Mesoamerican *Mallota* Flower Flies (Diptera: Syrphidae) with the description of four new species

[Mittelamerikanische Schwebfliegen der Gattung *Mallota* (Diptera: Syrphidae) nebst der Beschreibung von vier neuen Arten]

by

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Abstract The species of the genus *Mallota* found in Mesoamerica are revised. A key to species along with synonymies, descriptions, distributions, and figures of the male genitalia for all species are given. Four new flower flies are described: ***Mallota anniae* ZUMBADO spec. nov.** (Costa Rica), ***M. apis* THOMPSON spec. nov.** (Costa Rica), ***M. fuca* THOMPSON spec. nov.** (Mexico, Costa Rica) and ***M. klepsvikae* ZUMBADO spec. nov.** (Mexico, El Salvador, Costa Rica).

Key words Neotropical, Syrphidae, *Mallota*, new species, key

Zusammenfassung Die mittelamerikanischen *Mallota*-Arten werden revidiert. Ein Bestimmungsschlüssel, Angaben zur Synonymie und zur Verbreitung sowie Beschreibungen mit Abbildungen der männlichen Genitalien aller Spezies werden gegeben. Vier neue Arten werden beschrieben: ***Mallota anniae* ZUMBADO spec. nov.** (Costa Rica), ***M. apis* THOMPSON spec. nov.** (Costa Rica), ***M. fuca* THOMPSON spec. nov.** (Mexico, Costa Rica) und ***M. klepsvikae* ZUMBADO spec. nov.** (Mexico, El Salvador, Costa Rica).

Stichwörter Neotropis, Syrphidae, *Mallota*, neue Arten, Bestimungsschlüssel

Introduction

Mallota flower flies are common pollinators as adults and filter-feeders as maggots in tree-holes and other natural containers. As such they are useful indicators of habitat diversity and faunal richness. As part of the effort to document the biodiversity of Costa Rica, we here describe four new species of *Mallota*, and provide additional details on other Mesoamerican species.

Mallota species are found in all Biotic Regions except Australasian and Oceanian ones. All the New World species were treated by CURRAN (1940), and the species known from Canada and the United States are treated by THOMPSON (2002). There are no *Mallota* species known from the West Indies (THOMPSON 1981). The genus was redescribed by THOMPSON (1972) and a key to the Neotropical flower fly genera was given by THOMPSON (1999). The biology of the Neotropical species of *Mallota* remains unknown. The North Temperate species, which have been reared, are typical rat-tailed maggots and breed in water-filled tree holes. The life history of the common eastern Nearctic species, *Mallota posticata* (FABRICIUS, 1805), was given by MAIER (1978).

Materials and methods

Mesoamerica is considered to include all the countries south of the United States and north of Colombia, but excluding the West Indies. This is a pragmatic definition based on the reality that the adjectives "Nearctic" and sometimes "North American" are incorrectly used to refer to America north of Mexico. Hence, to assure complete coverage regardless of erroneous definitions of others, we include all of Mexico into our working definition of Mesoamerica.

Redescriptions, complete synonymies, illustrations, and distributions are given for all species. Terminology follows THOMPSON (1999), the abbreviations found in the synonymies follow THOMPSON (2002), the use of the asterisk in the distribution statement refers to verified records found in the material examined section. While this paper only treats those species found in Mesoamerica, those species are treated fully, that is, we provide complete details on their distribution. Color images of these flies along with the rest of the information in this paper may be found on the Diptera WWW site (http://www.sel.barc.usda.gov/Diptera/) and on the *Diptera Data Dissemination Disk*.

Key to Mesoamerican *Mallota* species

1. Metafemur pale basally, usually yellow to orange, rarely brownish (*Apis* mimics) **2**
– Metafemur entirely black (*Bombus* mimics) **5**
2. Scutum, scutellum and anepisternum densely, long yellow pilose; abdomen reddish orange, shiny, without pollinose fascia .... ***M. smithi*** **WILLISTON**
– Scutum, scutellum and anepisternum sparsely, short yellow pilose; abdomen brownish orange, entirely short black pilose .... ***Habromyia ochracea*** **HULL, 1941**
– Scutum, scutellum and anepisternum yellow and black pilose **3**
3. Alula and basal cells (cells R & BM) extensively bare; 4th tergum reddish brown to black, black pilose, shiny apically, with gray pollinose fascia .... ***M. aberrans*** **SHANNON**
– Alula microtrichose; basal cells almost entirely microtrichose **4**
4. 3rd & 4th terga black, shiny to subshiny, without pollinose fasciae, black pilose with medial yellow pilose fascia; 5th tergum orange to brown, shiny .... ***M. fuca*** **THOMPSON spec. nov.**
– 3rd & 4th terga black, with grayish pollinose fasciae, extensively black pilose; 5th tergum black, black pilose, sparsely gray pollinose .... ***M. apis*** **THOMPSON spec. nov.**
5. Abdomen pale pilose basolaterally **9**
– Abdomen black pilose basally. **6**
6. Scutellum black, black pilose except yellow pilose apically; alula microtrichose **8**
– Scutellum yellow, yellow pilose; abdomen black pilose apically; alula bare basomedially **7**
7. Calypter white; cell C entirely brown and microtrichose; anepimeron black pilose .... ***M. bequaerti*** **HULL**
– Calypter brownish; cell C bare on basal 1/3 or more, hyaline basally; anepimeron extensively yellow pilose .... ***M. sackeni*** **WILLISTON**
8. Abdomen reddish-orange pilose apically .... ***M. margarita*** **WILLISTON**
– Abdomen white pilose apically .... ***M. mystacia*** **FLUKE**
9. Abdomen with large basolateral yellow maculae on 2nd tergum; scutellum yellow, entirely yellow pilose (Fig. 1); ♂ eyes narrowly dichoptic, separated by less than width of anterior ocellus; alula partially bare .... ***M. klepsvikae*** **ZUMBADO spec. nov.**
– Abdomen black; ♂ eyes broadly dichoptic, separated by width of ocellar triangle; alula microtrichose **10**
10. Scutellum yellow, entirely yellow pilose (Mexico) .... ***M.*** **spec. 6 [VOCKEROTH]"**
– Scutellum black, black pilose except for white pile along apical margin .... ***M. anniae*** **ZUMBADO spec. nov.**

Mallota aberrans Shannon, 1927

(Fig. 2a–c)

Mallota aberrans Shannon, 1927 – Shannon 1927: 17. Peru, Paltaybamba. HT ♀ USNM. Curran 1940: 12 (key reference); Fluke 1957: 127 (cat. cit.); Thompson et al. 1976: 99 (cat. cit.).

Male and **female**. **Head**: Black; face shiny on medial 1/3 on ventral 2/3, grayish-white pollinose laterally and ventrad to antenna, white and black pilose laterally; gena shiny and bare on anterior half, white pollinose and pilose posteriorly; lunule brownish orange; frontal triangle shiny except very narrowly grayish-white pollinose along eye margin, black pilose except white pilose along eye margin in some specimens; frons shiny on ventral 1/3, brown pollinose dorsally except narrowly grayish-white pollinose along eye margin, mainly black pilose, with some yellow pile intermixed along eye margin; vertical triangle golden-brown pollinose and yellow pilose on ventral 1/4, brownish-black pollinose and black pilose dorsally; vertex brownish-black pollinose, black pilose; male eyes narrowly dichoptic, separated by slightly more than width of anterior ocellus, with length of approximation about 7–8 ommatidia; eye bare to very sparsely and short pilose; occiput white pollinose and pilose on ventral half becoming brownish-black pollinose and black pilose on dorsal 1/3; antenna brownish black except paler basoventrally on basoflagellomere, black pilose; basoflagellomere with distinct basoventral sensory pit on mesial surface, about size of aristal diameter in male, about 3 times aristal diameter in female; arista yellow.

Thorax: Black except postpronotum and scutellum brownish orange; postpronotum yellow and black pilose; scutum sparsely grayish-white pollinose, with darker brown pollinose medial and submedial vittae, darker brown pollinose laterally, mainly brownish-orange pilose with black pile intermixed; scutellum yellow and black pilose; pleuron sparsely grayish-white pollinose except denser and whiter on dorsal katepisternum, posterior anepisternum and anterior anepimeron, white pilose except black pilose on dorsal 1/3 of anepisternum and brownish-orange pilose on anepimeron except black pilose dorsally; spiracular fringes brownish orange; metasternum white pilose; plumula and calypter brownish black; halter yellow.

Wing: Hyaline except with brownish tinge in area of r-m crossvein, microtrichose except bare cell R on basal half, cell BM on anterobasal 1/3 and cell CuP very narrowly along anterobasal 1/3; alula microtrichose except bare on anteromedial 1/3; tegula black pilose.

Legs: Coxae black, white pollinose and pilose; trochanters brownish orange, black pilose except for a few scatter white pili on mesotrochanter and a patch of dense short black pile on metatrochanter; pro- and mesofemora black except brownish yellow on basal 1/3 except dorsally, shiny, black pilose except white pilose on basal 1/3 on profemur and on basal 1/3 and posterobasal 4/5 of mesofemur; metafemur black except yellow on basal 1/3, shiny, black pilose except white on basal half except dorsally and ventrally; tibiae black, black pilose except mesotibia white pilose anteriorly and posteriorly; tarsi black, black pilose.

Abdomen: Terga brownish black except 1st tergum brownish orange and 2nd tergum with large basolateral brownish-orange macula, shiny except grayish-white pollinose basally; 1st tergum sparsely grayish-white pollinose laterally, brownish-orange pollinose medially, orange pilose; 2nd tergum black pilose except brownish-orange pilose on basomedial 1/3 and some white pile laterally at base and apex, with brownish-orange macula on basolateral 3/4 which extends and tapers medially, but macula frequently weak or absent medially, shiny except sparsely pollinose basomedially; 3rd & 4th terga shiny except narrowly grayish-white pollinose basally, black pilose except white pilose laterally and some yellow pile basomedially; 5th tergum black to brownish-black pollinose, black pilose; 1st sternum brownish orange, grayish-white pollinose, white pilose; 2nd sternum black, although brownish orange in some

Fig. 1: Habitus of *Mallota klepsvikae* ZUMBADO spec. nov., dorsal.

females, shiny, white pilose; 3rd & 4th sterna black, shiny, white pilose; 5th sternum black, sparsely gray pollinose, black pilose; male genitalia (Fig. 2) black, sparsely gray pollinose, black pilose.

Distribution: Costa Rica*, Colombia*, Venezuela*, Ecuador*, Peru*.

Material examined: COSTA RICA: Guanacaste: Sector Cacao, sendero a la Cima, 1400–1500 m, LN 323800 37700, 13 April 1997, D. H. JANZEN GUSANEROS, lot# 50730 (3 ♂♂ 1 ♀ INBIO003012348-51 INBIO). Alajuela: San Carlos, Parque Nacional Volcán Tenorio, Albergue Heliconias, sendero Mirador, 1000 m, LN 298575 423400, 16 Jul–4 Aug 2000, J. D. GUTIÉRREZ, Lot # 62544 (1 ♀ INB0003304332 INBIO), Reserva Biológica San Ramón, 1100 m, LN 240100_470100, 26–31 Aug 1995, G. CARBALLO, lot# 6217 (1 ♀ INBIOCR I002388206 INBIO), Sendero L. Danta, 1400 m LN 293700 427050, 16-30 Mar 2000, J. D. GUTIÉRREZ, Malaise trap, Lot# 57298 (1 ♀ INB0003164762 USNM). Puntarenas: Coto Brus, Camino Tablas, La Montura, 1800 m, LS 320400 599000, 8 Feb 1999, B. GAMBOA, Lot# 59043 (1 ♀ INB0003310156 USNM), Monteverde, 1500 m, 25–30 Aug 1992, D. M. WOOD (1 ♂ USNMENT 00030151 CNC); Monteverde Reserva Cloud Forest, 1500 m, Feb 1980, W. MASON (1 ♀ USNMENT 00022439 CNC)Parque Internacional. La Amistad, Estación Altamira, sendero a Casa Coca, 1700 m, LS 331750 574400, 10–27 Mar 2001, O. ALEMÁN, Lot# 62985 (1 ♀ INB0003322285 INBIO). San José: Zurquí de Moravia, May 1989, P.

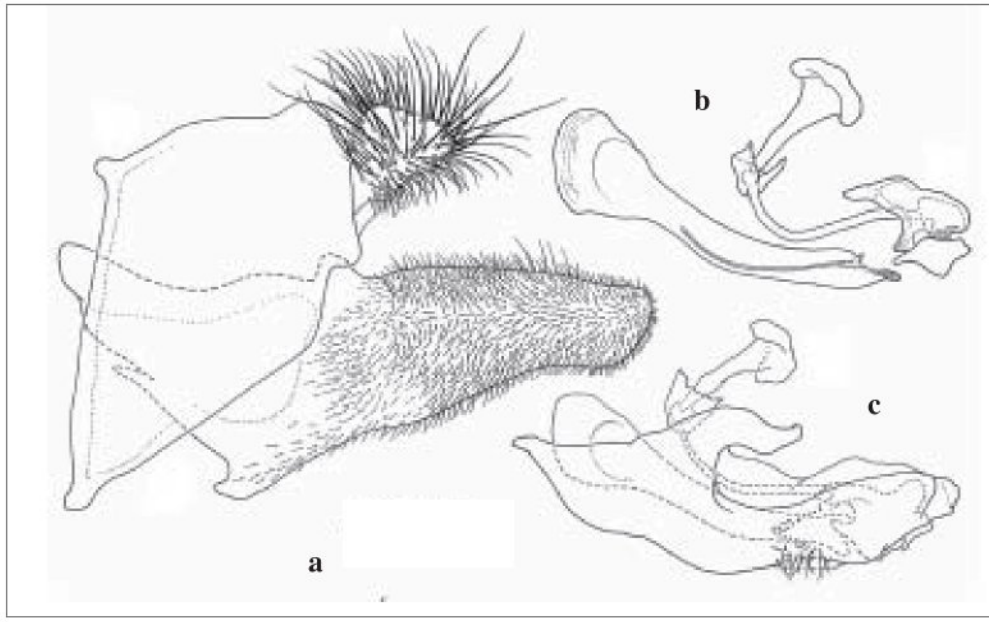

Fig. 2a–c: *Mallota aberrans* Shannon, male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view, c. 9th sternum and associated structures, lateral view.

Hanson, Malaise Trap (1 ♀ USNMENT 00030152 MIUCR); San Gerardo de Dota, 2000–2500 m, LS 387400 482700, 22–26 Feb 1992, Curso Tachinidae y Syrphidae (1 ♀ INBIOCRI00040622 USNM). Cartago: A. C. Amistad, Parque Nacional Tapantí, Quebrada Segundo, 1250 m, LN 194000_559800, Nov 1993, G. Mora, Lot# 2497 (1 ♀ INBIOCRI001825962 INBIO); Parque Nacional Tapantí, 1150 m, LN 194000_559800, March 1994, G. Mora, Lot# 2864 (1 ♀ INBIOCRI002079651 INBIO). COLOMBIA. Western Cordillera, Río Aguacatal, 2000 m, Fassl [C. T. Trechmann Bequest, B.M. 1964-549] (1 ♀ USNMENT 00030176 BMNH). VENEZUELA. Aragua: Rancho Grande, 8–11 June, A. S. Menke & D. Vincent (1 ♂ USNMENT 00030148 USNM) (1 ♂ NRS (Pape), 1 ♂ CNC). ECUADOR. Napo: Baeza, 7 km S, 2000 m, 20–25 Feb 1979, G. & M. Wood (1 ♂, 1 ♀ USNMENT 00030149-50 CNC, USNM). PERU. Paltaybamba (HT, 1 ♀ USNM).

Remarks. There remains a question of whether all these specimens belong to a single species. The holotype of *aberrans* Shannon is a female from Peru which has the frons extensively tawny pilose medially, not entirely black pilose, scutellum entirely and scutum extensively yellow pilose, not entirely black pilose; abdomen extensively yellow pilose, not entirely black pilose. However, this species is the only *Apis* mimic with the alula and basal half of the wing extensively bare. Hence, using this character we have associated the name '*aberrans*' with the above males, which all have identical genitalia.

Mallota anniae Zumbado spec. nov.

(Fig. 3a–c)

Male and **female**. **Head**: Black; face shiny on medial half, brownish-black pollinose ventrad to antenna and laterally, black pilose; gena shiny and bare anteriorly, blackish-gray pollinose and black pilose posteriorly; lunule brownish orange on medial 1/3, black elsewhere; frontal triangle shiny except narrowly brownish-black pollinose laterally and dorsally, black pilose; frons shiny on ventral 1/3, brownish-black pollinose dorsally except narrowly white pollinose along eye margin, black pilose; eye bare; ♂♂ broadly dichoptic, eyes separated by greater than ocellar triangle width; vertex brownish-black pollinose, black pilose; occiput blackish-

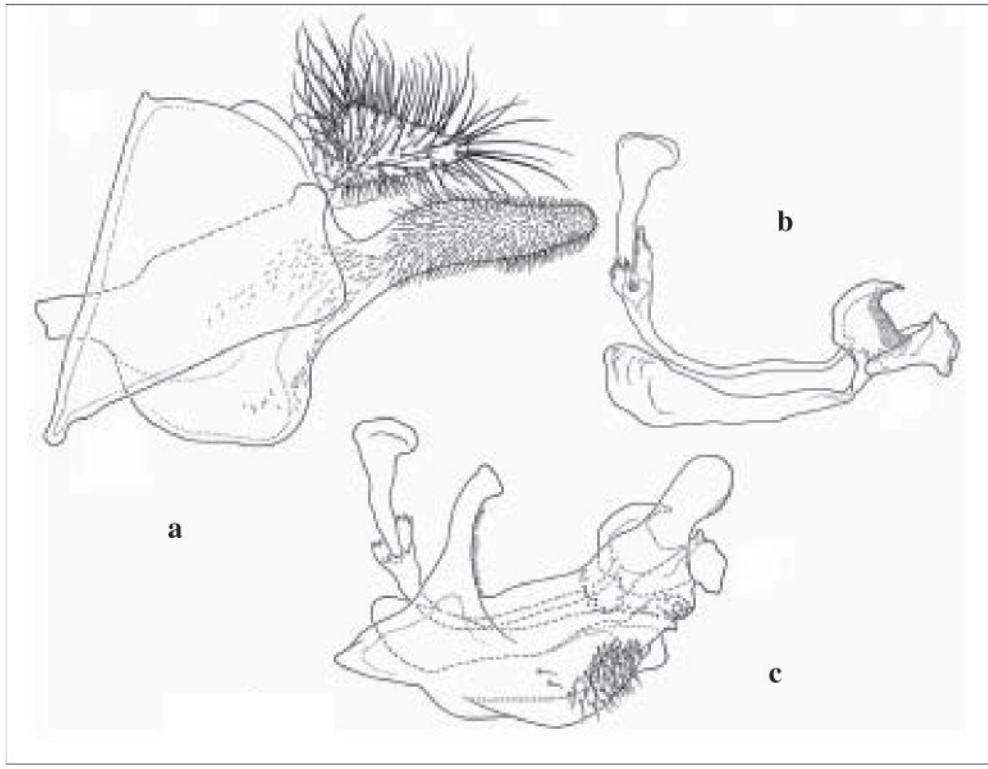

Fig. 3a–c: *M. anniae* ZUMBADO spec. nov., male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **b**: 9th sternum and associated structures, lateral view.

gray pollinose except whitish-gray pollinose along eye margin, black pilose. Antenna black except basoflagellomere and arista; basoflagellomere small, oval, slightly smaller than (♂♂) or about as large as (♀♀) anterior thoracic spiracle, without (♂♂) or with (♀♀) small sensory pit on mesial surface; arista orange except brown basally.

Thorax: Black, dull black to grayish-black pollinose, without any distinct scutal pattern; postpronotum brownish-yellow pilose, with a few intermixed black pili; scutum mainly black pilose, with some intermixed brownish-yellow to yellow pili laterally and anteriorly, with pale pile more extensive in ♀♀; scutellum black pilose except yellow pilose along apical margin; anepisternum black pilose, with some yellow pili dorsoanteriorly; katepisternum yellow pilose; anepimeron yellow pilose; metasternum yellow pilose; spiracular fringes brownish black; plumula black; calypter black; halter brown. **Wing**: Indistinctly brownish medially, otherwise hyaline; microtrichose except basal half cell R, basal 2/3 cell BM, anterobasal 1/5 cell CuP, anterobasally on anal lobe; alula completely microtrichose; tegula and basicosta black, black pilose. **Legs**: Black; pro and mesocoxae black pilose except for few yellow basolateral pili intermixed; metacoxa gray pollinose, yellow pilose; trochanters shiny, black pilose; femora black pilose except yellow pilose posterobasal 1/3 of profemur and posterobasal 2/3 of mesofemur; tibiae and tarsi black pilose.

Abdomen: Black; terga dull black pollinose except shiny apicolaterally on 3rd & 4th in ♀♀ and 5th tergum; terga generally black pilose, yellow pilose on 1st, 2nd except black pilose apicomedially and 3rd basolaterally; 1st & 2nd sterna gray pollinose, yellow pilose; 3rd &

4th sterna shiny, black pilose; ♂♂ genitalia (Fig. 3) sparsely black pollinose, black pilose; ♀♀ terminalia black pilose.

Distribution: Costa Rica*.

Types: **Holotype**: COSTA RICA, San José, Estación Cuericí, 4.6. km E de Villa Mills, 2600–2640 m, LS 389400 499600, 1♂, 15 July 1996, A. Picado, Lot# 7723 (INBIOCRI002467257) deposited in INBIO, Santo Domingo. **Paratypes**. COSTA RICA. Cartago: Madreselva, Finca los Lagos, 2600 m, LN 184450 550050, 7 Nov–5 Dec 1994, M. M. Chavarría & A. SOLANO, Malaise trap, Lot# 3356 (1♀ INBIOCRI002079943 USNM); Río Macho, Estación Ojo de Agua, Sendero a Torre 47, 2960 m, LS 396700 482800, 18 Sep 1997, B. Gamboa, Lot# 47753 (1♀ INBIOCRI002572063 INBIO). San José: Estación Cuericí, 4.6 km E de Villa Mills, 2700 m, LS 389700 499600, 28 Nov 1995, A. M. Maroto, Lot#6461 (1♀ INBIOCRI002366484 USNM).

Remark. *Mallota anniae* Zumbado spec. nov. is similar to *klepsvikae* Zumbado spec. nov. except the scutellum is black and extensively to entirely black pilose, the 2nd abdominal tergum lacks yellow ground color maculae but is yellow pilose, the male is broadly dichoptic, and the metafemur is entirely black pilose.

Derivation of specific epithet. This species is named after Annia Julia Picado Calvo, a Diptera parataxonomist at INBio, in recognition of her outstanding work and interest in entomology and conservation.

Mallota apis Thompson spec. nov.

(Fig. 4a–c)

Male and **female**. **Head**: Black; face shiny on medial 1/3 on ventral 2/3, brownish pollinose ventrad to antenna, white pollinose and pilose laterally; gena shiny and bare on anterior half, white pollinose and pilose posteriorly; lunule brownish orange to brown; frontal triangle shiny except very narrowly grayish-white pollinose along eye margin, black pilose except white pilose along eye margin; frons shiny on ventral 1/3, brown pollinose dorsally except narrowly grayish-white pollinose along eye margin, mainly yellow pilose, with black pile intermixed medially; vertical triangle golden-brown pollinose and yellow pilose on ventral 1/4, brownish-black pollinose and black pilose dorsally; vertex brownish-black pollinose, black pilose; male eyes narrowly dichoptic, separated by slightly more than width of anterior ocellus, with length of approximation about 7–8 ommatidia; eye very sparsely and short pilose; occiput white pollinose and pilose on ventral half becoming brownish-black pollinose and black pilose on dorsal 1/3; antenna brownish black, black pilose; basoflagellomere with distinct basoventral sensory pit on mesial surface, about size of aristal diameter in male, about 3 times aristal diameter in female; arista yellow.
Thorax: Black except postpronotum and scutellum brownish orange; postpronotum yellow and black pilose; scutum sparsely grayish-white pollinose, with darker brown pollinose medial and submedial vittae, darker brown pollinose laterally, mainly brownish-orange pilose with black pile intermixed; scutellum yellow and black pilose; pleuron sparsely grayish-white pollinose except denser and whiter on dorsal katepisternum, posterior anepisternum and anterior anepimeron, white pilose except black pilose on dorsal 1/3 of anepisternum and brownish-orange pilose on anepimeron; spiracular fringes brownish orange; metasternum white pilose; plumula and calypter brownish black; halter yellow. **Wing**: Hyaline, microtrichose except bare cell R on basal half posterior to spurious vein, BM on anterobasal 1/3 and CuP very narrowly along anterobasal 1/3; tegula black pilose. **Legs**: Coxae black, white pollinose and pilose; trochanters orange, white pilose except for sparsely scattered black pile on mesotrochanter and a patch of dense short black pile on metatrochanter; pro- and mesofemora black except brownish yellow on basal 1/3 except dorsally, sparsely gray

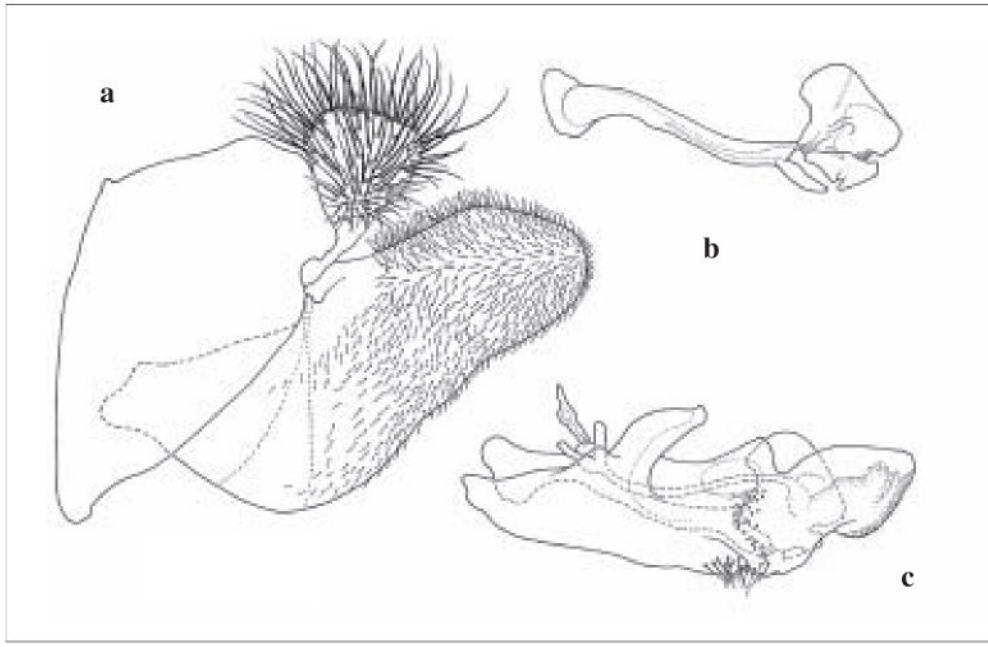

Fig. 4a–c: *Mallota apis* THOMPSON spec. nov., male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

pollinose, black pilose except white pilose on basal 1/3 on profemur and on basal half and posterobasal 3/4 of mesofemur; metafemur black except yellow on basal 1/3, shiny, black pilose except white on basal half except dorsally and ventrally; tibiae black, black pilose except mesotibia white pilose; tarsi black, black pilose.

Abdomen: Terga brownish black except 1st tergum brownish orange and 2nd tergum with large basolateral brownish-orange macula, shiny except for grayish-white pollinose fasciae; 1st tergum sparsely grayish-white pollinose laterally, orange pilose; 2nd tergum black pilose except brownish-orange pilose on basomedial 1/3 and some white pile laterally at base and apex, with brownish-orange macula on basolateral 3/4 which extends and tapers medially, but macula frequently weak or absent medially, shiny except apically with medial fasciate gray pollinose macula, which is sometimes absent; 3rd & 4th terga shiny except with white to grayish-white pollinose fasciate macula on basal 1/4 and on apical 1/3, with apical fasciae slightly broader and continuous, with these fasciae much broader in females, black pilose except white pilose laterally; 5th tergum gray pollinose, black pilose; 1st sternum brownish orange, grayish-white pollinose, white pilose; 2nd sternum black, although brownish orange in some females, shiny, white pilose; 3rd–4th sterna black, shiny, white pilose; 5th sternum black, sparsely gray pollinose, black pilose; male genitalia (Fig. 4) black, sparsely gray pollinose, black pilose.

Distribution: Costa Rica*, Peru*, Bolivia*.

Types: **Holotype** ♂: COSTA RICA, San José, Estación Santa Elena, Las Nubes, 1210 m, LS 371750 507800, 1♂, 5–21 Jul 1996, M. SEGURA, Lot#7888 (INBIOCRI002469639) deposited in INBIO, Santo Domingo. **Paratypes**: COSTA RICA. Limón: Guápiles, 16 km W, 400 m, Aug–Sep 1989, P. HANSON, Malaise Trap (1♀ USNMENT 00030156 USNM). Guanacaste: Estación Pitilla, 9 km S Santa Cecila, 700 m, W 85 25'40" N 10 59'26", Jan 1998, GNP Biodiversity Survey (1♀ INBIOCRI001048305 INBIO); ..., LN 330200_380200, Jan–Apr 1992, Malaise Trap (1♀

INBIOCRI000716974 INBIO); ... Apr 1995, P. Riós, lot # 4814 (1♀ INBIOCRI002335596 INBIO). Puntarenas: Finca Las Cruces, 4 mi S San Vito de Java, 1260 m, 11–19 Aug 1969, D. H. Janzen (1♀ USNMENT 00030155 USNM); Estación Biol. Las Alturas, 1 km N de Las Alturas, 1500 m, LS 322700 591400, 28–30 Sep 1994, M. A. Zumbado. Lot # 6024 (1♀ INBIOCRI002494399 USNM); ... Sendero a Cerro Echandi, 1580 m, LS 322900 591050, 28 Feb 1998, B. Gamboa, Lot# 49699 (1♂ INBIOCRI002601043 USNM); P. I. La Amistad, Coto Brus, Estación Pittier, 1670 m, LS 330900 577400, 23 Aug–9 Sep 1995, M. Moraga, lot # 5400 (1♀ INBIOCRI002250253 INBIO); ... San Vito, Fila Cruces, 1800 m, LS 304000 572200, 24 ENE 1996, I. A. Chacón (1♂ INBIOCRI001150135 INBIO). Alajuela: La Fortuna, Cerro Chato, 1100 m, LN 269500 460900, 4 Feb–4 Mar 1998, G. Carballo, Malaise trap, lot# 49974 (1♂ INBIOCRI002417348 INBIO); R. B. San Ramon, 800 m, LN 244100_472100, March 1995, G. Carballo, Lot# 5452 (1♂ INBIOCRI002386904 INBIO); Parque Nacional Guanacaste, Estación San Ramón, 620 m, LN 318100 381900, 22 Jul–24 Aug 1994, F. Hurtado García, Malaise trap, lot # 3359, (1♀ INBIOCRI002079698 INBIO); Sector Cerro Chato, 1100 m, LN 269500_460900, 6 Jan–4 Feb 1998, G. Carballo, Lot# 49751 (1♀ INBIOCRI002412837 INBIO); ... 18 Sept–3 Nov 1997, Lot# 48834 (1♀ INBIOCRI002408596 INBIO); Sector Colonia Palmarena, 9 km SO de Bajo Rodriguez, 700 m, LN 245900_475900, 3 Jan 1996, G. Carballo, Lot# 7197 (1♀ INBIOCRI002433294 INBIO). San José: P N Braulio Carillo, 9.5 km E Tunnel, 1000 m, Mar–Apr 1990, P. Hanson, Malaise Trap (1♀ USNMENT 00030157 MIUCR) (3♀♀ Hanson, 2♂♂ 1♀♀ INBio). Cartago: Madreselva, Finca Los Lagos, 2600 m, LN 550050 184450, Dec 1993, M. M. Chavarría, Malaise trap, lot # 2602, (1♀ INBIOCRI002079945 INBIO). PERU: Cuzco, Quincemil, 700 m, 1–15 Nov. 1962, L. Pena (1♀ CNC). BOLIVIA: Cochabamba, Oct. 1965, F. Steinbach (1♀ CNC); El Limbo, 2200 m, 65°36'W, 17°97'S, Nov. 1963, F. Steinbach (1♀ CNC).

Derivation of specific epithet. The epithet, '*apis*', is from the Latin, '*Apis*', for the honey bee and is to be treated as a noun in apposition.

Remarks. *Mallota apis* Thompson spec. nov. is related to *aberrans* Shannon but is readily distinguished by the microtrichose alula.

Mallota bequaerti Hull, 1956

Mallota bequaerti Hull, 1956 – Hull 1956: 24. USA, Texas, Chisos Mountains, Big Bend National Park. HT ♂ MCZ. Wirth et al. 1965: 621 (cat. cit.); Thompson 2002: (cat. cit.).
?*Mallota sackeni*: Williston 1892: 70 (Mexico, Guanajuato).

Male and **female**. **Head**: Black except in some individuals face reddish laterally; face shiny medially and ventrally, silvery-white pollinose dorsally and laterally, white pilose laterally; gena shiny and bare anteriorly, silvery-white pollinose and white pilose posteriorly; lunule brownish black; frons shiny medially, silvery-white pollinose laterally, white pilose; vertex shiny, black pilose; eye bare; male broadly dichoptic, with eyes separated by width of ocellar triangle; antenna black, black pilose; basoflagellomere with small basoventral sensory pit on mesial surface, with pit slightly smaller than aristal diameter; arista yellow; occiput silvery white pollinose, white pilose becoming yellow dorsally, with a few black pili intermixed on dorsal 1/5.
Thorax: Black except scutellum yellow; postpronotum and scutum gray pollinose, densely yellow pilose; scutellum densely yellow pilose; pleuron sparsely gray pollinose, yellow pilose except black pilose on anepimeron and with a few intermixed black pili on katepisternum; metasternum black pilose; spiracular fringes brown; plumula brown; calypter white; halter yellow with brown capitulum. **Legs**: Black except tarsi brownish with apical tarsomere of pro- and mesotarsi orange, black pilose. **Wing**: Hyaline except for large anteromedial black macula and basal costa, with black macula beginning in stigma area extending across r-m crossvein, apical ½ of cell R, apical 1/3 of cell BM, basal portion of cell DM and base of cell CuA1; microtrichose except bare basal half cell R, anterobasal 2/3 of cell BM, narrowly along anterior margin of cell CuP and anterior to vein A2; alula hyaline, microtrichose except narrowly bare basomedially; tegula black pilose.
Abdomen: Black, shiny except 1st segment gray pollinose; 1st tergum yellow pilose; terga 2 & 3 short black pilose, rarely with a few intermixed pale hairs laterally; terga 4–5 long yellow pilose; sterna yellow pilose medially, black pilose laterally.

Distribution: USA (Texas, Arizona*), Mexico*.

Material examined. USA. Arizona: Huachuca Mountains, Sunyside, 8–12 July 1940, D. G. HALL (1 ♀ USNMENT 00030180 USNM). MEXICO. Chihuahua: Sierra Madre, Headwaters of Río Piedras, about 7300 ft., 3 July, C. H. T. TOWNSEND (1 ♀ USNMENT 00030181 USNM); ... 17 July, on flowers of *Rhus glabra*, C. H. T. TOWNSEND (1 ♀ USNMENT 00030182 USNM).

Remarks. *Mallota bequaerti* is the sister species of *sackeni* WILLISTON, 1882 (western North America) and is undoubtedly a Nearctic species restricted to northern Mexico and southwestern USA. These two species and *bautias* WALKER, 1849 from eastern North America form a super species.

Mallota fuca THOMPSON spec. nov.

(Fig. 5a–c)

Male and **female**. **Head**: Black; face shiny on medial 1/4 on ventral 3/4, grayish-white pollinose ventrad to antenna and laterally, white and black pilose laterally; gena shiny and bare on anterior half, white pollinose and pilose posteriorly; lunule brownish black; frontal triangle shiny except very narrowly grayish-white pollinose along eye margin, black pilose except yellow pilose along eye margin; frons shiny on ventral 1/4, brown pollinose dorsally except narrowly grayish-white pollinose along eye margin, mainly yellow pilose, with black pile intermixed medially; vertical triangle golden-brown pollinose and yellow pilose on ventral 1/4, brownish-black pollinose and black pilose dorsally; vertex brownish-black pollinose, black pilose; male narrowly dichoptic, with eyes separated by slightly more than width of anterior ocellus, with length of approximation about 7–8 ommatidia; eye very sparsely and short pilose; occiput white pollinose and pilose on ventral half becoming brownish-black pollinose and with black pile intermixed on dorsal 1/4; antenna brownish black except basoflagellomere orange on basoventral 2/3, black pilose; basoflagellomere with a indistinct basoventral sensory pit on mesial surface, very small in male, about size of aristal diameter in female; arista yellow.
Thorax: Black except postpronotum and scutellum brownish orange; postpronotum yellow and black pilose; scutum sparsely grayish-white pollinose, with indistinct darker brown pollinose medial and submedial vittae, darker brown pollinose laterally, mainly brownish-orange pilose with black pile intermixed; scutellum shiny, yellow and black pilose; pleuron sparsely grayish-white pollinose except denser and whiter on dorsal katepisternum, posterior anepisternum and anterior anepimeron, white pilose except black pilose on dorsal 1/3 of anepisternum and brownish-orange pilose on anepimeron; spiracular fringes brownish orange; metasternum white pilose; plumula brownish orange, calypter brownish black; halter yellow. **Wing**: hyaline, microtrichose except bare on anterobasal 1/3 of BM and very narrowly along anterobasal 1/5 of CuP; tegula yellow and black pilose. **Legs**: Coxae black except procoxa brownish orange, white pollinose and pilose; trochanters brownish orange, white pilose except for a few scattered black pili on mesotrochanter and a patch of dense short black pile on metatrochanter; pro and mesofemora black except brownish yellow on basal 1/3 except dorsally, sparsely gray pollinose, white to yellow pilose except black pilose posteroventrally and on apical 1/3 of mesofemur; metafemur black except yellow on basal 1/3, shiny, black pilose except white pilose on basal 1/3 and apical 1/4; tibiae black, black pilose except white pile intermixed posteriorly on protibia, on apical 1/4 of mesotibia, on basal 1/4 of metatibia; protarsus blackish brown, black and yellow pilose; mesotarsus brownish orange, yellow pilose except black on apical tarsomere; metatarsus brownish orange except basitarsomere black, black pilose.

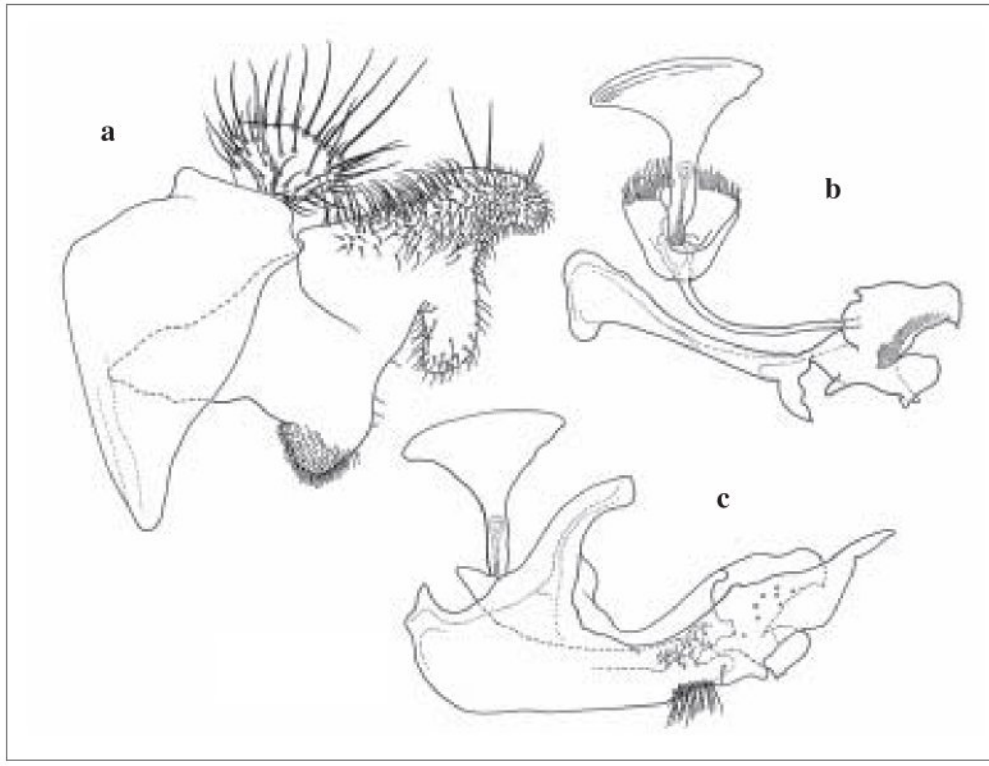

Fig. 5a–c: *M. fuca* THOMPSON spec. nov., male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

Abdomen: Terga brownish orange, with apical (3rd–5th) terga darker in some individuals; 1st tergum sparsely orange pollinose, orange pilose; 2nd tergum shiny, black pilose except brownish-orange pilose on basomedial 1/3 and some white pile laterally at base and apex; 3rd & 4th terga shiny, black pilose except white pilose laterally and with yellow pilose medial fasciae; 5th tergum sparsely gray pollinose, black pilose; 1st sternum black, grayish-white pollinose, white pilose; 2nd-4th sterna yellow to brownish, shiny, white pilose; 5th sternum brownish, sparsely gray pollinose, yellow and black pilose; male genitalia (Fig. 5) brownish orange to black, sparsely gray pollinose, black pilose.

Variation: The single Mexican specimen differs in having the pile entirely pale yellow on head and thorax, without the extensive black pile found in the Costa Rican material. However, as the male genitalia are identical, we include the specimen within our concept of the species.

Distribution: Mexico*, Costa Rica*.

Types: **Holotype** ♂: COSTA RICA: Puntarenas, Estación Progreso, NE de la Escuela Progreso, 800 m, LS 317700 594800, 20 Jul 1996, L. ANGULO, Lot# 7898 (1♂ INBIOCRI002469961) deposited in INBIO, Santo Domingo. **Paratypes**. MEXICO. Oaxaca: Km 90, Tuxtepec-Oaxaca, 9000 ft, 20 Aug 1984, A. IBARRA, (1♂ USNM ENT 00030696 UNAM). COSTA RICA. Guanacaste: Parque Nacional Guanacaste, Estación Pitilla, 9 km S de Santa Cecilia, LN 330200 380200, 6–17 Sep 1993, C. Moraga, lot #2344 (1♀ INBIOCRI001614943 INBIO); Estación Maritza, lado W de Volcan Orosi, 600 m, LN 326900 373000, 27 Feb 1992, M. I. ORTIZ, lot # 1505 (1♀ INBIOCRI001925222 INBIO); Río Góngora, 6 km NE de Quebrada Grande de Liberia, 700 m, LN 319700 376250, III Curso parataxon. (1♂ INBIOCRI000884249 USNM); Volcan Orosi, Lado O, Estación Maritza, 600 m, LN 326900_373000, 28 Feb–

10 March 1992, K. TAYLOR (1 ♀ INBIOCRI000394885 INBIO); Sector Cacao, Sendero a Cima, 1400–1500 m, LN 323800_37700, 25 Jan 1998, F. A. QUESADA, Lot# 49803 (1 ♀ INBIOCRI002602960 INBIO). Puntarenas: Monteverde, 1300 m, G. & M. WOOD (1 ♀ USNMENT 00030171 CNC); ... 1500 m, 25–30 Aug 1992, D. M. WOOD (1 ♂ USNMENT 00030172 CNC); Sabalito, Cerro Quijada del Diablo, 1950 m, LS 317400 600800, 11 Jul 2000, M ALFARO, Lot# 59062 (1 ♀ INB0003310318 INBIO), Coto Brus, Zona Protectora La Tablas, Estación Biológica Las Alturas, 1 km SE Cerro Quijada del Diablo, 1800 m, LS 317700 599800, 12 May 2000, M. ALFARO, Lot# 63213 (1 ♀ INB0003331396 USNM), San Luis, Finca Buen Amigo Monteverde, 4 km S de la Reserva, 1000–1350 m, LN 250850 449250, 1–12 Feb 1996, Z. FUENTES, lot# 6820 (1 ♀ INBIOCRI002368045 INBIO), Sendero Fila Cedro, 1900 m, LS 325100 590200, 25 Jul 1999, M ALFARO, Lot# 56965 (1 ♂ INB0003143655 USNM), Sendero Lechería abajo, 1320 m, LS 322100 598900, 30 Jul 1999, M. ALFARO, Lot# 57391 (1 ♂ INB0003165876 INBIO). San José: Estación Santa Elena, Las Nubes, 1210 m, LS 371750_507800, 5–21 July 1996, M. SEGURA, Lot# 78888 (1 ♀ INBIOCRI002469674 INBIO); San Gerardo de Dota, 26 Feb 1992, F. C. THOMPSON (1 ♀ USNMENT 00030173 USNM). Cartago: La Suiza, 8 Feb 1923, Pab. SCHILD (1 ♂ 1 ♀ USNMENT 00030169-70 USNM).

Remarks. *Mallota aberrans*, *apis* THOMPSON spec. nov. and *fuca* THOMPSON spec. nov. are all very similar in appearance, but easily separated by male genitalia (Figs 2, 4 & 5; differing most noticeably in shape of surstyle and superior lobe). *Mallota aberrans* is distinguished also by its partially bare alula. *Mallota fuca* differs from *apis* in being paler, without gray pollinose fasciae on abdominal terga, with pale pile on the apex of metafemur and pro- and mesotarsi extensively pale pilose.

Derivation of specific epithet. The epithet is from the Latin, '*fucus*', for drone and is to be treated as an adjective.

Mallota klepsvikae ZUMBADO spec. nov.

(Figs 1, 6a–c)

Male and **female**. **Head**: Black; tubercle and frontal prominence well developed, area between them concave; face shiny on medial half, grayish pollinose laterally and ventrad to antenna, black pilose; gena shiny and bare anteriorly, whitish pollinose and yellow pilose posteriorly; lunule black except brownish medially; frontal triangle shiny except narrowly grayish pollinose along eye margin, black pilose; frons shiny on ventral 1/3, brownish-black pollinose dorsally except narrowly white pollinose along eye margin, black pilose; eye bare; ♂ ♂ narrowly dichoptic, eyes separated by width of anterior ocellus; vertex brownish-black pollinose, black pilose; occiput blackish-gray pollinose except whitish-gray pollinose along eye margin, yellow pilose with some longer black pili on dorsal 1/4. Antenna: scape and pedicel black, black pilose; basoflagellomere whitish pollinose, subquadrate; arista bare, brown basally, brownish orange apically.
Thorax: Black; postpronotum dull grayish-black pollinose, yellow pilose; scutum dull black pollinose without any distinct pattern, black pilose, with yellow pile intermixed, especially on anterior, posterior and lateral margins, mostly black medially; scutellum narrowly black basally, brownish yellow apically, yellow pilose; anterior spiracular fringe brownish black; anepisternum black pilose with some yellow pile posterodorsally; katepisternum yellow pilose; anepimeron black pilose, intermixed with yellow pile medially and ventrally; posterior spiracular fringe yellowish brown; metasternum yellow pilose; calypter brownish black; halter brown; plumula light brown. **Legs**: Black; coxae yellow pilose except extensively black pilose on mesocoxa; trochanters shiny, black pilose; femora generally black pilose, yellow pilose posterobasally on profemur, anterobasal half and posterobasal 4/5 on mesofemur, dorsobasal 2/3 on metafemur, and with few long scattered yellow pili ventrally on metafemur; metafemur slightly arched medially; tibiae short black pilose except with some reddish-brown pile intermixed posteriorly on mesotibia; tarsi black pilose. **Wing**: Dark anteriorly, hyaline posteriorly, with brown area extending to vein M, darker at posterior side of vein C

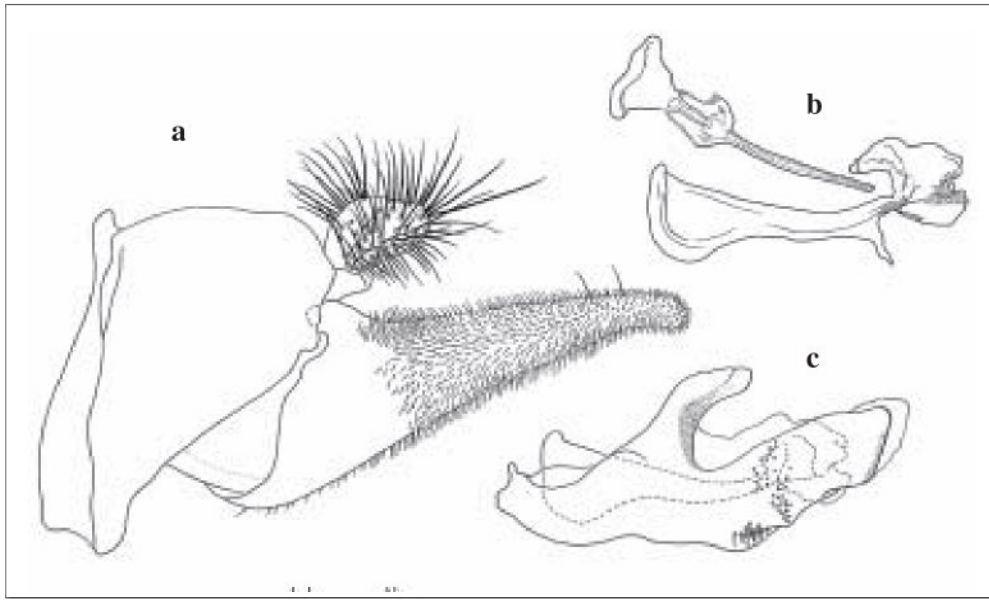

Fig. 6a–c: *Mallota klepsvikae* Zumbado spec. nov., male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

and at both sides of veins Sc, R_{2+3}, R_{4+5}, crossvein r-m and anterior side of vein M; microtrichose except on posteroapical margin of cell BM, basolateral margin of cell DM, most of cell CuP, basolateral section of cell CuA1, and both sides of vein A_2; alula bare except microtrichose anterobasally; tegula and basicosta black pilose.

Abdomen: Black, except yellow lateral margin of 1st tergum and basolateral triangular macula on 2nd tergum, black pilose dorsally except yellow pilose on posteromedial 1st tergum and 2nd tergum anterior 3/4, with some reddish pile intermixed posteromedially on 2nd tergum; 1st tergum yellowish white pollinose medially; sterna sparsely gray pollinose; 1st–3rd sterna sparsely yellow pilose, 4th sternum long black pilose, with yellow pilose intermixed on posterior margin; male genitalia (Fig. 6) black pollinose and pilose; female terminalia black pilose.

Distribution: Mexico*, El Salvador*, Guatemala*, Costa Rica*.

Types. **Holotype** ♂: COSTA RICA, Puntarenas, Monteverde area, 1400–1700 m, ♂♂, 6–14 June 1973, T. Erwin & G. Hevel, USNMENT 00030163, deposited in USNM, Washington. **Paratypes**: MEXICO. Chiapas, Municipio Motozintla, ridge between Cerro Boqueron & Niquivil, 2438–2743 m, 15 Dec 1976, D. E. & J. A. Bredlove (1♂ USNM ENT 00030695 CAS). EL SALVADOR. Monte Cristo, 25 Mar 1978, D. R. Barger (2 ♂♂ USNMENT 00030158-59 USNM). GUATEMALA. Chicacao, 3 Aug 1949, T. H. Farr (1♂ USNMENT 00030160 USNM). COSTA RICA. Guanacaste: Sector Cacao, Sendero a la Cima, 1400–1500 m, LN 323800 37700, 13 April 1997, D. H. Janzen Gusaneros, lot # 50730 (12 ♂♂ 2 ♀♀ INBIO003012352-65 INBIO) Heredia: Vara Blanca, Finca Georgina, 2100 m, Jan–Feb 1990, P. Hanson, Malaise Trap (1♀ USNMENT 00030168 BMNH). Puntarenas: Monteverde, 1842 m, 22 Aug 1991, D. M. Wood (1♀ USNMENT 00030161 CNC); ... 1799 m, 20 Aug 1991, D. M. Wood (1♂ USNMENT 00030162 CNC); Monteverde, Cerro Chomogo, 1800 m, LN 256400 448250, 1 Sep 1996, M. A. Zumbado, lot # 8502 (1♂ INBIOCRI002475935 INBIO); ... 27 May 1998, M. Zumbado, Lot# 50728 (2 ♂♂ INB0003051030-31 INBIO); Zona Protectora Las Tablas, Estación Las Alturas, Cerro Chai, 2000 m, LS 324500_592100, 1 April 2000, M. Alfaro, Lot# 56447 (5 ♂♂ INB0003078035-39 INBIO); Coto Brus, Zona Protectora Las Tablas, Sura, 2100 m, LS 323300_601500, 29 March 2000, M. Alfaro, Lot# 56443 (1♀ INB0003077879 INBIO); Buenos Aires, Estación Altamira, Quemado, 2279 m, LS 336200_575560, 22 June 1999, A. Picado, Lot# 53806 (1♂ INB0003043374 INBIO); Golfo Dulce, 3 km SW Rincon, 10 m, Mar 1991, P. Hanson, Malaise Trap (2 ♀♀ USNMENT 00030164-5 MIUCR); sendero a Cerro

Echandi, sobre la fila, 2600 m, LS 329700 593100, 13–14 April 1998, E. NAVARRO, lot # 51634 (1♂ INBIO003016588 INBIO). San José: Cerro de la Muerte, 16 km S Empalme, 2600 m, Mar–Jun 1990, P. HANSON, Malaise Trap (1♀ USNMENT 00030167 BMNH); Zurquí de Moravia, 1600 m, Apr 1991, P. HANSON, Malaise Trap (1♀ USNMENT 00030166 MIUCR); Perez Zeledon, P. N. Chirripó, Sabana Leones, 3160 m, LS 375350_517290. 27 Jan 2000, M. ALFARO, Lot# 56272 (1♂ INB0003081499 INBIO); ... Llano Bonito, 2150 m, LS 378500_513200, 31 Jan 2000, M. ALFARO, Lot# 56277 (1♂ INB0003081585 INBIO). Cartago: Reserva Forestal Rio Macho, Alto Robles, 8 km S de Orosi, 2200 m, LN 190000_552300, 16 Feb 2000, M. ALFARO, Lot# 552300 (1♂ INB0003081487 INBIO).

Remark. The two female specimens from Golfo Dulce are probably mislabeled as all other Costa Rican records are from higher elevations (1100 to 3160 m).

Derivation of specific epithet. This species is named for Mrs. Ingunn KLEPSVIK, the Norwegian Ambassador to Costa Rica, Nicaragua and Panama, in recognition of the support her country has provided INBIO and Costa Rica for the study of its biota.

Mallota margarita WILLISTON, 1892

(Fig. 7a–c)

Mallota margarita WILLISTON, 1892 – WILLISTON 1892: 70. Mexico, Guerrero, Omilteme, 8000 ft. LT ♂ BMNH design. THOMPSON 2002. GIGLIO-TOS 1893: 63 (citation); ALDRICH 1905: 395 (cat. cit.); KERTÉSZ 1910: 269 (cat. cit.); GROSSBECK 1912: 376 (3 syntypes in AMNH); CURRAN 1940: 12 (key reference); FLUKE 1957: 128 (cat. cit.); THOMPSON et al. 1976: 100 (cat. cit.); THOMPSON 2002: (cat. cit., lectotype designation).

Male. **Head**: Black; face shiny medially and ventrally, silvery-white pollinose dorsally and laterally, black pilose laterally; gena shiny and bare anteriorly, silvery-white pollinose narrowly along eye margin posteriorly, brownish and black pilose except for a few yellow pili posteriorly; lunule brownish black except anterior edge orange; frontal triangle shiny medially, silvery-white pollinose laterally, brownish pollinose posteromedially, black pilose; vertical triangle black pollinose and pilose; eye bare; male broadly dichoptic, with eyes separated by width of ocellar triangle; antenna black, black pilose; basoflagellomere with small basoventral sensory pit on mesial surface, with pit slightly smaller than aristal diameter; arista brownish yellow; occiput silvery white pollinose narrowly along eye margin, brownish-black pollinose elsewhere, black pilose.
Thorax: Black, black pilose; scutum black pollinose with indistinct gray pollinose submedial vitta; scutellum black pollinose; spiracular fringes black; plumula black; calypter black; halter brown with black capitulum. **Legs**: Black, black pilose. **Wing**: black except apical 1/5 hyaline, densely microtrichose; alula black, microtrichose; tegula black pilose.
Abdomen: Black; 1st–3rd terga black pollinose, black pilose except for a few yellow pili intermixed on apex of 3rd tergum; 4th tergum black pollinose, yellowish-orange pilose; sterna subshiny, sparsely black pollinose; yellow pilose; male genitalia (fig. 7) gray pollinose, sparsely short white pilose.

Female. Unknown.

Distribution: Mexico*.

Material examined: MEXICO. Chiapas: San Cristóbal, 7000 ft., 15 June 1969, J. W. BOYES (1♂ CNC). Guerrero: Xucumanatlán, 7000 ft., July, H. H. SMITH (1 Paralectotype ♂ CNC; 1 Paralectotype ♂ AMNH); Omilteme, 8000 ft., July, H. H. SMITH (Lectotype ♂ BMNH, 1 Paralectotype ♂ AMNH).

Remarks. *Mallota margarita* is most closely related to *mystacia* FLUKE.

Mallota mystacia FLUKE, 1939

(Fig. 8a–c)

Mallota mystacia FLUKE, 1939 – FLUKE 1939: 372. Panama, Chiriquí, El Volcán. HT ♂ AMNH. CURRAN 1940: 12 (key reference); FLUKE 1957: 128 (cat. cit.); THOMPSON et al. 1976: 100 (cat. cit.).

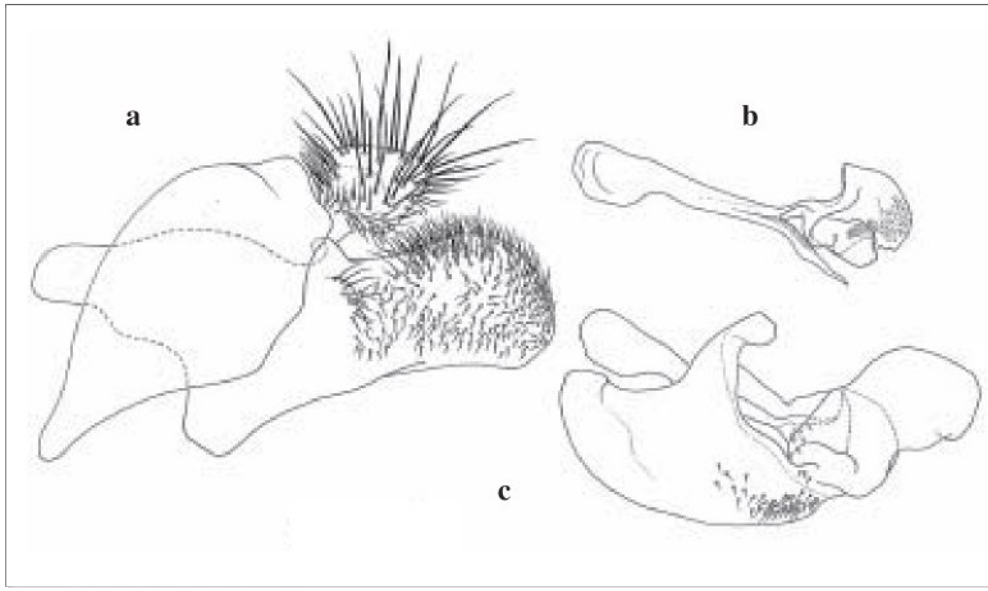

Fig. 7a–c: *M. margarita* Williston, male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

Male and female. Head: Black; face shiny medially and ventrally, grayish-white pollinose dorsally and laterally, black pilose laterally; gena shiny and bare anteriorly, grayish-white pollinose narrowly along eye margin posteriorly, black pilose; lunule black except anterior edge brown; frontal triangle shiny medially, grayish-white pollinose laterally, black pollinose posteromedially, black pilose; vertical triangle black pollinose and pilose; eye bare; male broadly dichoptic, with eyes separated by width of ocellar triangle; antenna black, black pilose; basoflagellomere with small basoventral sensory pit on mesial surface, with pit slightly smaller than aristal diameter; arista brownish black basally, brownish orange apically; occiput silvery pollinose narrowly along eye margin, black pollinose elsewhere, black pilose. **Thorax**: Black, black pilose except apically margin of scutellum broadly yellowish white pilose; scutum black pollinose with indistinct gray pollinose submedial vitta and narrow shiny broadly interrupted sublateral vitta; scutellum black pollinose; spiracular fringes black; plumula black; calypter black; halter black. **Legs**: Black, black pilose. **Wing**: Black except apical 1/5 hyaline, densely microtrichose; alula black, microtrichose; tegula black pilose. **Abdomen**: Black; 1st & 2nd terga black pollinose, black pilose; 3rd tergum black pollinose, yellowish-white pilose except black pilose basally in some specimens; 4th tergum black pollinose, yellowish-white pilose; sterna subshiny, sparsely black pollinose; yellowish-white pilose except 3rd & 4th sterna black pilose; male genitalia (Fig. 8) grayish-brown pollinose, sparsely short black pilose.

Distribution: Costa Rica*, Panama*.

Material examined. COSTA RICA. Heredia: Parque Nacional Braulio Carrillo, Estación Barva, 2500 m, LN 233400 523200, Apr 1990, A. Fernandez (1 ♂ INBIOCRI000213102 INBIO). Puntarenas: Estación Biologica Las Alturas, sendero a Cerro Echandi, 1580 m, LS 322900 591050, 28 Feb 1998, A. Picado, lot # 49687 (1 ♀ INBIOCRI002600688 INBIO); Monteverde, 1500 m, 30 Aug 1993, E. R. Barr, Malaise Trap (1 ♀ INBIOCRI001116500 USNM), ... 1842 m, 22 Aug 1991, D. M. Wood (1 ♀ USNMENT 00030154 CNC); Monteverde, San Luis, Finca Buen Amigo, 4 km S de la Reserva, 1000–1350 m, LN 250850 449250, 25 Nov–10 Dec 1996, Z. Fuentes (1 ♀ INBIOCRI002487926

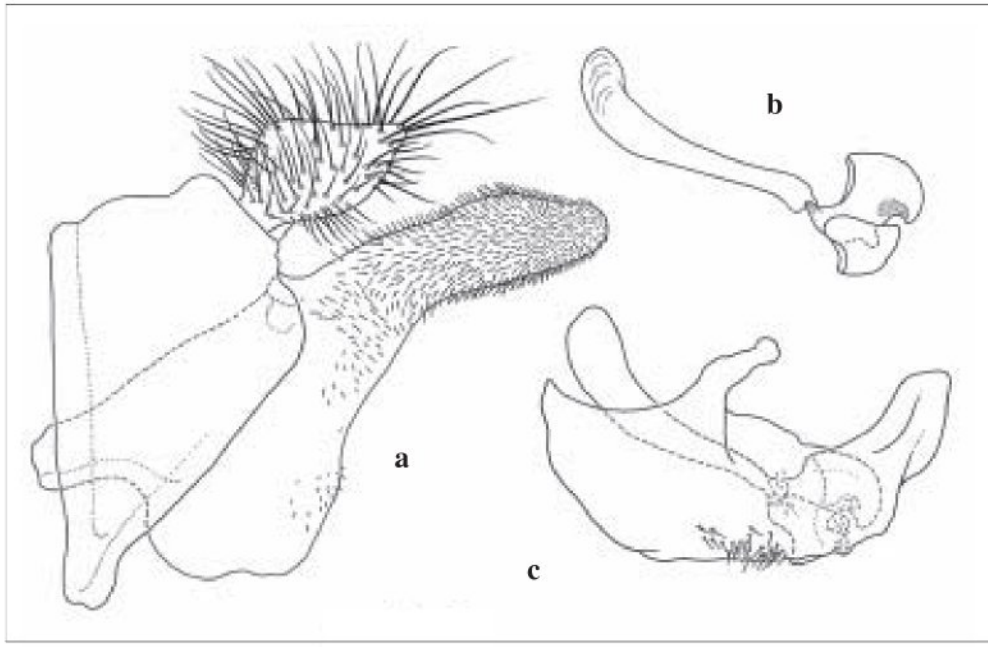

Fig. 8a–c: *Mallota mystacia* FLUKE, male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

INBIO); ... 20 Dec 1997–10 Jan 1998, Z. Fuentes, "vistando flores de frambuesa se comporta como *Bombus*" (1♂ INBIOCRI002594816 USNM); ... Apr 1995, Z. FUENTES, Red de Golpe, Lot # 4801 (1♂ INBIOCRI002202647 INBIO). San José: Zurquí de Moravia, 1600 m, Oct–Dec 1989, P. HANSON, Malaise Trap (1♀ USNMENT 00030153 MIUCR). PANAMA. Chiriquí: El Volcán (Holotype ♂ AMNH).

Remarks. *Mallota margarita* and *mystacia* are very similar in appearance. They differ only in that *mystacia* has more extensive pale pile, including some on the scutellar margin and more extensively on abdomen, with the 3rd tergum extensively pale pilose and its pale pile more white than orange.

Mallota smithi WILLISTON, 1892

(Fig. 9a–c)

Mallota smithi WILLISTON, 1892 – WILLISTON 1892: 70. Mexico, Guerrero, Omilteme, 8000 ft. Lectotype ♂ BMNH design. THOMPSON 2002. GIGLIO-TOS 1893: 63 (citation); ALDRICH 1905: 395 (cat. cit.); KERTÉSZ 1910: 269 (cat. cit.); GROSSBECK 1912: 376 (4 syntypes in AMNH); CURRAN 1940: 12 (key reference); FLUKE 1957: 128 (cat. cit.); THOMPSON et al. 1976: 100 (cat. cit.); COOPER & CUMMING 1993: 61 (Syntype ♂ in CNC); THOMPSON 2002: (cat. cit., lectotype designation).

Male and female. Head: Black except brownish orange laterally on face and lower frons; face shiny medially and ventrally, silvery-white pollinose dorsally and laterally, yellow pilose laterally; gena shiny & bare anteriorly, silvery-white pollinose posteriorly, yellow pilose; lunule brownish black to orange; frontal triangle shiny apicomedially, grayish-white pollinose elsewhere, black pilose; frons brownish orange on ventral 2/3, black dorsally, shiny basomedially on ventral 1/3, grayish-white pollinose laterally, grayish-black pollinose dorsomedially, black pilose; vertical triangle and vertex black pollinose and pilose; eye bare; male dichoptic, with eyes separated by slightly less than width of ocellar triangle; antenna

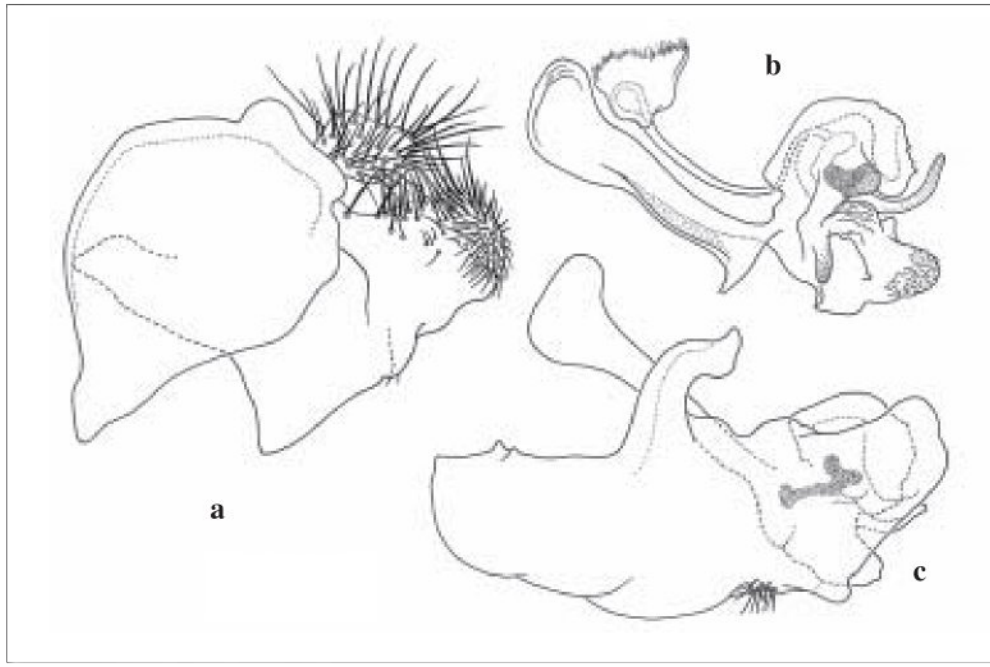

Fig. 9a–c: *M. smithi* WILLISTON, male genitalia. – **a**: 9th tergum and associated structure, lateral view; – **b**: Aedeagus and associated structures, lateral view; – **c**: 9th sternum and associated structures, lateral view.

black except basoflagellomere brownish orange, black pilose; basoflagellomere with very small basoventral sensory pit on mesial surface, with pit much smaller than aristal diameter; arista yellow; occiput silvery white pollinose, yellow pilose except becoming black pilose on dorsal 1/3.

Thorax: Black except scutellum yellow, yellow to yellowish-orange pilose; scutum gray pollinose; scutellum very sparsely black pollinose basomedially, elsewhere sparsely grayish pollinose which does not obscure yellow ground color; spiracular fringes brown; plumula and calypter brownish orange; halter orange. **Legs**: Black except brownish orange on profemur sometimes (mainly ♀♀) posteriorly, mesofemur basally and posteriorly, and metafemur on basal 1/3 to 2/3; coxae grayish pollinose, yellow pilose; trochanters yellow and black pilose; femora gray pollinose except shiny on apical half of metafemur, black pilose except yellow pilose on basoposterior ½-3/4 of profemur, basoposterior 4/5 of mesofemur, basal half–2/3 of metafemur; tibiae and tarsi black pilose. **Wing**: Hyaline except brownish apicomedially, microtrichose except bare on posterobasal 1/3 of cell C, narrowly on posterior basal 1/4 of cell R, posterobasal 2/3 of cell BM, anterobasal 1/4 of cell CuP; alula microtrichose; tegula yellow and black pilose.

Abdomen: Orange except for narrow interrupted black fascia on apex of 1st and base of 2nd tergum; 1st tergum sparsely grayish-yellow pollinose, yellow pilose; 2nd–4th terga shiny, yellow pilose laterally and on basolateral 2/3, black pilose on apicomedial 1/3, in female almost entirely yellow pilose; 1st sternum gray pollinose, white pilose; 2nd–4th sterna shiny, white to yellow pilose; male genitalia (Fig. 9) shiny, mainly long black pilose, with some intermixed yellow pile.

Distribution: Mexico*.

Material examined. MEXICO. Guerrero, Omilteme, 8000 ft., July, H. H. SMITH [Type series: BMNH (LT ♂), AMNH (2♂♂ 1♀), CNC (1♂)].

'*Mallota* spec. 6' [VOCKEROTH]

This species is related to *M. albipilis* SNOW, 1895. It is known from a pair of specimens collected in Mexico (Durango, 10 miles west of El Salto, 9,000 feet) and now in the Canadian National Collection.

Acknowledgments

We thank Paul ARNAUD, Department of Entomology, California Academy of Sciences, San Francisco (CAS); Paul HANSON, Museo de Insectos, Universidad de Costa Rica, San Pedro de Montes de Oca, San Jose (MIUCR); A. CONTRERAS-RAMOS, Instituto de Biología, Universidad Nacional Autónoma de Mexico, Mexico (UNAM); David GRIMALDI, American Museum of Natural History, New York (AMNH); Richard VANEWRIGHT, The Natural History Museum [formerly the British Museum (Natural History)], London (BMNH); Philip PERKINS, Museum of Comparative Zoology, Cambridge (MCZ); J. CUMMING and J. R. VOCKEROTH, Canadian National Collection, Ottawa (CNC); for permission to study material in their care [other collection acronyms used are: INBIO for Instituto Nacional de Biodiversidad, Santo Domingo, USNM for United States National Museum, Washington].

The male genitalia figures were done by Taina LITWAK; the color habitus was prepared by Claudia ARAGÓN and as copyright holder of this image she hereby makes it available for non-commercial and scientific use only.

We also thank our technical support team: Kyle APIGIAN, Systematic Entomology Laboratory and Elvia ZUMBADO, Institudo Nacional de Biodiversidad for assistance in recording data, preparing the plates and maps, and many other critical tasks too numerous to list; and the parataxonomists for collecting and preparing most of the specimens studied.

Thanks are also due Drs Stephen GAIMARI, Plant Pest Diagnostics Branch, California Department of Food and Agriculture, Sacramento; Michael E. SCHAUFF, Allen NORRBOM, and Thomas J. HENRY, Systematic Entomology Laboratory, USDA, Washington; for their critical reviews of the manuscript.

This paper is the 9th in a series dedicated to the documentation of the Costa Rican flower fly fauna, started in 1991 with the encouragement of Daniel H. JANZEN. Beyond the support of our organizations, additional funding has been provided by the S. W. Williston Diptera Research Fund of the Smithsonian Institution and the Global Environmental Facility Trust Fund of the World Bank (project# CR-GE-39876). FCT conceived and designed the overall series and has done most of the taxonomy; MAZ described two of the new species, provided the biological information, and contributed to as well as verified the taxonomy.

Literature

ALDRICH, J. M. (1905): A catalogue of North American Diptera. – Smithsonian Miscellaneous Collections 46 (2[= pub. 1444]), 680 pp.; Washington [before 1905.05.25].

COOPER, B. E. & CUMMING, J. M. (1993): Diptera types in the Canadian National Collection of Insects. Part 2 Brachycera (exclusive of Schizophora). – Research Branch, Agriculture Canada, Publ. 1896/B, iv + 105 pp; Ottawa.

CURRAN, C. H. (1940): Some new Neotropical Syrphidae (Diptera). – American Museum Novitates **1086**, 14 pp.; New York [1940.10.16].

FLUKE, C. L., Jr. (1939): New Syrphidae (Diptera) from Central and North America. – Annals of the Entomological Society of America **32**: 365–375; Washington [1939.06.30].

FLUKE, C. L., Jr. (1957): Catalogue of the family Syrphidae in the Neotropical Region (Diptera) [part]. – Revista Brasileira Entomologia **7**: 1–181; São Paulo [1957.06.20].

GIGLIO-TOS, E. (1893): Ditteri del Messico. – Pt. 2, 80 pp.; Torino: C. Clausen [1893.03.31].

GROSSBECK, J. A. (1912): Types of insects, except Lepidoptera and Formicidae, in the American Museum of Natural History additional to those previously listed. – Bulletin of the American Museum of Natural History **31**: 353–379; New York [1912.12.12].

HULL, F. M. (1956): A new Southwestern species of *Mallota* MEIGEN (Diptera: Syrphidae). – Psyche **63**: 24–26; Cambridge [1956.10.11]

KERTÉSZ, K. (1910): Catalogus dipterorum hucusque descriptorum. – Vol. 7, 470 pp. Museum Nationale Hungaricum, Budapestini [= Budapest] [1910.06.??].

Maier, C. T. (1978): The immature stages and biology of *Mallota posticata* (Fabricius) (Diptera: Syrphidae). – Proceedings of the Entomological Society of Washington **80**: 424–440; Washington. [1978.07.18]

Meigen, J. W. (1822): Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. **2**: 416 pp.; Hamm: Schultz [1822.09.??].

Rondani, C. (1845): Ordinamento sistematico del generi italiani degli insetti ditteri. – Nuovi Annali delle Scienze Naturali **1844**(2): 443–459 [part]; Bologna. [1845.01.16]

Rondani, C. (1857): Dipterologiae Italicae prodromus. Vol. II: Species italicae ... Pars prima. Oestridae: Syrphidae: Conopidae. – 264 pp., Parmae [= Parma]: A. Stocche [after 1857.09.20].

Shannon, R. C. (1927): A review of the South American two-winged flies of the family Syrphidae. – Proceedings of the United States National Museum **70**(9 [2658]), 34 pp., 1 pl.; Washington [1927.04.29].

Thompson, F. C. (1972): A contribution to a generic revision of the Neotropical Milesinae (Diptera: Syrphidae). – Arquivos de Zoologia **23**: 73–215; São Paulo [1972.12.14].

Thompson, F. C. (1981): The flower flies of the West Indies (Diptera: Syrphidae). – Memoirs of the Entomological Society of Washington **9**: 200 pp.; Washington [1981.09.02].

Thompson, F. C. (1999): A key to the genera of the flower flies of the Neotropical Region including the descriptions of genera and species and a glossary of taxonomic terms. – Contributions on Entomology, International **3**: 319–378; Gainesville. [1999.08.23]

Thompson, F. C. (2002, in press): Nearctic Flower Flies (Diptera: Syrphidae). – Myia **13** [2002.??.??]

Thompson, F. C., Vockeroth, J. R. & Sedman, Y. S. (1976): Family Syrphidae. – Catalog of the Diptera of America south of the United States **46**: 195 pp.; São Paulo [1976.08.09].

Williston, S. W. (1892): Fam. Syrphidae. – Pp. 1–56, [1891.12.??] [cont.]. – In: Godman, F. D. & Salvin, O. (eds): Biologia Centrali-Americana. Zoologia-Insecta-Diptera **3**: 127 pp., 2 pls.; London.

Wirth, W. W.; Sedman, Y. S. & Weems, H. V., Jr. (1965): Family Syrphidae. – U. S. Deptartment of Agriculture, Agricultural Handbook **276**: 1696 pp.; Washington [1965.08.23].

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The paper was accepted on 20 February 2002.
Editum: 15 September 2002.

Buchbesprechung
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