



## Research Note

### A check list of necrophagous flies (Diptera: Calyptratae) from urban area in Medellín, Colombia

#### Lista de moscas necrófagas (Diptera: Calyptratae) del área urbana del municipio de Medellín, Colombia

Jorge Alberto Salazar-Ortega, Eduardo Amat y Luz Miryam Gomez-Piñerez✉

Grupo de Investigación en Ciencias Forenses y Salud, Tecnológico de Antioquia-Institución Universitaria, Medellín, Colombia, Calle 78B N 72A-220 of 5-124.

✉ lgomez@tdea.edu.co

**Abstract.** An updated checklist of necrophagous flies (Diptera, Calyptratae) occurring in the urban area of Medellín-Colombia is presented. 27 species belonging to 4 families are reported. Data were obtained from field work and recent bibliography references.

Key words: forensic entomology, carrion, Calliphoridae, Sarcophagidae, inventory.

**Resumen.** Se presenta una lista actualizada de moscas necrófagas (Diptera, Calyptratae) presentes en el área urbana del municipio de Medellín. Se registran 27 especies incluidas en cuatro familias. Los datos se obtuvieron a partir de recolectas en campo y referencias bibliográficas.

Palabras clave: entomología forense, carroña, Calliphoridae, Sarcophagidae, inventario.

Diptera is one of the mega diverse order of insects and encompasses approximately 152 000 described species (Courtney et al., 2009). In the neotropical region, near to 24 000 species had been reported (Amorim et al., 2002). This order of insects is one of the most diverse ones concerning to morphology and habits. This group includes pollinators, predators, parasitoids, decomposers of plant and animal organic matter playing an important ecological role in the recycling of elements in the ecosystems (Hanski, 1987), and some others that could transmit diseases behaving as mechanical vectors (Skevington and Dang, 2002; Brown et al., 2009). Calyptratae flies (Diptera, Brachycera) are comprised of approximately 18 000 species worldwide and includes blowflies (Calliphoridae), fleshflies (Sarcophagidae) and house flies (Muscidae) among others. These families are of significant importance from the forensic point of view due to their decomposer and synanthropic habits. Unfortunately, no official data on species richness for calyptratae species are available for Colombia.

In the last 2 decades, carrion feeding arthropods mainly calyptratae flies had been used in forensic entomology to

establish circumstances of death in legal cases (Smith, 1986; Cats and Haskell, 1990; Greenberg, 1991). Studies of forensic entomology emphasize the importance of the families Calliphoridae, Muscidae, Sarcophagidae and Fanniidae among others due to their ecological traits, including its predominance in colonizing corpses (Catt and Goff, 1992). In Colombia, studies on decomposer or necrophagous flies had been focused on forensic entomology development, but unfortunately no local comprehensive inventories of this fauna had been done.

In Medellín, the most important studies have been those by Restrepo et al. (2000), Wolff et al. (2001) and Pérez et al. (2005) on pig corpses; but in some cases, taxonomic identification at species level have not been achieved. In order to offer a faunistic tool to forensic entomology development and further ecology studies, an updated check list of necrophagous flies recorded in the city of Medellín, Colombia based on field work and bibliography references is presented.

Flies were collected from October to December in 4 sites: a restaurant area (AR) 6°12'31.8" N, 75°34'04.4" W, a residential complex (RC) 6°15'27.6" N, 75°34'44.2" W, a marketplace (MP) 6°15'26.2" N, 75°34'29" W, and a slaughterhouse (SH) 6°18'06.4" N, 075°33'45.7" W. At each site, 2 McPhail modified traps were baited with

**Table 1.** Carrion-feeding flies (Diptera, Calypttratae) from Urban Area in Medellín, Colombia

<i>Species</i>	<i>Locality (in this study)</i>	<i>Date (month)</i>	<i>Reference</i>
Calliphoridae family			
<i>Chrysomya albiceps</i> (Wiedemann, 1819)	AR, RC, SH	Apr-Dec	Wolff et al., 2001, 2004; Pérez et al., 2005
<i>Chrysomya megacephala</i> (Fabricius, 1794)	All	Apr-Dec	Pérez et al., 2005; Wolff et al., 2004
<i>Cochliomyia macellaria</i> (Fabricius, 1775)	-	Apr-Dec	Wolff et al., 2001; Pérez et al., 2005
<i>Comptosyiops verena</i> (Walker, 1849)?	-	Jan	Amat, 2009
<i>Comptosyiops</i> sp.	-	Oct	Pérez et al., 2005
<i>Hemilucilia semidiaphana</i> (Rondani, 1850)	AR	Dec	
<i>Lucilia cluvia</i> (Walker, 1849)?	-	Jan-Aug	Giraldo, 2007
<i>Lucilia cuprina</i> (Wiedemann, 1819)	All	Oct-Dec	
<i>Lucilia eximia</i> (Wiedemann, 1819)	-	-	Velez and Wolff, 2008
<i>Lucilia peruviana</i> Robineau-Desvoidy, 1830	AR, RC	Sept-Oct	
<i>Lucilia sericata</i> (Meigen, 1826)	-	Oct, Dec	Wolff et al., 2004; Pérez et al., 2005
<i>Lucilia</i> sp.	AR, RC, SH	Oct, Dec	
Fanniidae family			
<i>Euryomma</i> sp. 1†	-	Aug	Grisales, 2010
<i>Euryomma</i> sp. 3†	-	May	Grisales, 2010
<i>Fannia canicularis</i> (Linnaeus, 1761)*?	-	Oct	Pérez et al., 2005
<i>Fannia dodgei</i> (Seago, 1954)	-	May	Grisales, 2010
<i>Fannia pusio</i> (Wiedemann, 1830)	-	May, Nov	Grisales, 2010
<i>Fannia trimaculata</i> (Stein, 1898)	-	Fev, Jun, Dec	Grisales, 2010
<i>Fannia scalaris</i> (Fabricius, 1794)*?	-	-	Wolff et al., 2004
<i>Fannia</i> sp.	All	Oct, Dec	Wolff et al., 2001
Muscidae family			
<i>Atherigona orientalis</i> Schiner, 1868	All	Oct-Dec	
<i>Morellia</i> sp.	-	Oct	Wolff et al., 2001
<i>Musca domestica</i> Linnaeus, 1758	All	Oct-Dec	Wolff et al., 2004; Pérez et al., 2005
<i>Ophyra aenescens</i> (Wiedemann, 1830)	AR	Oct, Dec	
<i>Ophyra capensis</i> (Wiedemann, 1818)	-	Oct	Pérez et al., 2005
<i>Ophyra</i> sp.	-	Oct	Wolff et al., 2001
<i>Synthesiomyia</i> sp.	-	Oct	Pérez et al., 2005
Sarcophagidae family			
<i>Blaesoxipha plinthopyga</i> (Wiedemann, 1830)	MP	Oct	
<i>Oxysarcodexia bakeri</i> (Aldrich, 1916)	RC	Oct	
<i>Oxysarcodexia thornax</i> (Walker, 1849)	-	-	Buenaventura, pers comm.
<i>Oxysarcodexia</i> sp.	MP	Oct-Nov	Wolff et al., 2001; Pérez et al., 2005
<i>Peckia anguilla</i> (Curran and Walley, 1934)	-	Jun, Jul, Nov	Buenaventura and Pape in press
<i>Peckia chrysostoma</i> (Wiedemann, 1830)	-	Dec	Buenaventura and Pape in press
<i>Peckia collusor</i> (Curran and Walley, 1934)	-	May, Jun, Aug, Nov	Buenaventura and Pape in press
<i>Peckia ingens</i> (Walker, 1849)	-	-	Buenaventura, pers comm.
<i>Peckia intermutans</i> (Walker, 1861)	-	Nov	Buenaventura and Pape in press
<i>Peckia</i> sp. 1	MP, RC	Oct	
<i>Peckia</i> sp. 2	RC	Oct	
<i>Peckia</i> sp.	-	-	Pérez et al., 2005
<i>Lepidodexia</i> sp. ?	-	Feb	Buenaventura, 2006
<i>Ravinia</i> sp.	-	Oct	Pérez et al., 2005
<i>Sarcodexia lambens</i> (Wiedemann, 1830)	AR	Oct	
<i>Sarcophaga</i> sp.	-	Oct	Pérez et al., 2005
<i>Sarcophaga ruficornis</i> (Fabricius, 1794)	MP	Oct	

AR: area restaurant, MP: marketplace, RC: residential complex, SH: slaughterhouse. (\*= identified through immature stages, †= species undescribed and named with numbers in the original reference, ?= doubtful record).

rotten fish heads and chicken viscera (further details in Amat, 2010). The traps were operated 1 day from 10:00 to 14:00 hrs. Specimens collected were identified using the taxonomic keys of Chillcott (1961), Amat et al. (2008), Buck et al. (2009), Buenaventura et al. (2009), and Grisales (2010). Some Muscidae and Sarcophagidae specimens were identified by Dra. Couri and Mello-Patiu at Museu Nacional in Rio de Janeiro, Brazil. Specimens were mounted and deposited in the entomological collection of Tecnológico de Antioquia, Medellín, Colombia (CE-TDEA).

Twelve species were collected in this study, 11 of these are reported for the first time from Medellín. A total number of 29 species were summarized and listed, morphotypes identified at genus level are included (Table 1), Calliphoridae and Sarcophagidae being the richest families. Calliphoridae mainly represented by: 1), *Chrysomya albiceps* (Wiedemann, 1819), previously reported by Wolff et al. (2001) in Antioquia and currently reported in all natural regions of Colombia from 0 to 2 700 m asl by Amat (2009). 2), the introduced synanthropic latrine fly *Chrysomya megacephala* (Fabricius, 1794), previously reported in Colombia, in the provinces of Antioquia, Boyacá, Sucre, Vaupés, Bolívar, and Chocó (Pape et al., 2008). 3), the green bottlefly, *Lucilia cuprina* (Wiedemann, 1830), reported in the province of Antioquia by Pape et al. (2004). 4), *Lucilia peruviana* Robineau-Desvoidy, 1830 reported in Andean region mainly in Antioquia, Caldas and Risaralda provinces (Florez and Wolff, 2009), and 5), *Hemilucilia semidiaphana* (Rondani, 1850), reported in this study, for the first time in Medellín.

The family Muscidae was represented by: 1), *Atherigona orientalis* Schiner, 1868, genus previously reported in the Province of Antioquia by Pérez (2007). 2), *Musca domestica* Linnaeus, 1758, a widely distributed specie, and 3), *Ophyra aenescens* (Wiedemann, 1830), reported in this study for the first time in the urban area of Medellín, although the genus was reported previously in the Province of Antioquia by Pérez (2007).

The family Sarcophagidae (Fleshflies) was mainly represented by the genera *Oxysarcodexia* and *Peckia*, both taxa widely distributed in Colombia, were previously reported by Pape et al. (2004) and Buenaventura et al. (2007). Neotropical *Peckia* species, found here, were recently reviewed and keyed by Buenaventura and Pape (in press). *Blaesoxipha plinthopyga* is previously reported from Antioquia (Pape et al., 2004). *Sarcodexia lambens* previously reported in Chocó, Magdalena and Putumayo provinces, and finally *Sarcophaga ruficornis* reported in an insular area from Colombia by Buenaventura et al. (2007).

And finally, Fanniidae, with specimens that could not be identified at the species level, due to the fact that no males

were collected in order to review diagnostic characters. *Fannia* and *Euryomma* species reported here have been reviewed and keyed by Grisales (2010).

The entomofauna in the tropics is characterized to be rich in species and still underestimated (Gaston, 1991). Necrophagous flies communities found in Neotropical environments probably are not the exception in terms of species richness if compared with other studies in the holarctic region whose assemblages comprise only a few number of species, usually dominated by 1 to 3 species (Hanski, 1987).

The composition of species presented in this study may serve as baseline for future ecological research in a multidimensional scale, and will provide support to consolidate the framework in the use of techniques of forensic entomology development. We believe that conducting long-term studies at Medellín can provide a better understanding of these fly communities and the species richness will be most likely increased.

We thank the Muscidae and Sarcophagidae specialist named in the text for taxonomic identifications. We also thank to the Director's Office of Research and Postgraduate courses (CITIA) and the Committee of Research (CODEI) of Tecnológico de Antioquia; for the financial support. To Eliana Buenaventura for sharing Sarcophagidae unpublished data.

#### Literature cited

- Amat, E. 2010. Notes on necrophagous flies (Diptera: Calyptreatae) associated with fish carrion in Colombian Amazon. *Acta Amazonica* 40:397-400.
- Amat, E. 2009. Contribución al conocimiento de las Chrysomyinae y Toxotarsinae (Diptera: Calliphoridae) de Colombia. *Revista Mexicana de Biodiversidad* 80:693-708.
- Amat, E., M. C. Veléz and M. Wolff. 2008. Clave ilustrada para identificación de los géneros y las especies de Califoridos (Diptera: Calliphoridae) de Colombia. *Caldasia* 30:227-240.
- Amorim, D. S., V. C. Silva and M. I. Balbi. 2002. Estado do conhecimento dos dípteros neotropicais. In *Proyecto de Red Iberoamericana de Biogeografía y Entomología Sistemática PriBES, Monografías Tercer Milenio, Vol. 2*, C. Costa, S. A. Vanin, J. M. Lobo and A. Melic, (eds.). SEA Zaragoza. p. 29-36.
- Brown, B. V., S. A. Marshall and D. M. Wood. 2009. Natural History. In *Manual of Central American Diptera*, B. Brown, A. Borkent, J. M. Cumming, D. M. Wood, N. E. Woodley and M. A. Zumbado (eds.). NCR Research press, Ottawa. p. 51-63.
- Buck, M., N. E. Woodley, A. Borkent, D. M. Wood, T. Pape, J. R. Vockeroth, V. Michelsen and S. Marshall. 2009. Key to dipteran families-Adults. In *Manual of central American Diptera*, B.

- V. Brown, A. Borkent, J. M. Cumming, D. M. Wood, N. E. Woodley and M. A. Zumbado (eds.). NCR Research press. Ottawa. p. 95-155.
- Buenaventura, E. 2006. Los Sarcófagidos (Diptera, Sarcophagidae) de importancia forense en Colombia. Tesis, Facultad de Ciencias y Educación, Universidad Distrital Francisco José de Caldas. Bogotá, D.C. 192 p.
- Buenaventura, E. and T. Pape. Revision of the New World genus *Peckia* (Diptera: Sarcophagidae), Zootaxa (in press).
- Buenaventura, E., G. Camacho, A. Garcia and M. Wolff. 2009. Sarcophagidae (Diptera) de Importancia Forense en Colombia: Notas sobre su biología y distribución. *Revista Colombiana de Entomología* 35:189-196.
- Catts, P. and H. Haskell. 1990. Entomology and death, a procedural guide, Joyce's Print Shop, Clemson, South Carolina. 180 p.
- Catts, E. P. and M. L. Goff. 1992. Forensic Entomology in Criminal Investigations. *Annual Review of Entomology* 37: 253-272.
- Chillcott, J. 1961. A Revision of the Nearctic Species of Fanniinae (Diptera: Muscidae). *Canadian Entomology* 92:1-295.
- Courtney, G. W., T. Pape, J. H. Skevington and B. J. Sinclair. 2009. Biodiversity of Diptera. In *Insect Biodiversity Science and society*, R. G. Footitt and P. H. Adlher (eds.). Wiley-Blackwell. p. 185-222.
- Florez, E. and M. Wolff. 2009. Descripción y clave de los estadios Inmaduros de las principales especies de Calliphoridae (Diptera) de Importancia Forense en Colombia. *Neotropical Entomology* 38:418-429.
- Gaston, K. J. 1991. The magnitude of global insect species richness. *Conservation Biology* 5:283-296.
- Giraldo, P. A. 2007. Variabilidad molecular de *Phaenicia cluvia* (Diptera: Calliphoridae) a partir de Secuencias de ADN Mitocondrial. Tesis, Instituto de Biología, Facultad de Ciencias Naturales Universidad de Antioquia, Medellín. 96 p.
- Greenberg, B. 1991. Flies as Forensic Indicators. *Journal of Medical Entomology* 28:565-577.
- Grisales, D. 2010. Taxonomia de Fanniidae (Diptera) da Colômbia. Msc Tese, Universidad Federal do Paraná Programa de Pós-Graduação em Ciências Biológicas, Área de Concentração em Entomologia, Parana. 151 p.
- Hanski, I. 1987. Carrion fly community dynamics: patchiness, seasonality and coexistence. *Ecological Entomology* 12:257-266.
- Pape, T., M. Wolff and E. Amat. 2004. Los Califóridos, Estridos, Rinofóridos y Sarcófagidos (Diptera: Calliphoridae, Oestridae, Rhinophoridae, Sarcophagidae) de Colombia. *Biota Colombiana* 5:201-208.
- Pérez, S. 2007. Muscidae (Diptera) de interés forense en Colombia: importancia y distribución. In *Memorias del XXXIV Congreso de la Sociedad Colombiana de Entomología*, Cartagena de Indias, del 25-27 de julio. Sociedad Colombiana de Entomología (eds.). Alpha impresores, Colombia. p. 105-113.
- Pérez, S., P. Duque and M. Wolff. 2005. Successional behavior and occurrence matrix of carrion-associated arthropods in the urban area of Medellín, Colombia. *Journal of Forensic Science* 50:448-454.
- Restrepo, F., C. Valderrama, M. Marín and G. Cadavid. 2000. Artropodofauna cadavérica asociada con los estados de descomposición del intervalo post mortem en cerdo blanco *Sus scrofa* en dos medios ecológicos diferentes, Tesis, Instituto de Biología, Facultad de ciencias Naturales, Universidad de Antioquia. Medellín. 90 p.
- Skevington, J. H. and P. T. Dang. 2002. Exploring the diversity of flies (Diptera). *Biodiversity* 3:1-27.
- Smith, K. G. V. 1986. A manual of forensic entomology. British Museum (Natural History) London and Cornell University Press, Ithaca. 205 p.
- Velez, M. C. and M. Wolff. 2008. Rearing five species of Diptera (Calliphoridae) of forensic importance in Colombia in Semicontrolled field conditions. *Papeis Avulsos de Zoologia* 48:41- 47.
- Wolff, M., A. Uribe, A. Ortiz and P. Duque. 2001. A preliminary study of forensic entomology in Medellín, Colombia. *Forensic Science International* 120:53-59.
- Wolff, M., A. Builes, G. Zapata, G. Molares and M. Benecke. 2004. Detection of Phoratoxion (O, O diethyl O (4-nitrophenyl) Phosphorothioate) by HPLC in insect of forensic importance in Medellín, Colombia. *Annual Aggrawal's Internet Journal of Forensic Medicine and Toxicology* 5:6-11.