.352915], J. Dias leg., 15-18.I.1991, 1♂, MPEG; Parque Estadual do Utinga [−01.424356, −48.441683], S.L. Camargo leg., 07.X.2010, 1♂, DZUP; Floresta Nacional de Caxiuanã [−01.954649, −51.683018], C. Esposito leg., 10.XI.1995, 1♂, MPEG; same label information, except: III.1996, 1♀, MPEG; Jacundá, Ilha Maria Juriti [−04.614514, −49.182549], 17.III.1981, 11♂ and 4♀, INPA; Jacundá, Rio Tocantins, Ilha M. Juriti [−04.614514, −49.182549], J.A. Nunes de Melo leg., 17.III.1981, 1♂ and 2♀, INPA; same label information, except: 11-12.IV.1981, 1♀, INPA; Repartimento, Vicinal 45 [−04.368611, −50.023611], Malaise trap, J.A. Rafael & J. Vidal leg., 29.XI.2001, 1♂, INPA; Tucuruí [−03.712826, −49.729370], Nunes de Melo leg., 04.VIII.1980, 1♂ and 5♀, INPA; same label information, except: 06.VIII.1980, 10♂ and 7♀, INPA; Tucuruí, Vila Brava [−03.765058, −49.678289], Nunes de Melo leg., 27.VI.1980, 1♂, INPA; Tucuruí, Lago do Pitinga [−03.755129, −49.701318], 10.IV.1981, 1♂, INPA; Tucuruí, Morro do Senador [−03.989722, −49.745833], J.A. Rafael & J. Vidal leg., 01.xii.2001, 2♀, INPA; Tucuruí, Ilha Chorona [−03.989722, −49.745833], 17.viii.1980, 1♀, INPA; **Paraíba**, Cabaceiras (Fazenda Bravo) Caatinga de Lageiro

[−07.490196, −36.287887], Light trap, D.S. Amorim & N. Stevaux leg., 28-29.VI.1986, 1♀, DZUP.

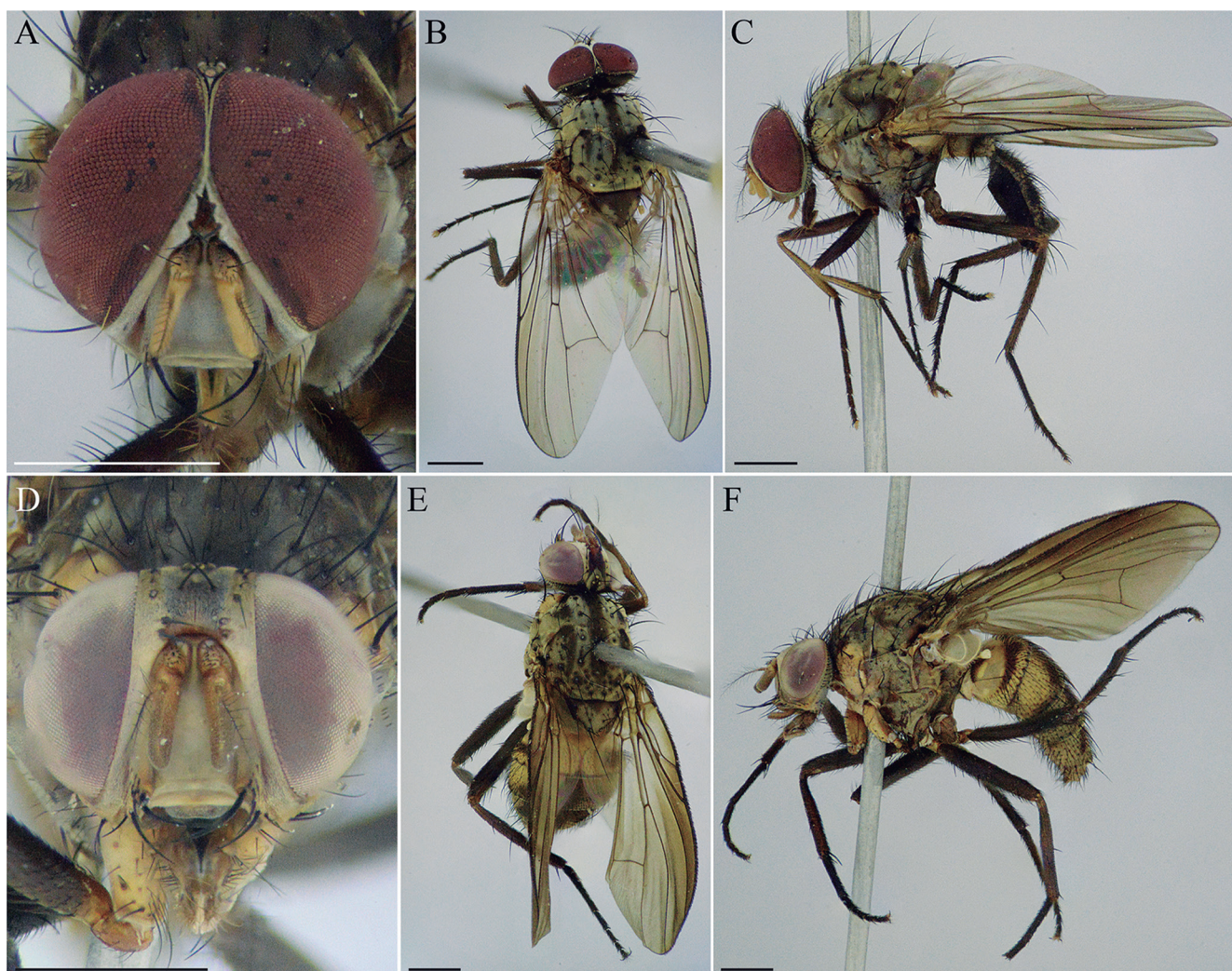
**Distribution:** Brazil (Acre\*, Amazonas\*, Goiás\*, Maranhão\*, Mato Grosso\*, Pará\*, Paraíba\*, Rio de Janeiro) (Pamplona & Couri, 1993).

**Remarks:** Some specimens were collected with Malaise traps, light traps, and Shannon traps, using fish, fruit, and feces as bait.

### *Phaonantho* sp.

**Material examined:** MEXICO, Veracruz, Est. Biol. de Los Tuxtles [18.584982, −95.073932], A. Ibarra, 14.IV.1986, 1♀, CNIN.

**Remarks:** This female specimen is the first record of *Phaonantho* in Mexico. Its morphology resembles *P. benevola*, but considering its distribution (the northernmost known locality for the genus) and the fact that the main diagnostic characteristics are in males, we preferred to indicate this specimen as a morphospecies.



**Figure 3.** *Phaonantho sordilloae* Pamplona & Couri, 1993. Male: (A) Head, frontal view. (B) Habitus, dorsal view. (C) Habitus, lateral view. Female: (D) Head, frontal view. (E) Habitus, dorsal view. (F) Habitus, lateral view. Scale bar: 1.0 mm.





**Figure 4.** Map of *Phaonantho* species with geopolitical borders: *P. benevola* (orange); *P. mallochi* (blue); *P. sordilloae* (red); and *Phaonantho* sp. (black). Circles = literature records; square = new records.

## Distribution

We have updated the distributional knowledge of the genus, including the first record of *Phaonantho* in Bolivia, Paraguay, Peru, and Mexico, as well as the first records across Brazilian states: Amazonas, Bahia, Goiás, Maranhão, Pará, Paraíba, Paraná, Piauí, Rio Grande do Sul, Rondônia, Roraima, and Santa Catarina (Fig. 4). *Phaonantho benevola* and *P. sordilloae* are mainly distributed in the Boreal Brazilian, Paraná, Chacoan, South Brazilian, and South-eastern Amazonian dominions (*sensu* Morrone, 2014), with both species co-occurring in most regions where they have been recorded. In contrast, *P. mallochi* is mainly distributed in the Paraná dominion, with only a few known records in the Boreal Brazilian, Chacoan, and Pacific dominions (Fig. 4). Remarkably, *P. mallochi* is distributed in Panamá and Guyana (Curran, 1934). Conversely, the remaining records are exclusively from southern, southeastern, and northeastern Brazil and Paraguay, with no presence in Bolivia, Peru, and Northern Brazil, where *P. benevola* and *P. sordilloae* have numerous records. Our study introduces numerous new records for *Phaonantho* species, but the distribution of these species probably are even wider.

## DISCUSSION

We have examined a significant number of specimens representing the three recognized species of *Phaonantho*. Through our observations, we noted that some characters indicated by Pamplona & Couri (1993) key are intraspecific variation. These morphological variations are as follows: the number of posterior anepisternal setae ranged between 3 and 5 in *P. benevola* and *P. sordilloae*; the number of anterior anepisternal setae ranged

between 1 and 2 across all three species; and hind femur exhibited a range of 2 to 4 anterodorsal and anteroventral setae also in the three species. Therefore, we updated the *Phaonantho* key by omitting these characters and including the new information presented in the key above.

Some studies have indicated that *P. mallochi* is an asynanthropic species in Campinas (Linhares, 1981), São Carlos (Oliveira, 1986), and Rio de Janeiro (D'Almeida, 1992). Linhares (1981) collected *P. mallochi* from human feces and mouse carcasses as bait. Based on label information of the numerous specimens of *Phaonantho* that we examined, these specimens were primarily collected using Malaise, light, and Shannon traps with various baits including fish, bovine lungs, feces, and pig carcasses. In addition, *P. mallochi* was collected from *Aristolochia giberti* Hook (Aristolochiaceae), a genus known for its pollination by various families of flies (Endress, 1994).

Gomes & de Carvalho (2023) recovered the topology of *P. mallochi* (*P. benevola* + *P. sordilloae*). This topology agrees with the distribution of these species, considering that *P. benevola* and *P. sordilloae* co-occur mainly in the northern portion of South America, whereas *P. mallochi* occurs mainly in southeastern South America.

The distribution pattern of Anthomyiidae is mainly concentrated in cold areas at high altitudes or latitudes (Michelsen, 2010). Nevertheless, *Phaonantho* species (as well as *Coenosopsia*) are an exception, occurring mainly in the warm lowland forests of Central and South America (Michelsen, 1996). This concurs with our current understanding of *Phaonantho* distribution pattern. *Phaonantho mallochi* had a wider longitudinal distribution pattern among the three species, reaching colder southern regions.

**AUTHORS' CONTRIBUTIONS:** Conceptualization, writing – original draft, review and editing: LRPG, CJBC. Images: LRPG.

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