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Review of the New World genus *Cholomyia* (Diptera, Tachinidae), with a new species from Costa Rica



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ABSTRACT

The tachinid genus *Cholomyia* presents Neotropical and Nearctic distribution with three species: *C. acromion* (Wiedemann, 1824), *C. filipes* (Walker, 1857), and *C. inaequipes* Bigot, 1884. In the present paper, all species are reviewed and redescribed, and a new species from Costa Rica is described, *C. zumbaboi* sp. nov. An identification key based on males is provided. For the first time, the male terminalia of all species, and the female terminalia and first instar larva of *C. inaequipes* are described and illustrated. Finally, based on the detailed morphological study we discuss the systematic placement of *Cholomyia* into Myiophasiini-Tachinidae. A list of host–parasite records is synthesized.

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Introduction

The genus *Cholomyia* was erected by Bigot (1884) for his new species, *C. inaequipes*, based on five males from Mexico. Later, two other species were transferred to the genus: *C. acromion* (Wiedemann, 1824) and *C. filipes* (Walker, 1857) (Guimarães, 1971). All species are distributed exclusively in the Neotropical region, except for *C. inaequipes*, which also occurs in the Nearctic region. The genus was previously placed in the Urodexiini-Dexiinae (Townsend, 1936; Guimarães, 1971) and in the latest Nearctic Catalogue (O'Hara and Wood, 2004) was transferred to the Myiophasiini-Tachinidae.

C. filipes (Walker, 1857) is known only from its original description and then listed in the Neotropical catalogue (Guimarães, 1971). *C. acromion* (Wiedemann, 1824) and *C. inaequipes* Bigot, 1884 are better known, for they parasitize the curculionid *Conotrachelus* Dejean, 1835, an important pest that attacks grown plums, apples and peaches (O'Brien and Couturier, 1995). Data on immature stages of *C. inaequipes*, parasitizing the plum-curculio *Conotrachelus nenuphar* (Herbst, 1797) were published elsewhere (Quaintance and Jenne, 1912). On the other hand, the male and female terminalia have never been described.

In the present paper, the genus *Cholomyia* is reviewed. The valid species are redescribed, and a new species is described from Costa Rica, *C. zumbaboi* sp. nov. An identification key is provided based on male specimens. Descriptions and illustrations of the male terminalia of all species and the female terminalia and first instar larva of *C. inaequipes* are presented for the first time. Finally, based on the detailed morphological study, we discuss the systematic placement of *Cholomyia* into the tribe Myiophasiini. A list of host–parasite is synthesized from literature.

Material and methods

The examined material is deposited in the following institutions: The Natural History Museum, London, United Kingdom (BMNH); Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Rio de Janeiro, Brazil (CEIOC); Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (INBio); Muséum National d'Histoire Naturelle, Paris, France (MNHN); Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ); Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (MZSP); Universidade Estadual de Feira de Santana, Feira de Santana, Brazil (UEFS) and Colección Museo de Historia natural, Universidad de la Amazonia, Florencia, Colombia (UAM-E). Other repositories cited in the text: Museo di Zoologia dell'Università di Torino, Torino, Italy (MZUT); National Museum of Natural History, Washington, United States (USNM) and Zoological Museum, Copenhagen, Denmark (ZMUC). The labels of the type

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material are represented with quotes (") to indicate the same label, slash (/) to line break, and semicolon to indicate a new label.

The following abbreviations are used for the position of the setae/setulae on legs: A – anterior; AD – anterodorsal; AV – anteroventral; D – dorsal; P – posterior; PD – posterodorsal; PV – posteroventral; and V – ventral.

Male and female terminalia and first instar larva were clarified in 10% solution of KOH at room temperature for 24 about hours, then neutralized with acetic acid (50%), and washed with distilled water and a series of ethanol solutions of increasing concentrations. After examination on microscope temporary slides, the terminalia were stored in plastic microvial with glycerin and attached to the respective specimen. A permanent microscope slide with the first-instar larvae was mounted for examination and measurements, and both slide and adult pinned specimen were properly labelled.

Morphological terminology follows Cumming and Wood (2009), but for antennal morphology follows Stuckenberg (1999), and for male terminalia Tschorinig (1985). Female terminalia and larva morphology follow Cantrell (1988), but the term cephaloskeleton of Courtney et al. (2000) is used.

Species were identified by morphological characters using the original description and redescrptions, for *C. inaequipipes* and *C. acromion*, and by previously identified specimens by the museum of origin, for *C. filipes*. Host records mentioned in this study were gathered from the literature. New data from specimens labels were not found. Geographical data were gathered based on specimens' labels and literature records. Those records without original geographic coordinates were georeferenced using GeoNames Search (<http://www.geonames.org/export/geonames-search.html>) and GeoHack (<http://toolserver.org/~geohack/>). The distribution map was produced using the software Diva-Gis 7.5.

Results

Genus *Cholomyia* Bigot, 1884

(Fig. 1)

Cholomyia Bigot, 1884: 42 (also 1884: xxxvii). Type species: *C. inaequipipes* Bigot, 1884, by monotypy.

Acromiodexia Townsend, 1931a: 335. Type species: *Musca acromion* Wiedemann, 1824, by original designation.

References. Wulp, 1891: 246 (revision); Townsend, 1892: 275 (key to North American Tachinidae); Williston, 1908: 356 (key to North American Diptera); Coquillett, 1910: 522 (catalogue); Townsend, 1927: 222 (key to South American "muscoids"); Aldrich, 1929: 13 (notes and catalogue); Curran, 1934 (key to British Guyanan Tachinidae); Townsend, 1936: 43, 45 (key to Urodexini genera); Townsend, 1939: 107 (redescription of *Cholomyia*); 97 (redescription of *Acromiodexia*); Guimarães, 1971: 105 (catalogue); Wood, 1987 (key to Nearctic Tachinidae genera); O'Hara and Wood, 2004: 275 (catalogue); Wood and Zumbado, 2010: 1387 (key to Central American Tachinidae genera); O'Hara, 2014: 18 (list).

Description. Eyes very close to each other in males, with frons tapering towards the vertex, not approximate in females. Fronto-orbital plate well developed in profile, twice the parafacial width, at midlength. Parafacial setulose with slight pale pruinosity. Eye bare. Ocellar setae proclinate and well differentiated from the adjacent setae; postocellar setae proclinate about ¼ the length of ocellar setae; inner vertical setae straight and barely differentiated from postocular setae; outer vertical setae proclinate and long. Gena height 0.4 mm in average. Genal dilation with pale pruinosity and covered with pale setulae. Facial ridge bare. Antenna usually brownish yellow, almost reaching lower facial margin and inserted below middle of eyes. Arista densely plumose with long inner dorsal

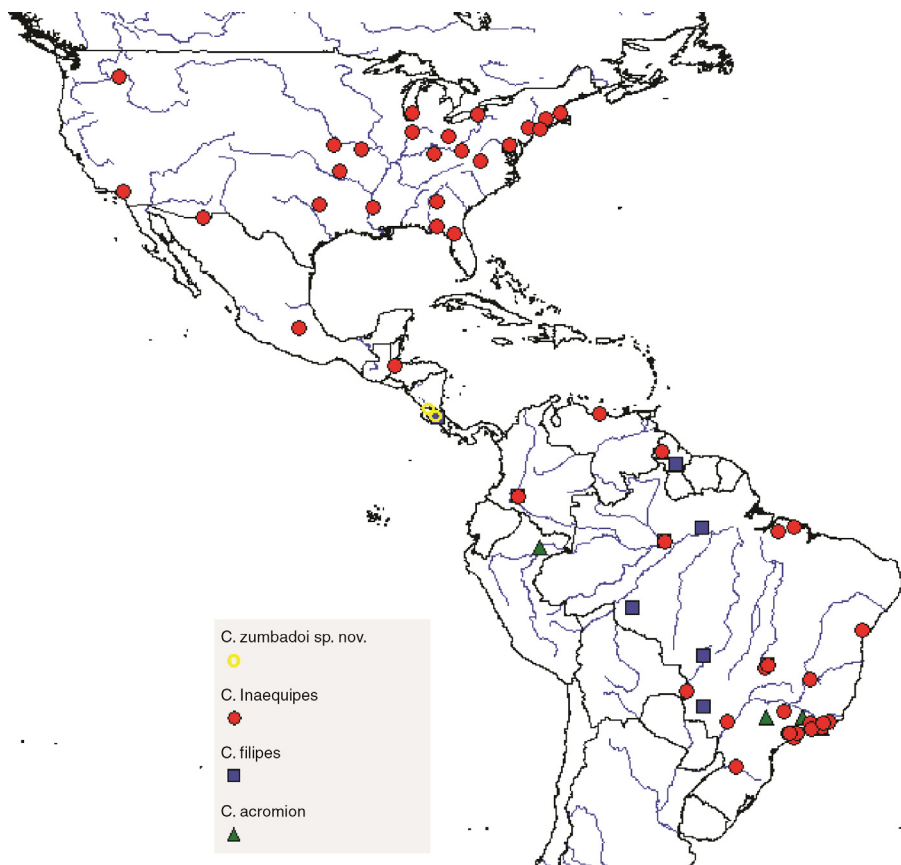


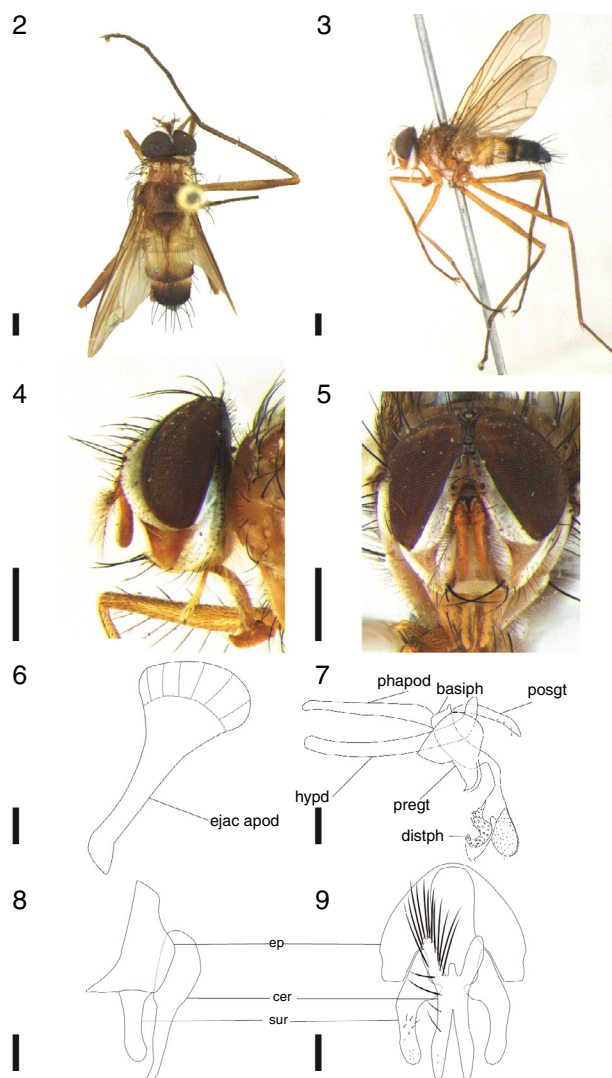
Fig. 1. Distributional map of *Cholomyia* species.

trichia and with same length as postpedicel. Strong and convergent vibrissa; 1–2 developed subvibrissal setae. Palpus filiform in male, more rounded in female. Scutum with yellow or white pruinosity on presutural portion. Prosternum bare. Notopleuron with anterior seta longer than posterior seta (about twice longer). Acrostichal setae 3 + 1 (postsutural seta weak). Dorsocentral setae 2 + 3. Intra-alar setae 1 + 1. Proepimeral setae 2. Proepisternal setae 2. Anatergite setulose. Wing hyaline. Costal spine absent. Vein M_1 ending at wing margin close to tip. Rs node setulose ventrally. Upper calypter whitish; lower calypter yellowish. Male with mid leg extremely elongate, pulvilli and tarsal claws elongated. Fore femur with row of PD and PV setae. Hind coxa bare on posterodorsal margin. Abdomen cylindrical in male (oval in females) and bicolored: syntergite I+II and tergite III usually occasionally yellow, tergite IV with light brown posterior margin (thin band) (entirely black in females), and tergite V black with two lateroventral silver pruinose areas. Syntergite I+II with lateral marginal setae. Tergites IV and V with 2 posterior marginal pair of setae and 1 median marginal pair of setae. Male terminalia with cerci enlarged, slightly convex and setulose at base. Surstylus broad, and usually slightly rounded at base. Base of pregonite sub-triangular, postgonite rod-shaped with strong setae, beginning at base of basiphallus. Distiphallus short with numerous spinules on apical membranous portion and basiphallus elongated. Ejaculatory apodeme fan-shaped.

Diagnosis. *Cholomyia* differs from myiophasiine *Gnadochaeta* mainly by the plumose arista (pubescent in *Gnadochaeta*), parafacial pale setulose (setulae longer and black in *Gnadochaeta*), notopleuron with anterior seta about twice longer than posterior seta (equal size in *Gnadochaeta*), mid legs elongate in males (not elongate in *Gnadochaeta*) and abdomen and legs almost entirely yellow (both entirely black in *Gnadochaeta*).

Key to species of *Cholomyia* (males)

1. Mid leg approximately twice the length of the other legs (Figs. 23, 38); two katepisternal setae; postpronotum with two basal setae; abdominal syntergite I+II entirely yellow (Figs. 22, 23, 37, 38) 2
Mid leg approximately 1.5× the length of the other legs (Figs. 3, 15); one katepisternal seta; postpronotum with 1 anterior seta and 2–3 basal setae; abdominal syntergite I+II with a light brown transverse band on posterior margin (Figs. 2, 3, 14, 15) 3
2. Anepisternum with 2 upward setae on anterodorsal corner. Surstylus with rounded enlargement at apex in posterior view (Fig. 29). Ejaculatory apodeme narrow at base and wide at apex (about twice the basal width), and 1.6× longer than cerci (Fig. 26) (USA, Mexico, Guatemala, Guyana, Venezuela, Colombia, Peru, Brazil) *C. inaequipes* Bigot, 1884
Anepisternum with 4–5 set of upward directed setae on anterodorsal corner. Surstylus with no apical enlargement in posterior view (Fig. 44). Ejaculatory apodeme narrow at base and very wide at apex (about 4.5× the basal width), 1.3× longer than cerci (Fig. 41) (Costa Rica) *C. zumbadoi* sp. nov.
3. Thorax light brown (Figs. 3, 4), prescutum with thin white pruinosity (Fig. 2); anepisternum with 1 upward setula on anterodorsal corner; abdominal tergite III with 1 median marginal pair of setae, usually strong (Peru, Guyana, Brazil) ... *C. acromion* (Wiedemann, 1824)
Thorax dark brown (Figs. 14, 15), prescutum with dense white pruinosity (Fig. 14); abdominal tergite III without median marginal seta (Costa Rica, Guyana, Colombia, Brazil) ... *C. filipes* (Walker, 1857)



Figs. 2–9. *Cholomyia acromion* (Wiedemann), ♂: 2, dorsal habitus; 3, lateral habitus; 4, head, lateral view; 5, head, frontal view. 6–9, ♂ terminalia: 6, ejaculatory apodeme, lateral view; 7, aedeagus and hypandrium, lateral view; 8, epandrium, surstylus and cerci, lateral view; 9, epandrium, surstylus and cerci, posterior view. (Legends: *basiph*, basiphallus; *cer*, cerci; *distph*, distiphallus; *ejac apod*, ejaculatory apodeme; *ep*, epandrium; *hypd*, hypandrium; *phapod*, phallapodeme; *pregt*, pregonite; *posgt*, postgonite; *sur*, surstylus). Scale bar from figures 2 to 5: 1 mm; figures 6 to 9: 0.1 mm.

C. acromion (Wiedemann, 1824)

(Figs. 2–13)

M. acromion Wiedemann, 1824: 47. Holotype ♀ (ZMUC; not examined). Type locality: “South America”. Wiedemann, 1830: 412 (redescription).

Acromiodexia acromion; Townsend, 1936: 45 (comments).

C. acromion; Emden, 1950: 203 (host record); Parker et al., 1953: 12 (host record); Parker, 1953: 54, 66 (host record; figure of puparium, posterior spiracles and cephaloskeleton of first instar); Guimarães, 1971: 105 (catalogue); Guimarães, 1977: 30 (host–parasite catalogue); O’Brien and Couturier, 1995: 234 (host record).

Diagnosis. *C. acromion* differs from *C. inaequipes* and *C. zumbadoi*, and it resembles more with *C. filipes*, by having the postpronotal lobe with 1 anterior and 2–3 basal setae, one katepisternal seta, and abdominal syntergite I+II with a narrow light brown transverse band on distal margin. Moreover, *C. acromion* differs from *C.*



Figs. 10–13. *Chologymia acromion* (Wiedemann), ♀: 10, dorsal habitus; 11, lateral habitus; 12, head, lateral view; 13, head, frontal view. Scale bar: 1 mm.

filipes by having the thorax light brown, prescutum with thin white pruinosity, and abdominal syntergite I+II with median marginal pair of setae.

Redescription

Male (Figs. 2–5)

Body length: 6.7 mm in average (6.3–7.2 mm; $n=4$). Wing length: 6.5 mm in average (5.9–6.9 mm; $n=4$).

Colouration. Genal groove yellow. Antenna yellow. Proboscis and palpus yellow. Thorax light brown, with white pruinosity on prescutum. Fore and mid legs brown, hind leg yellowish with posterior half black, and all legs with tarsus, claw and pulvillus light brown. Abdomen translucent yellow, but with a light brown thin band on posterior margin of syntergite I+II, a larger band on tergite III (about $\frac{1}{4}$), and tergite IV with black posterior margin, about distal $\frac{2}{3}$ of width.

Head. (Figs. 4, 5) Frontal vitta tapering towards the apex. Gena, when seen in profile, about 0.3–0.4 times as height as eye. Gena and parafacial with white pruinosity.

Thorax. (Figs. 2, 3) Postpronotal lobe with 1 anterior and 2–3 basal setae (nearly aligned). Supra-alar setae 1+1. Postalar setae 2. Scutellum with 1 basal (weak), one subapical (weak) and one apical (weak or absent) pairs of setae. Anepisternum with 4–5 strong setae and without upward setulae on anterodorsal corner. Katepisternal setae 1 (posterior).

Wing. R_{4+5} setulose dorsally from R_s node until half of distance to r-m crossvein, and R_1 setulose dorsally until distal $\frac{1}{3}$. R_s node with 2–4 setulae ventrally.

Legs. (Fig. 3) Fore femur with row of PD and PV setae; fore tibia with 1 submedian and 2 preapical setae on PD surface. Mid leg elongate with $1.5\times$ of length of other legs, 13.5 mm in average (12.2–14.5 mm; $n=3$); mid femur with 2 AV supramedian setae, 1 D supramedian seta; and mid tibia with 2 AD setae at apical third and 1 P seta on median third. Hind femur with a row of PD and AD setae, 1 D seta on basal third, 1 PV seta on median third and 2 preapical AD setae; and hind tibia with 1 PD seta on median third, 1 median AV seta, 1 median AD seta and 1 preapical seta on PV and on PD surfaces.

Abdomen. (Figs. 2, 3) Syntergite I+II with 1 to 2 pairs of lateral marginal setae. Tergite III with 1 lateral marginal and 1 median marginal pairs of setae. Tergites IV and V with 2 lateral marginal and 1 median marginal pairs of setae.

Male terminalia. (Figs. 6–9) Cerci tapered and well separated at apex in posterior view, curved and with tip narrowed internally in profile. Surstylus narrowing near the apex in posterior view (Fig. 9), concave and somewhat curved posteriorly in profile (Fig. 8). Base of pregonite sub-triangular, postgonite rod-shaped with strong setae, beginning at base of distiphallus (Fig. 7). Ejaculatory apodeme widening slightly at apex, and conspicuously supersized, about $1.3\times$ length of cerci (Fig. 6).

Female (Figs. 10–13)

Body length: 5.1 mm in average (4.8–5.6 mm; $n=3$); wing length: 4.6 mm in average (4.5–4.8 mm; $n=3$). (Figs. 12–13).

Differs from male by the following: Fronto-orbital plate with reclinate orbital setae 2, and proclinate orbital seta 1. Ocellar setae not developed and straight, inner vertical setae well developed and reclinate; outer vertical setae developed, about $\frac{1}{2}$ length of inner vertical seta. Thorax dark brown (sometimes light brown), with white pruinosity on scutum and scutellum. Postpronotal setae 2. Supra-alar setae 2. Katepisternal setae 1–2 (anterodorsal and posterodorsal). Mid leg dark brown and not elongate as in males, 6–7 mm (Fig. 11). Pulvillus not elongated (Fig. 10). Abdomen oval with anterior thin band of white pruinosity on tergites II–V; syntergite I+II dark yellow, tergite III black, with anterior margin dark yellow, tergites IV and V entirely black, the latter with conspicuous pointed tip.

Examined material. GUYANA: *Mazaruni*: Cuyuni-Mazaruni, 1 ♀, 16.viii.1937, Richards & Smart col. (BMNH); “*British Guiana*”: [Pres. by Imp. Int. Ent. B. M. 1927], 1 ♀, F. A. Squire col. (BMNH). BRAZIL: *Minas Gerais*: Cambuquira, 1 ♂, 2.1941, Lopes & Gomes col. (CEIOC); *Rio de Janeiro*: Grajaú, 1 ♀, undated, H. Souza Lopes col. (MNRJ); idem, 1 ♂, 1.i.1939, [H. Souza] Lopes col. (MZSP); idem, 1 ♂, 22.ix.1940, [H. Souza] Lopes & Oliveira col. (BNMH); idem, 1 ♂, 1.v.1947, [H. Souza] Lopes col. (MZSP); *Rio de Janeiro*, 1 ♂, fevereiro.1939, [Serviço Febre Amarela, M. E. S. Bras] (MZSP).

Distribution. Peru, Guyana, Brazil (Minas Gerais, Rio de Janeiro, São Paulo). (Fig. 1).

C. *filipes* (Walker, 1857)

(Figs. 14–21)

Dexia filipes Walker, 1857: 202. Holotype ♂ (BMNH; not examined). Type locality: “Brazil”.

C. filipes; Guimarães, 1971: 105 (catalogue).

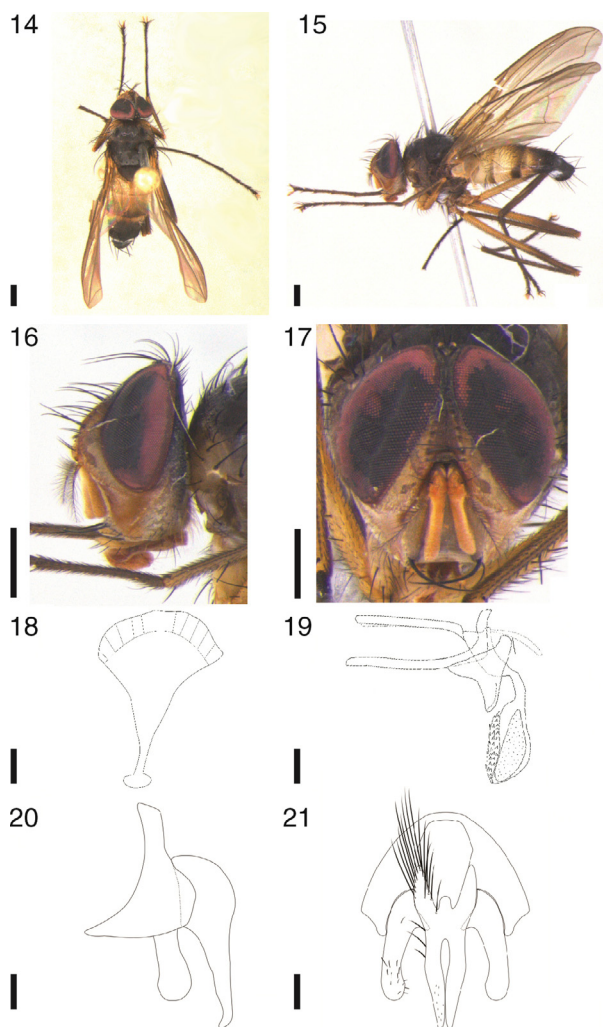
Diagnosis. *C. filipes* differs from *C. inaequipes* and *C. zumbadoi*, and it resembles more with *C. acromion*, by having the postpronotal lobe with 1 anterior and 2–3 basal setae, one katepisternal seta, and abdominal syntergite I+II with a narrow light brown transverse band on distal margin. Moreover, *C. filipes* differs from *C. acromion* by having the thorax dark brown, prescutum with dense white pruinosity, and abdominal syntergite I+II without median marginal setae.

Redescription

Male (Figs. 14–17)

Body length: 6.6 mm in average (5.0–7.3 mm; $n=8$). Wing length: 6.2 mm in average (5.2–6.8 mm; $n=8$).

Colouration. Genal groove dark yellow. Antenna light yellow. Proboscis and palpus yellow. Thorax dark brown, with dense white pruinosity on prescutum. Fore leg with yellow femur black, mid and hind femur yellow (except for posterior margin blackish on distal $\frac{1}{4}$), and all legs tibia and tarsus black. Abdomen light



Figs. 14–21. *Cholomyia filipes* (Walker), ♂: 14, dorsal habitus; 15, lateral habitus; 16 head, lateral view; 17 head, frontal view. 18–21, ♂ terminalia: 18, ejaculatory apodeme, lateral view; 19, aedeagus and hypandrium, lateral view; 20, epandrium, surstylus and cerci, lateral view; 21, epandrium, surstylus and cerci, posterior view. Scale bar from figures 14 to 17: 1 mm; figures 18 to 21: 0.1 mm.

yellow, but light brown thin band on posterior margin on syntergite I + II and tergite III (about $\frac{1}{4}$), and tergite IV with black posterior margin, about $\frac{2}{3}$ of width.

Head. (Figs. 16, 17) Frontal vitta tapering towards the apex. Gena, when seen in profile, about 0.2–0.3 times as height as eye. Gena and parafacial with pale pruinosity.

Thorax. (Figs. 14, 15) Postpronotal lobe with 1 anterior and 2–3 basal setae (nearly aligned). Supra-alar setae 1 + 2. Postalar setae 1 or 2. Intrapostalar seta present (weak). Scutellum with 1 basal, 1 subapical (or absent), 1 discal (weak) and 1 apical (decussate) pair of setae. Anepisternum with 5–6 strong setae and with 1 upward setula on anterodorsal corner. Katepisternal seta 1 (posterior).

Wing. R_{4+5} setulose dorsally from R_s node until half of distance to r-m crossvein. R_1 setulose dorsally (scarce) until distal $\frac{1}{3}$. R_s node with 2 setae ventrally.

Legs. (Fig. 15) Fore femur with row of PD and PV setae; fore tibia with 1 submedian and 2 preapical setae on PD surface. Mid leg elongated, with $1.5\times$ of length of other legs 12.3 mm in average (9.2–15.8 mm; $n = 5$); mid femur with 1 submedian and 1 preapical on PD surfaces and mid tibia with 2 supramedian AD setae at apical third, 1 PV setae on median third. Hind femur with row of PD and AD setae, 1 PD seta on basal third, 1 PV seta on median third and 2

preapicals seta on AD; hind tibia with 1 PD seta on median third, 1 median AD seta, 2 preapical PV surface.

Abdomen. (Figs. 14, 15) Syntergite I + II with 1 pair of lateral marginal setae. Tergite III with 1 pair of median marginal. Tergites IV and V with 2 lateral marginal and 1 median marginal pairs of setae.

Male terminalia. (Figs. 18–21) Cerci tapered at apex, touching each other in posterior view (Fig. 21), with narrowed and subtly curved edge internally in profile (Fig. 20). Surstylus narrowing near the apex in posterior view (Fig. 21), concave and somewhat curved posteriorly in profile (Fig. 20). Base of pregonite sub-triangular, and postgonite rod-shaped, with strong setulae, beginning at base of distiphallus (Fig. 19). Ejaculatory apodeme with wide apex and conspicuously supersized, with $1.6\times$ length of cerci (Fig. 18).

Female. Unknown.

Examined material. COSTA RICA: 1 ♂, 1921, P. Serre col. (MNHN). Guyana: “Brit. Guiana”: 2 ♂, 1908, K. S. Wise col. (BMNH). COLOMBIA: Florencia: 1 ♂, 10.ix.2010, Yardany Ramos-Pastrana col. (UAM-E). BRAZIL: Rondônia: Monte Negro, Setor Chacareiro, $S10^{\circ}16'21.4''$ $W63^{\circ}20'45.2''$, 1 ♂, 10.ii.2012, Malaise, Lamas, Nihei & eq. col. [SISBIOTA CNPq/FAPESP] (MZSP); Amazonas: Manaus, 1 ♂, vi.1955, Elias & Roppa col. (MNRJ); Pará: Oriximiná, 1 ♂, 12–13.i.1968, [Exp. Perm. Amaz.] (MZSP); Mato Grosso: Chap.[Chapada] dos Guimarães, Vale da Benção, $S15^{\circ}25'10.7''$ $W055^{\circ}47.22'9''$, 1 ♂, 17.i.2012, Coleta Manual, Lamas, Nihei & eq. col. [SISBIOTA CNPq/FAPESP] (MZSP); *idem*, 1 ♂, 19.i.2012, Coleta Manual, Lamas, Nihei & eq. col. [SISBIOTA CNPq/FAPESP] (MZSP); Goiás: Anápolis, 1 ♂, VII.1955, [Serviço Febre Amarela, M. E. S. Bras] (possible collector) (MZSP); Mato Grosso do Sul: Serra da Bodoquema, Fazenda Califórnia, Rio da Gruta, $S20^{\circ}42'28''$ $W055^{\circ}51'07''$, 1 ♂, 09.xii.2011, Nihei, Gudín, Sato, Moll col. [SISBIOTA CNPq/FAPESP] (MZSP).

Distribution. Costa Rica, Guyana, Colombia (Florencia), Brazil (Rondônia, Amazonas, Pará, Mato Grosso, Goiás, Mato Grosso do Sul). (Fig. 1)

Remarks. José H. Guimarães during his studies at USNM in 1967 made some personal notes based on records from J.M. Aldrich performed in the BMNH in 1929, which he reports *D. filipes* as synonym of *C. inaequipes*. However, Guimarães (1971) in the Neotropical catalogue still kept *C. filipes* as a valid species. In our review, we recognized both *C. filipes* and *C. inaequipes* as separate and valid species. In fact, *C. filipes* shares more similarities with *C. acromion* than with *C. inaequipes*.

C. inaequipes Bigot, 1884

(Figs. 22–36)

Musca longipes Fabricius, 1805: 398 (preoccupied Scopoli, 1763). Holotype ♂ (ZMUC; not examined). Type locality: “Brazil”.

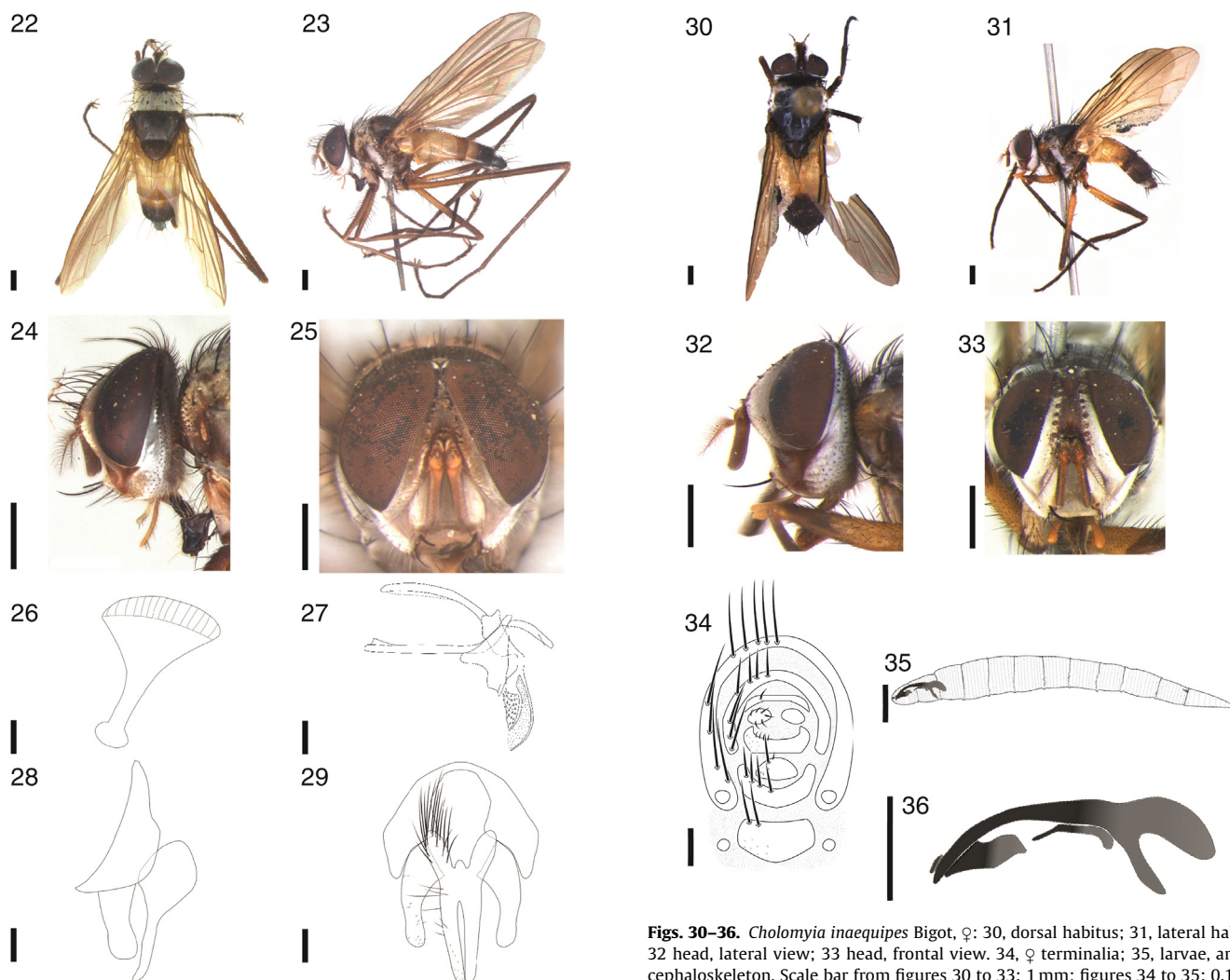
C. inaequipes Bigot, 1884: 42 (also 1884: xxxvii). Lectotype ♂ (BMNH; not examined). Type locality: “Mexico”.

Thelairodes basalis Giglio-Tos, 1893: 3. Holotype ♀ (MZUT; not examined). Type locality: “Mexico”.

C. nigriceps Williston, 1908: 353, Fig. 146 (figure of head and legs). Holotype ♂ (whereabouts unknown). Type locality: “unknown”.

Metadexia flavipes Johnson in Coquillett: 1905: 78. *Nomen nudum*.

References. Wulp, 1891: 247 (redescription of *C. inaequipes*); Brauer, 1897: 365 (*inaequipes* as synonym of *longipes*); Johnson in Coquillett, 1905: 78 (*C. flavipes* as junior synonym of *T. basalis*); Pierce, 1908: 381 (host record); Johnson, 1912: 102 (notes of *C. longipes*); Quaintance and Jenne, 1912: 150 (notes, hosts and figure of puparium); Pierce et al., 1912: 78 (host record); Brooks, 1922: 7, 11, 13, 16 (host record); Mutchler and Weiss, 1925:



Figs. 22–29. *Cholomyia inaequipes* Bigot, ♂: 22, dorsal habitus; 23, lateral habitus; 24 head, lateral view; 25 head, frontal view. 26–29, ♂ terminalia: 26, ejaculatory apodeme, lateral view; 27, aedeagus and hypandrium, lateral view; 28, epandrium, surstylus and cerci, lateral view; 29, epandrium, surstylus and cerci, posterior view. Scale bar from figures 22 to 25: 1 mm; figures 26 to 29: 0.1 mm.

10, 13 (host records); Aldrich, 1929: 13 (redescription and comments); Snapp, 1930: 77, 79 (host record); Townsend, 1931b: 93 (*C. inaequipes* as synonym of *C. longipes*); Townsend, 1936: 45 (comments about *C. inaequipes*); Curran, 1934: 502 (comments on female of *C. inaequipes*); Fattig, 1949: 12 (host record); Armstrong, 1958: 17 (host record); Patton, 1958: 36 (distributional records); Gibson, 1964: 525 (host record); Guimarães, 1971: 105 (catalogue); Arnaud, 1978: 15, 144, 611 (host–parasite catalogue); Maier, 1980: 61 (host record); O'Hara and Wood, 2004: 275 (catalogue); Jenkins et al., 2006: 438 (host record); Wood and Zumbado, 2010: 1401 (comments).

Diagnosis. *C. inaequipes* differs from *C. acromion* and *C. filipes*, and it resembles more with *C. zumbadoi*, by having the mid leg approximately twice the length of the other legs, two katepisternal setae, postpronotum with two basal setae and abdominal sytergite I + II entirely yellow. Moreover, *C. inaequipes* differs from *C. zumbadoi* by having the anepisternum with 2 upward setae on anterodorsal corner, surstylus with rounded enlargement at apex in posterior view, ejaculatory apodeme narrow at base and wide at apex (about twice the basal width), about 1.6× longer than cerci and pregonites without narrowed basal portion.

Figs. 30–36. *Cholomyia inaequipes* Bigot, ♀: 30, dorsal habitus; 31, lateral habitus; 32 head, lateral view; 33 head, frontal view. 34, ♀ terminalia; 35, larvae, and 36, cephaloskeleton. Scale bar from figures 30 to 33: 1 mm; figures 34 to 35: 0.1 mm; figure 36: 0.05 mm.

Redescription

Male (Figs. 22–25)

Body length: 8 mm in average (7.1–8.8 mm; $n=30$). Wing length: 8.2 mm in average (7.1–9 mm; $n=30$).

Colouration. Genal groove dark yellow. Proboscis and palpus pale yellow. Antenna yellow. Thorax dark brown, with pruinosity usually yellow on prescutum. Fore and hind legs with femur yellow (except mid distal region black), and all legs with tibia and tarsus black. Abdomen yellow, but light brown thin band on posterior margin of tergite III (about $\frac{1}{4}$) and tergite IV with black posterior margin, about distal $\frac{2}{3}$ of width.

Head. (Figs. 24, 25) Frontal vitta narrow. Gena, when seen in profile, about 0.4–0.5 times as height as eye. Gena and parafacial with white pruinosity. Parafacial with thin pale pruinosity.

Thorax. (Figs. 22, 23) Postpronotal lobe with 2 basal setae. Supralar setae 1 + 1. Postalar setae 1 or 2. Scutellum 1 one basal, 1 discal (weak or absent), 1 subapical and 1 apical (usually decussate) pairs of setae. Anepisternum with 5–6 strong setae and with 2 upward setulae on anterodorsal corner. Katepisternum 2 (posterior and anterior).

Wing. R_{4+5} setulose dorsally from R_s node until half of distance to r-m crossvein, and R_1 setulose dorsally until distal $\frac{1}{3}$ (rarely beyond). R_s node with 3–4 setae ventrally.

Legs. (Fig. 23) Fore femur with row of PD and PV setae, fore tibia with 2 PD setae at apical third and 1 PD on median third, and 1 D and 1 PV preapical setae. Mid leg very elongate twice longer than other legs, 18.8 mm in average (14.9–20.5 mm; $n = 30$); mid femur with 4 AD setae suprmedian and 1 PV seta preapical, mid tibia with 2 suprmedian AD setae and preapicals 1 D, 1 V and 1 P. Hind femur with a row of AV and AD setae, 1 submedian D seta, and 1 preapical P seta; tibia with 1 suprmedian AD seta, 1 median AD seta, 1 median AV seta, 1 submedian D seta and 1 DV preapical seta.

Abdomen. (Figs. 22, 23) Syntergite I+II with 2 pairs of lateral marginal setae. Tergite III (rarely) with 1 pair of lateral marginal seta. Tergites IV and V with 2 pairs of lateral marginal setae and 1 pair of median marginal setae.

Male terminalia. (Figs. 26–29) Cerci tapered at apex, touching each other or not, in posterior view (Fig. 29), with a subsequent narrowing and internally curved in profile (Fig. 28). Surstylus with a subsequent narrowing near the apex in posterior view (Fig. 29), and somewhat curved posteriorly in profile (Fig. 28). Base of pregonite sub-triangular, postgonite rod-shaped with strong setae, beginning at base of basiphallus (Fig. 27). Ejaculatory apodeme wide at apex, and conspicuously supersized, about 1.6× length of cerci (Fig. 26).

Female (Figs. 30–33)

Body length: 8 mm in average (8–8.1 mm; $n = 2$); wing length: 6.6 mm in average (6.5–6.8 mm; $n = 2$).

Differs from male by the following: (Figs. 32, 33) Fronto-orbital plate with reclinate orbital setae 2, and proclinate orbital setae 1. Ocellar setae not developed and straight, inner vertical setae well developed and reclinate; outer vertical setae developed about ½ length of inner vertical seta. (Figs. 30, 31) Prescutum with thin white pruinosity, denser on posterior half. Mid leg dark brown and not elongate as in males, 9.2 mm ($n = 1$). Pulvillus not elongated. Abdomen oval, not translucent; yellow but abdominal tergite III (with 1 developed marginal median seta) only posterior half black, tergites IV and V entirely black, the latter with conspicuous pointed tip.

Female terminalia. (Fig. 34) Tergite 6 dorsally with 2 pairs of spiracles, 6th spiracle on membrane ventrally and 7th spiracle near ventral end of tergite, with several setae. Tergite 7, with a few setae dorsally and laterally. Tergite 8 as narrow strip, with one pair of setae laterally. Sternite 5 subrectangular with some scarce setae. Sternite 6 well developed as a complete ventral shield, with several small setae. Sternite 7 with setae on posterior margin and without small setae. Sternite 8 with one long and one small seta on posterior margin. Sternite 10 without lingulae, but with lateral projections dorsally and several scarce setae. Cerci well developed, sub-circular, with several setae apically. Syntergite 9+10 absent.

First instar larva (Fig. 35)

Body length: 1.029 mm in average (1.008–1.062 mm). [70–80 larvae were measured from two ♀]

Colourless except for the pigmented cephaloskeleton and ventral cuticular spines on each segment posterior margin (without cuticular scales). Along all the segments, complete bands of minute spines (encircle all the segment). Antenna not visible. Posterior spiracle as a simple round opening in the 11th segment, with short internal tubule visible through the cuticle. The 12th segment is prolonged into a conical tail. Cephaloskeleton (Fig. 36) with fine mouth hook, slightly ventrally curved and sharply pointed, with well developed accessory sclerite. Long intermediate region, with salivary gland thin and long (almost as long as

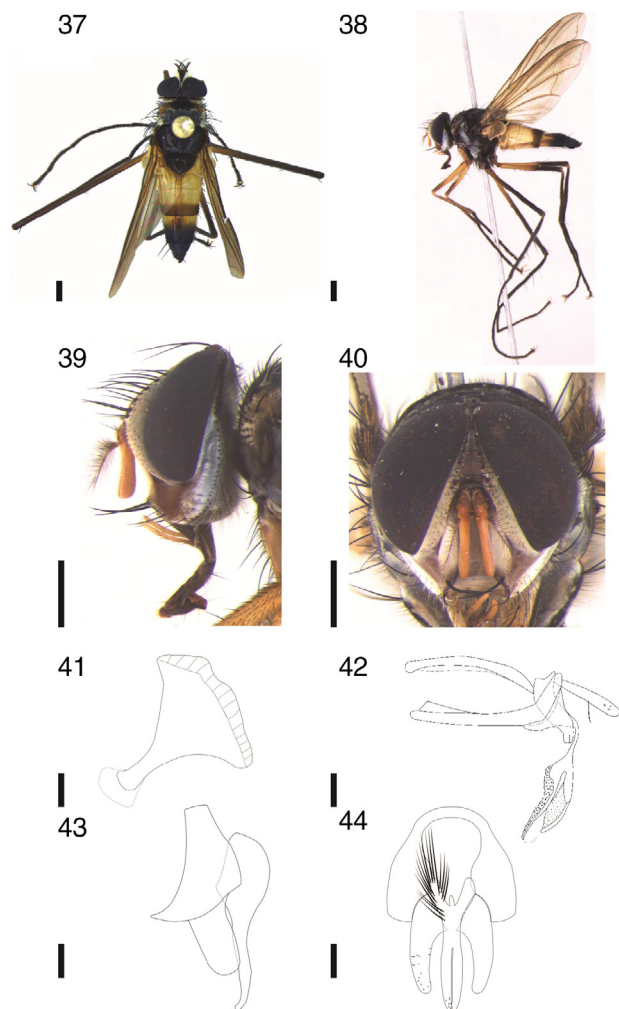
intermediate region), with posterior portion enlarged. Dorsal cornu larger and somewhat longer than ventral cornu, and both less pigmented than anterior parts of skeleton.

Examined material. UNITED STATES OF AMERICA: *Washington*: Dayton: 1 ♂, no date, C.W. Johnson col. (MZSP). COLOMBIA: *Florencia*: 2 ♂, 21.x.2011, Yardany Ramos-Pastrana col. (UAM-E). PERU: *Huarochiri*: 1500 m, 1 ♂, 1.5.1970, C. Kofytkowski col. (MZSP). BRAZIL: *Rondônia*: Vilhena: 1 ♀, xi.1973, Alvarenga & Roppa col. (MNRJ); *Amazonas*: Manaus, 1 ♂, 4.iv.1946, Elias & Roppa col. (MNRJ); R. Ita: 1 ♂, vi.1950, J. C. M. Carvalho col. (MNRJ); *Pará*: Canidé: Gurupi, 1 ♂, 27.ii.1966, Malkin col. (MZSP); *Concórdia do Pará*: Santana, Floresta dos Macacos, 1 ♂, ix.1969, [Exp. Ferm. Amaz.] (MZSP); *Bahia*: Cachoeira, Faz Vila Real: 1 ♂, 23.vii.2007, E. Alvin & et al. col. (USFS); *Mato Grosso*: Fazenda Primavera, Rio Paran: 1 ♂, x.1954, Rabello col. (MZSP); Tapirap [Serra do Urubu Branco–possibly]: 1 ♂, i.1940, Carvalho col. (MNRJ); *Gois*: Anpolis, 1 ♂, iv.1.1936 (no collector data), Goinia, 1 ♂, viii.1943, Freitas e Nobre col. (MZSP); *Mato Grosso do Sul*: Corumb, 4 ♂, iii.1949, M. P. Barreto col. (MZSP); *Minas Gerais*: Passa Quatro, 3 ♂, 1903, E. R. Wagner (MNHN), Lassance, 1 ♂, 20 a 31.i.1939, Martins, Lopes e Mangabeira col. (MZSP); *Rio de Janeiro*: Angra dos Reis (Japuhya): 1 ♂, xii.1940, Oliveira & Venfel (CEIOC); Barra da Tijuca: 1 ♂, 19.6.1994, Rocha Barros Santos Machado col. (MNRJ); Itatiaia: 5 ♂, iv.1945, M. P. Barretos, col., *idem*, 24.i.1934, J. F. Zikn. col.; Nova Friburgo, Mury: 1 ♂, xii.1976, 3 ♂, 1/15.iv.1964, 3 ♂, 1/15.iv.1964, 3 ♂, 22–24.xii.1964, 1 ♂, 1–31.Jan.1965, 16 ♂, xii.1965, 1 ♂, 1–2.Nov.1970, 1 ♂, iii.1972, 5 ♂, xii.1974, 1 ♂, xii.1975, 1 ♂, xii.1976, Gred & Guimares, cols. (MZSP); *Petrpolis*: 6 ♂, xi.1929 (MZSP), *idem*, 1 ♂, 4.69, H.S. Lopes col. (MNRJ); *So Paulo*: Barueri: 1 ♂, 23.ii.1955, 1 ♂, 23.iv.1957, 1 ♂, 16.ii.1965, 1 ♂, 16.i.1966, K. Lenko col. (MZSP); Cssia dos Coqueiros, Cajuru: 3 ♂, x.1954, M.P. Barreto col. (MZSP), *idem*, 1 ♂, xi.1954, M. P. Barreto col. (MZSP); Mogi das Cruzes: 1 ♂, nov.1939, M. Carrera col. (MZSP); Guaruj: 1 ♂, 25/30.i.1941, M. Carrera col. (MZSP), *idem*, 1 ♂, i.1942, M. Carrera col. (MZSP); *Salespolis*: Estcao Biolgica de Boraccia, 850 m: 1 ♂, 30.i.1968, Rabello col., *idem*, 9 ♀, 21.v–28.vi.2008 (malaise), Nihei, Figueiredo & Andrade col. (MZSP); *So Paulo*: 1 ♂, 9.iv.1933, M. T. Leite col. (MZSP); *Santa Catarina*: Nova Teutnia [2711'S 5223'W]: 2 ♂, 14.5.1936, Fritz Plaumann col. (MZSP), *idem*, 1 ♂, 10.10.1937, Fritz Plaumann col. (MZSP).

Distribution. United States of America (Arkansas, Arizona, California, Connecticut, Florida, Gainesville, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Missouri, New Jersey, New York, Ohio, Pennsylvania, Texas, Virginia, Washington, West Virginia and Wisconsin), Mexico (Vera Cruz), Guatemala, Guyana, Venezuela, Colombia (Florencia), Peru, Brazil (Par, Mato Grosso, Gois, Mato Grosso do Sul, Minas Gerais, Rio de Janeiro, So Paulo, Santa Catarina). (Fig. 1)

Remarks. This species presents the widest geographical distribution, ranging from northern USA (Wisconsin) to southern Brazil (Santa Catarina) (Fig. 1), and has the most extensive list of host records.

M. longipes Fabricius is synonym of *C. inaequipes* Bigot. Wulp (1891: 247), commented: "(...) it is possible that [*C. inaequipes*] is *M. longipes* Fabri. (...)". Brauer (1897: 365) stated the possible synonymy between both species, and Aldrich (1929: 13) formally proposed such synonymy: "(...) *inaequipes* Bigot, new, is equals *M. longipes* Fabricius preoccupied." Townsend (1931: 93) also agreed with this synonymy: "*Musca longipes* Fab. preoc. (...) is *Cholomyia inaequipes* Big. (...)", and reproduced this in his *Manual of Myology* (Townsend, 1939). However, some other authors placed *C. longipes* as synonym of *C. acromion* (e.g., Parker, 1953; Guimares, 1971). Aldrich (1929) and Townsend (1931) examined and compared the types, while Parker (1953) and Guimares (1971) did not mention about types examination.



Figs. 37–44. *Cholomyia zumbadoi* sp. nov., ♂: 37, dorsal habitus; 38, lateral habitus; 39 head, lateral view; 40 head, frontal view. 41–44, ♂ terminalia: 41, ejaculatory apodeme, lateral view; 42, aedeagus and hypandrium, lateral view; 43, epandrium, surstylus and cerci, lateral view; 44, epandrium, surstylus and cerci, posterior view. Scale bar from figures 37 to 40: 1 mm; figures 41 to 44: 0.1 mm.

C. zumbadoi sp. nov.

(Figs. 37–44)

Diagnosis. *C. zumbadoi* differs from *C. acromion* and *C. filipes*, and it resembles more with *C. inaequipes*, by having the mid leg approximately twice the length of the other legs, two katepisternal setae, postpronotum with two basal setae and abdominal sytergite I + II entirely yellow. Moreover, *C. zumbadoi* differs from *C. inaequipes* by having the anepisternum with 4–5 upward setae on anterodorsal corner, surstylus without concavity and curved externally in profile view, ejaculatory apodeme narrow at base and very wide at apex (about twice the basal width), about 1.3× longer than cerci and pregonites with basal portion narrowed.

Description

Male (Figs. 37–40)

Body length: 8.3 mm in average (8.0–8.8 mm; $n=4$). Wing length: 8.4 mm in average (8.0–8.5 mm; $n=4$).

Colouration. Genal groove dark yellow. Antenna yellow. Proboscis and palpus pale yellow. Prescutum usually with yellow pruinosity. Thorax dark brown. Fore leg with yellow femur, mid and hind femur yellow (except for blackish posterior margin about distal ¼), and all legs with tibia and tarsus black. Abdomen yellow, but

light brown thin band on posterior margins on tergite III (about ¼) and tergite IV with black posterior margin, about distal ⅔ of width.

Head. (Figs. 39, 40) Frontal vitta narrow. Gena, when seen in profile, about 0.4–0.5 times as height as eye. Gena and parafacial with thin pale pruinosity.

Thorax. (Figs. 37, 38) Postpronotal lobe with 2 basal setae. Supralar setae 1 + 2. Postalar setae 1 to 2. Scutellum with one basal, one discal (weak or absent), one subapical and one apical (generally decussate) pairs of setae. Anepisternum setae with 5–6 of strong setae and with 4–5 developed upward setae on anterodorsal corner. Katepisternal setae 2 (anterior and posterior).

Wing. R_{4+5} setulose dorsally from R_s node until half of distance to r-m crossvein and R_1 fully setulose dorsally (scarce in the median region). R_s node with 5 setulae ventrally.

Legs. (Fig. 38) Fore femur with row of PD and PV setae, fore tibia with 2 PD and 1 PV setae on median third, and 1 D and 1 PV preapical setae. Mid leg very elongate, twice longer than other legs, 20.5 mm in average (20.3–20.8 mm; $n=4$), mid femur with 4 suprmedian AD setae, 1 preapical PV seta; mid tibia with 2 suprmedian AD setae, and 1 D, 1 V and 1 P preapical setae. Hind femur with a row of AV (usually) and AD setae, 1 submedian D seta, and 1 preapical P seta; hind tibia with 1 suprmedian AD seta, 1 median AD seta, 1 median AV seta, 1 submedian D seta and 1 DV preapical seta.

Abdomen. (Figs. 37, 38) Sytergite I + II with 2 pairs of lateral marginal setae. Tergite III (rarely) with 1 lateral marginal pair of seta. Tergites IV and V with 2 pairs of lateral marginal setae and 1 pair of median marginal setae.

Male terminalia. (Figs. 41–44) Cerci tapered at apex, touching each other or not, in posterior view (Fig. 44), narrowed tip without curvature in profile (Fig. 43). Surstylus without narrowing near the apex, in posterior view (Fig. 44), slightly curved posteriorly, with absence of concavity, in profile (Fig. 43). Base of pregonite subtriangular with basal portion narrowed, postgonite rod-shaped with strong setae, beginning at the base of distiphallus (Fig. 42). Ejaculatory apodeme very wide at apex, with conspicuously super-sized, about 1.3× length of cerci (Fig. 41).

Female. Unknown.

Type material examined. Holotype ♂ (INBio) labelled as “COSTA RICA, Prov. Alajuela, PN/Volcán Tenório, Albergue Heliconias,/send. Mirador 1000 m. 16. Jul. al 04/.ago.2000, J. D. Guitierrez, Manual. LN_298575.423400 #62544”; “INB0003304285/INBIOCRI COSTA RICA”; “*Cholomyia zumbadoi*/Santis, M. det./Out – 2013”; “Holótipo” [red label with black borders].

Paratypes. ♂ (INBio). “COSTA RICA, Prov. Alajuela, PN/Volcán Tenório, Albergue Heliconias,/send. Mirador 1000 m. 16. Jul. al 04/.ago.2000, J. D. Guitierrez, Manual. L N_298575.423400 #62544”; “INB0003304285/INBIOCRI COSTA RICA”; “Parátipo” [green label with black boards]. ♂ (INBio). “COSTA RICA, Prov. Alajuela, Upala,/Bijagua, Falda, N.E./V. Tenório, 700–1200 m, 28.may.2001, M. Afro/Libre L.N.295900.426650 #63212”; “INB0003333473/INBIOCRI COSTA RICA”; “Parátipo” [green label with black boards]. ♂ (INBio). “COSTA RICA, Prov. Alajuela, Upala,/Bijagua, Sector Alto Los Brenes. 700/m. 26 ABR – 11 MAY 2001. J. D./Gutierrez. Red com Aguameil./L.N.300600.422800 #62187”; “INB0003333473/INBIOCRI COSTA RICA”; “Parátipo” [green label with black boards].

Type locality. Costa Rica, Alajuela, P.N. Volcán Tenório.

Distribution. Costa Rica (Alajuela) (Fig. 1)

Etymology. This species is named in honour of Dr. Manuel A. Zumbado, curator of Diptera at the Instituto Nacional de Biodiversidad (INBio).

Host–parasite records

- 1) *C. acromion* (Wiedemann):
Curculionidae: Molytinae.
 - *Conotrachelus eugeniae* O'Brien, 1995 – (O'Brien and Couturier, 1995)
Peru: Iquitos.
 - *Conotrachelus curvicostatus* Marshall, 1929 – (Guimarães, 1977; Parker et al., 1953)
Brazil: São Paulo.
Curculionidae: Curculioninae
Curculio (Balaninus) sp. (Curculionidae: Curculioninae) – (Emden, 1950).
- 2) *C. filipes* (Walker):
No records.
- 3) *C. inaequipes* Bigot:
Curculionidae: Molytinae
 - *Conotrachelus affinis* Boheman, 1837 – (Quaintance and Jenne, 1912: 150; Brooks, 1922: 13; Mutchler and Weiss, 1925: 10; Arnaud, 1978: 611)
USA: West Virginia.
 - *Conotrachelus aratus* (Germar, 1824) – (Brooks, 1922: 16; Mutchler and Weiss, 1925: 13; Arnaud, 1978: 611)
USA: West Virginia.
 - *Conotrachelus crataegi* Walsh – (Maier, 1980: 61)
USA: Connecticut.
 - *Conotrachelus elegans* (Say, 1831) – (Pierce, 1908: 381; Pierce et al., 1912: 78; Quaintance and Jenne, 1912: 150; Arnaud, 1978: 611)
USA: Texas.
 - *Conotrachelus juglandis* Leconte, 1876 – (Quaintance and Jenne, 1912: 150; Brooks, 1922: 7; Arnaud, 1978: 611)
USA: Louisiana, Missouri and West Virginia.
 - *Conotrachelus naso* Leconte, 1876 – (Gibson, 1964: 525; Arnaud, 1978: 611)
USA: Alabama, Georgia and Ohio.
 - *C. nenuphar* (Herbst, 1797) – (Pierce et al., 1912: 78; Snapp, 1930: 77, 79; Fattig, 1949: 12; Armstrong, 1958: 17; Arnaud, 1978: 611; Maier, 1980: 61; Jenkins et al., 2006: 438)
USA: Arkansas, Connecticut, Georgia, Maryland, Pennsylvania and Virginia.
 - *Conotrachelus posticatus* Boheman, 1837 – (Gibson, 1964: 525; Arnaud, 1978: 612)
USA: Alabama, Georgia and Ohio.
 - *Conotrachelus retencus* Say, 1831 – (Brooks, 1922: 11)
USA: Pennsylvania.
- 4) *C. zumbadoi*:
No records.

On the systematic placement of *Cholomyia*

In a detailed comparative study of the male terminalia of Tachinidae, Tschorsnig (1985: 99) characterized the terminalia of members of the tribe Myiophasiini, where he pointed out: (1) a large epandrium (in Tschorsnig, 1985: Fig. 46 can be noticed that the apical region is short and not tapered in lateral view); (2) cerci separated at apex (by his Fig. 46, the proximal region is not fully fused); (3) the surstylus is narrow and curved internally; (4) pregonite with a plate-like form with setulae and in front of basiphallus (Tschorsnig, 1985: Fig. 133); and (5) the ejaculatory apodeme is large and fan-shaped. Tschorsnig's observations were based on two species of *Angiorhina*, which is currently a junior synonym of *Gnadochaeta* (sensu O'Hara and Wood, 1998).

The male terminalia of *Cholomyia* species mostly agree with the tribal characterization provided by Tschorsnig (1985): (1) the epandrium is large with its elongated apical region and tapered in

posterior view; (2) cerci are separated at the apex but with fully fused proximal region; (3) the surstylus is narrow, but slightly curved internally (although in *C. zumbadoi* sp. nov. it is rectilinear); (4) the pregonite has a sub-triangular form, and is in front of basiphallus, but it lacks setulae, and is expanded on the distal region; and finally, (5) the ejaculatory apodeme is large and also has a fan shape. Therefore, based on your detailed analysis of *Cholomyia* species, including male terminalia, the systematic placement of *Cholomyia*, transferred from the Urodexiini (sensu Guimarães, 1971) to the Myiophasiini (sensu O'Hara and Wood, 2004) is supported and confirmed herein.

Besides the external morphology and male terminalia, characters from immature stage also support the placement of *Cholomyia* into the Myiophasiini. By comparing the 1st instar larva and cephaloskeleton of *C. inaequipes* with those of *Gnadochaeta globosa* (Townsend, 1892), illustrated and described by Townsend (1942) and Bissel (1945), we could observe some resembling features shared by both species. The 1st instar larva of *G. globosa* has the ventral cuticular spines on each segment of the posterior margin, the posterior spiracles located at the 11th segment, lacks a spine-like microtrichia in all segments, and the last segment is prolonged into a conical tail, exactly as *C. inaequipes* (Fig. 35). The cephaloskeleton of *G. globosa* has a down-curved and sharply pointed mouth hook, also present in *C. inaequipes* (Fig. 36) and in *C. acromion* (Parker, 1953: Fig. 60). The well-developed accessory sclerite and the salivary gland with the same posterior enlargement strongly resemble those observed in *C. inaequipes* (Fig. 36).

In the first cladistic analysis of the family performed by Cerretti et al. (2014), the tribe Myiophasiini was only represented by some species of *Gnadochaeta* Macquart (*G. puncticeps* Zetterstedt, 1859 and some spp.), and was recovered as sister group of three genera of Palpostomatini, forming a monophyletic group, "clade B" (*Gnadochaeta* + Palpostomatini) of Cerretti et al. (2014). The only synapomorphy that supports this group is the presence of a membranous medial surface of male pregonite (105:1). Despite regarding the presence of this membrane as doubtful (we believe this could be a weaker sclerotization), we considered this character state as present in *Cholomyia*. Although the taxonomic sampling was extremely biased by Palearctic taxa and the Myiophasiini was underrepresented by a single genus in Cerretti et al. (2014), the genus *Cholomyia* seems to be placed in the clade B. However, not conclusively in Myiophasiini because the autapomorphy of *Gnadochaeta*, the presence of a posteromedial connection between pregonites (108:1), that could be a synapomorphy of this tribe, is not present in *Cholomyia* (even though the two homoplasies for the Palpostomatini are not present in the genus *Cholomyia*).

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgements

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