New species of *Metachela* Coquillett (Diptera, Empididae) from the Atlantic Forest, Brazil and a key to the Neotropical species

Josenir Teixeira Câmara¹, Jose Albertino Rafael¹

¹ Instituto Nacional de Pesquisas da Amazônia, INPA, Coordenação de Biodiversidade, Caixa Postal 2223, 69080–971 Manaus, Amazonas, Brazil

Corresponding author: Josenir Teixeira Câmara (josenircamara@gmail.com)

Academic editor: T. Dikow | Received 16 December 2016 | Accepted 14 September 2017 | Published 7 November 2017

http://zoobank.org/82FF5425-D410-47E5-AABC-2C9FCE561713

Citation: Câmara JT, Rafael JA (2017) New species of *Metachela* Coquillett from the Atlantic Forest, Brazil and a key to the Neotropical species (Diptera, Empididae). ZooKeys 714: 129–140. https://doi.org/10.3897/zookeys.714.11503

Abstract

Two new species of *Metachela* Coquillett from the Brazilian Atlantic Forest, *M. danitakiyae* sp. n. from Rio de Janeiro and Minas Gerais and *M. spinulosa* sp. n. from Minas Gerais, are described and illustrated. A key to the Neotropical species is provided.

Keywords

Empidoidea, Hemerodromiinae, *Metachela danitakiyae* sp. n., *Metachela spinulosa* sp. n., Neotropical realm, taxonomy

Introduction

*Metachela* Coquillett [type species *M. collusor* (Melander)] is part of the tribe Hemerodromiini, and contains 12 previously described species, plus two species described here (see Table 1) with representatives in Western Europe, and the Neotropical and Nearctic regions (Yang et al. 2007). However, specimens of the genus are also known from Australia (pers. obs.). Collin (1933) and Smith (1962) described some South American species of *Metachela*, but considered them to be atypical in terms of antennal characters, thoracic shape, and head setation. MacDonald (1989) revised the genus; however, he covered only the three North American species.
Yang et al. (2007) catalogued only eight species of *Metachela* for the Neotropical Realm; however, more species still await description as Cumming and Sinclair (2009) mention an undescribed species from Costa Rica. There are two species recorded for Brazil: *M. barueri* Smith from São Paulo and *M. breviradius* Smith from Santa Catarina (Smith 1962). The remaining Neotropical species were described from the extreme south of South America, in southern Argentina and southern Chile (Collin 1933). Herein, two new species are described from southeastern Brazil, and a key to the Neotropical species is provided.

### Materials and methods

This study is based on the examination of specimens housed at Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil (*INPA*). Species with long series of representatives will also be deposited in the Museu Nacional do Rio de Janeiro (*MNRJ*), and Museu de Zoologia da Universidade de São Paulo (*MZUSP*). The specimens were collected using Malaise traps placed over small streams.

Dissected structures were macerated in heated 85% lactic acid (Cumming 1992) and examined on excavated slides. Wings were mounted on microslides, terminalia were placed in microvials with glycerin, and these were pinned with their associated specimens. Terminology follows Cumming and Wood (2009).

The holotype label data was cited in full before the description, with original spelling and punctuation. Data from each label was enclosed by quotation marks (“ ”). Information presented within square brackets ([ ]) is supplementary data not present on the labels.

| Species                          | Known sex | Geographical records                  |
|----------------------------------|-----------|----------------------------------------|
| *Metachela albipes* (Walker, 1849) | x         | Canada and USA                         |
| *M. barueri* Smith, 1962         | x         | Brazil (São Paulo)                     |
| *M. breviradius* Smith, 1962     | x         | Brazil (Santa Catarina)                |
| *M. circumdata* Collin, 1933     | x         | Argentina (Bariloche)                  |
| *M. colluor* (Melander, 1902)    | x         | Canada and USA                         |
| *M. convexa* MacDonald, 1989     | x         | USA (California)                       |
| *M. danitakiyae* sp. n.          | x         | Brazil (Rio de Janeiro, Minas Gerais)  |
| *M. flavella* Collin, 1933       | x         | Chile (Casa Pange)                     |
| *M. hexachatæta* Collin, 1933    | x         | Chile (Casa Pange, Puerto Varas, Puerto Montt, Peulla) |
| *M. inornata* Collin, 1933       | x         | Argentina (Bariloche)                  |
| *M. instabilis* Collin, 1933     | x         | Chile (Puerto Varas)                   |
| *M. nigriventris* (Loew, 1864)   | x         | Austria, Germany, Hungary, Italy?      |
| *M. patula* Collin, 1933         | x         | Argentina (Bariloche)                  |
| *M. spinulosa* sp. n.            | x         | Brazil (Minas Gerais)                  |
Taxonomy

*Metachela*

*Metachela* Coquillett, 1903: 253, 263. Type species: *Hemerodromia collusor* Melander, 1902 (original designation). Melander 1928: 262 (cat.); Collin 1935: 285 (Patagonian fauna); Melander 1947: 260 (cat.); Smith 1962: 261 (Brazilian fauna); Smith 1967: 42 (Neotropical cat.); MacDonald 1989: 513 (Nearctics fauna); Yang et al. 2007: 276 (world cat.); Cumming and Sinclair 2009:667 (undescribed Costa Rican species).

**Diagnosis.** Face with some pale setae, front tibiae with apical rather trowel-like projection beneath and no spine, crossvein *h* present, cells bm and dm fused (crossvein bm-cu absent), *M*₁ and *M*₂ with common petiole arising from anterior end of crossvein dm-cu and cell *CuP* present. The Neotropical *Metachela* differs from the typical northern species by lacking a distinct stylus, having the thorax more pointed anteriorly, possessing four to equally spaced vertical setae and lacking spine below the front tibia. Although there are the differences mentioned, we still think that the Neotropical species are congeneric with the northern species.

**Key to the Neotropical species of Metachela**

1. Pterostigma semi-circular, almost closed by a veinlet (Fig. 24). Records: Argentina, Bariloche......................................................... *M. circumdata* Collin
   – Pterostigma absent (Figs 2, 20) .................................................. 2

2. Ground colour of thorax tawny or yellow, never black ......................... 3
   – Ground colour of thorax black ................................................... 8

3. Scutum with a mid-longitudinal brown stripe (Fig. 12) .......................... 4
   – Scutum without a mid-longitudinal stripe ......................................... 7

4. Vein R₂,₃ ending on C; fore femur very stout. Records: Argentina, Bariloche....
   ........................................................................................................ *M. patula* Collin
   – Vein R₂,₃ fused to vein R₁ (Figs 2, 9, 20); fore femur not stout............... 5

5. Scutellum yellow. Records: Brazil, Santa Catarina.................................... *M. breviradius* Smith
   – Scutellum brown (Figs 1, 8, 12) .......................................................... 6

6. Male cercus with acute apex (Fig. 5), without spine-like setae (Fig. 3); epandrium with postero-dorsal sinus; female tergite 10 bilobate on posterior margin (Fig. 11). Records: Brazil, Minas Gerais and Rio de Janeiro
   ........................................................................................................ *M. danitakiyae* sp. n.
   – Male cercus with truncate apex, and with scattered spine-like setae (Figs 15 and 16); epandrium without postero-dorsal sinus; female tergite 10 divided into two sclerotized plates separated by a membranous area (Fig. 22). Records: Brazil, Minas Gerais.................................................. *M. spinulosa* sp. n.
Scutum entirely yellow. Abdominal segments 4 and 5 brownish. Records: southern Chile..............................................

**M. flavella** Collin

Scutum with a short dark streak below the notopleural setae and slightly dark anterior to the scutellum. Abdomen segments 4 and 5 yellowish. Records: Brazil, São Paulo ..............................................................

**M. barueri** Smith

Head with six vertical setae. Records: southern Chile......

**M. hexachaeta** Collin

Head with four vertical setae........................................

**M. instabilis** Collin

Scutum with alternating dark and pale stripes. Mid femora with yellow posteroventral setae at base and an anteroventral row of denticles towards the apex. Records: southern Chile........................................

**M. inornata** Collin

---

**Metachela danitakiyae** sp. n.
http://zoobank.org/D957CD88-DFBC-4544-A465-1BB95F63082F
Figs 1–11

**Type-locality.** BRAZIL, Rio de Janeiro: Itatiaia, Parque Nacional de Itatiaia, 22°25’38.6”S–44°37’9.7”W, 1140 m,

**Type-specimen.** Holotype male, pinned, not dissected: “BRAZIL, RJ [Rio de Janeiro], Itatiaia, Parque Nacional de Itatiaia. Córrego Maromba, abaixo da Cachoeira Véu de Noiva. Malaise trap, 22°25’38.6”S–44°37’9.7”W, 1140 m. 10.i–02.II.2015. D.M. Takiya, A.P.M. Santos & M.F. Monné” (INPA). Paratypes. Same data as holotype (8 males, 2 females, INPA, 5 males, 2 females, MNRJ, 3 males, 4 females, MZUSP). BRAZIL, MG[Minas Gerais], Alto Caparaó, Parque Nacional do Caparaó, Vale Verde. Malaise, 17–20.i.2014. 20°25’09.7”S–41°50’47”W, 1364m. J.L. Nissimian & A.P.M. Santos. (2 males, 1 female, INPA).

**Diagnosis.** Scutum with a mid-longitudinal brown stripe; vein R$_{2+3}$ fused to R$_{1}$ (Figs 2 and 9); male cercus arched, in dorsal view, acute at extreme apex (Figs 3, 4); epandrium with a dorsoapical sinus (Fig. 5); hypandrium membranous midventrally on basal ¾ and sclerotized apically (Fig. 7); female tergite 10 with bilobate posterior margin (Fig. 11); female sternite 8 elongate, concave on anterior margin, membranous on apical half (Fig. 11). 

**Male** (Fig. 1). **Head** (Fig. 1): Dark brown to black, setae whitish. Ocellar triangle with two pairs of proclinate bristles, anterior pair stouter. Eyes iridescent black, separated on face. Occiput with scattered fine setae. Mouth parts yellow; proboscis short, slightly curved and with yellow setae. Antenna yellow, with scape and pedicel bearing distinct short ventral setulae; postpedicel nearly 2× as long as wide; stylus very short, ~0.1× as long as postpedicel.

**Thorax** (Fig. 1): Elongate, slightly arched dorsally; scutum yellowish except for mid-longitudinal brown stripe, wider posteriorly, and brownish posterolateral spot above wing base; scutum with very small and fine yellow setae except for one notopleural, one postalar, and two pairs of small parallel scutellars; scutellum and mediotergite brown.
New species of *Metachela* Coquillett from the Atlantic Forest, Brazil and a key...

**Figures 1–7.** *Metachela danitakiyae* sp. n., 1–2 holotype male 3–7 paratype ♂ 1 Habitus, lateral view 2 Wing 3 Cercus, dorsal view 4 Subependrial sclerite, epandrium and cercus, anteroventral view 5 Cercus, epandrium and hypandrium, lateral view 6 Phallus, lateral view 7 Hypandrium, ventral view.
Figures 8–11. Metachela danitakiyae sp. n., paratype female from Itatiaia. 8 Habitus, lateral view 9 Wing 10 Segments 7-11, lateral view 11 Tergites 7, 8, and 10, dorsal view, sternites 7 and 8, ventral view.

Legs (Fig. 1): Yellow, except fore tibia with narrow anteroventral brown stripe distally, and hind femur at distal 2/3 and tarsomeres 4–5 brown. Fore coxa as long as distance between fore- and mid coxae, 4× as long as wide, with some dorso-apical pale setae. Fore femur approximately 1.3× as long as fore coxa, 4.5× as long as wide, with anteroventral row of 3–5 spines, anteroventral row of 6–8 denticles, and posteroventral row of 18–20 denticles, with basal ones stouter; anteroventral row of denticles placed on distal half and posteroventral row restricted to distal 0.9, and both rows without apical discontinuity and diverging at apex. Fore tibia approximately 0.8× as long as fore femur; with decumbent short pale bristles dorsally, more densely distributed apically. Mid femur with two anteroventral and 12 posteroventral spines, basal pair stouter. Hind legs slender, with fine setae, except hind tibia with dorsoapical comb of short setae.

Wings (Fig. 2): Membranous, veins yellowish; vein R_{2+3} short, fused to vein R_1; R_4+5 fork angle around 70°; R_5 and M_1 slightly divergent at extreme apex; cell bm+dm ending beyond apex of R_1, ~1.3× as long as cell br; cup cell closed. Halter whitish yellow.
Abdomen (Fig. 1): Tergites and sternites membranous, yellow, except anterior margin of all tergites and sternite 8 brownish; sternite 8 strongly sclerotized, U-shaped posteriorly.

Male terminalia: Brown. Cercus arched, in dorsal view (Figs 3, 4) narrower on basal 1/4, expanded apically, extending beyond epandrium apex (Fig. 5); left and right cerci closely approximated anterodorsally (Fig. 3); distinctly setose. Epandrium subrectangular, with a posterodorsal sinus (Fig. 5), with distinct strong setae on outer face. Hypandrium membranous midventrally on basal 3/4, sclerotized and fused posteriorly (Fig. 7); gonocoxal apodeme projecting anteriorly as a small protuberance (Fig. 5). Subepandrial sclerite subrectangular, more sclerotized basally and laterally (Fig. 4). Phallus strongly sclerotized, except less sclerotized apically (Fig. 6), abruptly pointed apically. Ejaculatory apodeme present. Holotype: body length. 3.3 mm; wing length. 2.7 mm.

Female (Figs 8, 9). Similar to male. Terminalia: Tergite 7 brown, shorter than tergite 8 (Figs 10, 11); tergite 8 brown, subtrapezoidal, with anterior margin slightly concave in dorsal view (Fig. 11); tergite 10 slightly light brown, bilobate on posterior margin (Fig. 11). Cercus brown, apex pale (Fig. 10). Sternite 7 brown, with small median projection on anterior margin (Fig. 11); sternite 8 dark brown on basal 2/3 and with pale apex, elongate, concave on anterior margin (Fig. 11); sternite 10 very narrow, v-shaped.

Geographical records. Brazil (Minas Gerais and Rio de Janeiro states).

Etymology. The specific epithet is a tribute to Daniela Maeda Takiya, friend of the authors and collector of the specimens.

Remarks. Metachela danitakiyae sp. n. differs from other species by the elongate male cercus, narrower on the apical 1/4 (usually short in other species, if elongate then with broad apex); epandrium with a posterodorsal sinus (without sinus in other species).

Metachela spinulosa sp. n.
http://zoobank.org/740F1C97-E46A-40DE-8F24-97FE22ECBEF5
Figs 12–23

Type-locality. BRAZIL, Minas Gerais, São Roque de Minas, Parque Nacional Serra da Canastra, Rio Rolador.

Type-specimen. Holotype male, pinned, with abdomen in a microvial. Original label: “BRAZIL, MG[Minas Gerais], São Roque de Minas, Parque Nacional Serra da Canastra, Rio Rolador. Malaise, 15–18.xi.2014. J.L.Nissimian, A.L. Oliveira & A.P.M. Santos.” (INPA). Paratypes. Same data as holotype (1 male, 3 females, INPA).

Diagnosis. Scutum with a mid-longitudinal brown stripe; vein R_{2+3} fused to R_{1}; male cercus with truncate apex and somewhat scattered spine-like setae; epandrium with an apicoventral acute projection; female tergite 8 with bilobate apex; female tergite 10 divided into two sclerotized plates separated by a membranous area.

Male (Fig. 12). Holotype: body length: 3.5 mm; wing length: 2.7 mm.
Figures 12–18. *Metachela spinulosa* sp. n., holotype male. 12 Habitus, dorsolateral view 13 Right fore femur, anteroventral view 14 Right fore tibia, anteroventral view 15 Abdomen from segments 7–11, lateral view 16 Cercus, dorsal view 17 Subepandrial sclerite and epandrium, dorsal view 18 Hypandrium and epandrium, ventral view.
Head (Fig. 12): Dark brown to black, setae whitish. Ocellar triangle with two pairs of proclinate bristles, anterior pair stouter. Eyes iridescent black, separated on face. Occiput with scattered fine setae. Mouth parts yellow; proboscis short, right and with yellow setae. Antenna yellow, with scape and pedicel bearing distinct short ventral setulae; postpedicel approximately 2× as long as wide; stylus very short, 0.1× as long as postpedicel.

Thorax (Fig. 12): Elongate, slightly arched dorsally; scutum yellowish except for mid-longitudinal brown stripe, darker posteriorly, and brownish posterolateral spot above wing base; scutum with very small and fine yellow setae except for one notopleural, one postalar, and two pairs of small parallel scutellars; scutellum and mediogaster brown;

Legs (Fig. 12): Yellow. Fore coxa as long as distance between fore- and mid coxae, 3× as long as wide, with some dorsoapical pale setae. Fore femur (Fig. 13) 1.2× as long as fore coxa, 3.5× as long as wide, with anteroventral row of four spines, anteroventral row of 4 denticles, and posteroverentral row of 17 denticles, with basal one stouter; anteroventral row of denticles placed on distal half and posteroverentral row restricted to distal 0.9, and both rows without apical discontinuity and diverging at apex. Fore tibia (Fig. 14) ~ 0.8× as long as fore femur; with decumbent short pale setulae dorsally, denser apically. Mid femur with 2 anteroventral and 15 posteroventral spines, basal pair stouter. Hind legs slender with fine setae, except hind tibia with dorsoapical ‘comb’ of short setae.

Wings (Figs 12 and similar to 20 of female): Membranous, veins yellowish; vein R$_{2+3}$ short, fused to R$_1$; R$_{4+5}$ fork angle around 70°; R$_5$ and M$_1$ slightly divergent at extreme apex; cell bm+dm ending beyond apex of R$_1$, ~ 1.4× as long as cell br. Halter whitish yellow.

Abdomen (Fig. 12): Tergites and sternites 1–6 and anterior margin of tergite 7 yellowish, membranous; posterior margin of tergite 7, tergite 8 and sternite 8 brownish; sternite 8 strongly sclerotized, U-shaped with lateral side upward directed posteriorly.

Male terminalia: Brown. Cercus wider on basal 1/3, apex truncate in lateral view (Fig. 15), with somewhat scattered spine-like setae (Fig. 16); left and right cerci closely approximated anterodorsally (Fig. 16). Epandrium with a posterodorsal pointed projection apically (Figs 17 and 18) and distinct strong setae on outer face (Fig. 17). Hypandrium membranous medially on basal half, with strong setae (Figs 15 and 18); gonocoxal apodeme projecting anteriorly as a small protuberance. Subepandrial sclerite subrectangular, more sclerotized basally and laterally (Fig. 17). Phallus strongly sclerotized, abruptly acute apically. Ejaculatory apodeme short, trilamellar.

Female (Fig. 19, 20). Similar to male. Tergite 7 brown, rectangular, shorter than tergite 8 (Figs 21 and 22); tergite 8 brown, elongate, bilobate posteriorly (Fig. 22); tergite 10 light brown, divided into two sclerotized plates separated by membranous area medially (Fig. 22). Cercus light brown, apex pale (Figs 21, 22 and 23). Sternite 7 light brown, concave on posterior margin (Fig. 23); sternite 8 brown, subrectangular (Fig. 23); sternite 10 light brown, v-shaped (Fig. 23). Body length: 3.9 mm; wing length: 3.1 mm.

Geographical records. Brazil (Minas Gerais).
Figures 19–24. 19–23 Metachela spinulosa sp. n., paratype female 19 Habitus, lateral view 20 Wing 21 Segments 6-11, lateral view 22 Tergite 7 until cercus, dorsal view 23 Segments 7-11, ventral view 24 Metachela circumdata, wing modified from Collin (1933).

**Etymology.** From the Latin *spinosus* (spine), referring to the spine-like setae on the male cercus.

**Remarks.** *Metachela spinulosa* sp. n. differs from other species especially by the male cercus with scattered spine-like setae (absent in other species) and epandrium with an apicoventral acute projection (absent in other species).
Discussion

The Atlantic forest is one of the five most important biodiversity hotspots in the world (Myers et al. 2000). In face of the rapid anthropic changes to this area, it is important that its fauna be studied, including Diptera, before of it is lost. Prior to the current study, there were only two species of *Metachela* described from this biome, and no doubt there are certainly new species still left to be described.

Acknowledgements

To Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for awarding a fellowship to J.A.R. (grant 300.305/2007–9), the scholarship to J.T.C. (proc. 152.131/2016–7) and for financial resources (grant 401.243/2012–5); to Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM) for financial support (calls 016/2006, 021/2011, 020/2013 and 022/2013, Fixam/AM 062.00745/2014).

References

Coquillett DW (1903) The genera of the dipterous family Empididae, with notes and new species. Proceedings of the Entomological Society of Washington 5: 245.

Collin JE (1933) Diptera of Patagonia and South Chile, Part IV Empididae. British Museum (Natural History), London, 334 pp.

Cumming JM (1992) Lactic acid as an agent for macerating Diptera specimens. Fly Times 8: 7.

Cumming JM, Wood DM (2009) Adult morphology and terminology. In: Brown BV, Borkent A, Cumming JM, Wood DM, Woodley NE, Zumbado MA (Eds) Manual of Central American Diptera. Volume 1. NRC Research Press, Ottawa, Ontario, 9–50.

Cumming JM, Sinclair BJ (2009) Empididae (dance flies, balloon flies, predaceous flies. In: Brown BV, Borkent A, Cumming JM, Wood DM, Woodley NE, Zumbado MA (Eds) Manual of Central American Diptera (Vol. 1). NRC Research Press, Ottawa, 653–670.

MacDonald JF (1989) Review of Nearctic *Metachela* Coquillett, with description of a new species (Diptera: Empididae; Hemerodromiinae). Proceedings of the Entomological Society of Washington 91: 513–522.

Melander AL (1902) A monograph of the North American Empididae. Part I. Transactions of the American Entomological Society 28: 195–367. [5 pls]

Melander AL (1928) Diptera, Family Empididae. In: Wyttsman P (Ed.) Genera Insectorum, 1927. Louis Desmet-Verteneuil, Bruxelles, Fasc.185, 434 pp.

Melander AL (1947) Synopsis of the Hemerodromiinae (Diptera, Empididae). Journal of the New York Entomological Society 55: 237–273.

Myers N, Mittermeier RA, Mittermeier CG, da Fonseca GAB, Kent J (2000) Biodiversity hotspots for conservation priorities. Nature 403: 853–858. https://doi.org/10.1038/35002501
Smith KGV (1962) Studies on the Brazilian Empididae (Diptera). Transactions of the Royal Entomological Society of London 114: 195–266. https://doi.org/10.1111/j.1365-2311.1962.tb01079.x

Smith KGV (1967) Family Empididae. In: Museu de Zoologia da Universidade de São Paulo (Ed.) A Catalogue of Diptera of Americas South of the United States, Volume 39. São Paulo, 67 pp.

Yang D, Zhang K, Yao G, Zhang J (2007) World Catalog of Empididae (Insecta: Diptera). China Agricultural University Press, Beijing, 599 pp.