

Electronic guide for identification of Diptera species of great forensic importance in Brazil

João V. A. Verçosa*, Jessica L. Bauri, Patrícia J. Thyssen

Abstract

Diptera is one of the orders of Insecta with greater importance for the forensic area, especially the medical-legal field, since its species are mainly the first to colonize a corpse, thus, it is possible to estimate the postmortem interval, among other purposes. However, valuable information about biology or ecology can only be accessed and applied to criminal investigation if species are correctly diagnosed. In general, criminal experts do not have taxonomic training for the recognition of species found in cadavers or in a criminal scene. Thus, we developed a guide to identify Diptera species of great forensic importance in Brazil, aiming to create an accessible tool for the identification of dipterans by non-taxonomist professionals.

Key words:

Taxonomy, flies, forensic entomology.

Introduction

Necrophagous insects belonging to the order Diptera are those that have greater relevance for forensic entomology, since they are the first to colonize a corpse. In addition, in the medical-legal context, data regarding their biology, ecology or geographical distribution may be useful in estimating the postmortem interval, determining the cause or circumstances that led an individual to death, or inferring instances of maltreatment and negligence¹.

The valuable information provided by insects can only be accessed and applied to criminal investigation if species are correctly diagnosed². In general, criminal experts do not have taxonomic training for the recognition of species found in cadavers or in a criminal scene. Material that collects all the information (morphological, biological, ecological, case reports) in one place for consultation is also not easily found.

Thus, we developed a guide to identify Diptera species of great forensic importance in Brazil, aiming to create an accessible tool for the identification of dipterans by non-taxonomist professionals.

Results and Discussion

For the construction of the guide the following families and species were selected: **Calliphoridae** (*Chrysomya albiceps*, *Chrysomya megacephala*, *Chrysomya putoria*, *Cochliomyia macellaria*, *Cochliomyia hominivorax*, *Lucilia eximia*, *Lucilia sericata*, *Lucilia cuprina*, *Hemilucilia segmentaria*, *Hemilucilia semidiaphana* and *Sarconesia chlorogaster*); **Sarcophagidae** (*Peckia* (Pattonella) *intermutans* and *Microcerella halli*); **Muscidae** (*Ophyra chalcogaster*, *Hydrotaea aenescens* and *Synthesiomyia nudiseta*); **Fanniidae** (*Fannia trimaculata* and *Fannia canicularis*); **Piophilidae** (*Piophila casei*); **Stratiomyidae** (*Hermetia illucens*); and **Phoridae** (*Megaselia scalaris*). As criteria for classification within the legal medical field, species should be necrophagous or parasitic and have records of their immature rearing on cadavers or corpses of other decomposing animals. Biological, ecological and geographic distribution data included in the guide were extracted from the literature¹⁻⁵.

Photographic images of dipterans and their diagnostic characters were made using the ZeissTM Discovery V.12 stereomicroscope with AxioCam 5.0TM image capture system and ZENTM 2.0 software, subsequently processed in the PhotoShopTM, where scale bars (in mm) were also included. The Canva online design platform was used to format the guide (Fig. 1).



Figure 1. The guide. In: (A) Cover; (B) Introductory page; (C and D) Internal pages showing the information contained in the guide.

Conclusions

This is the first Brazilian illustrated guide for the simple and practical identification of necrophagous flies.

Acknowledgement

This study is the result of a project developed during an undergraduate course (BZ 586) at the Institute of Biology of UNICAMP.

¹ Thyssen, P. J. *Entomologia Forense*. **2011**, 229-238.

² Thyssen, P. J.; Aquino, M.F.K.; Purgato, N.C.S.; Martins, E.; Costa, A.A.; Lima, C.G.P.; Dias Fº, C.R. *J. Forensic Sci. Res.* **2018**, 2: 1-8.

³ Carvalho, C. J. B. and Mello-Patiu, C. A. *Rev. Bras. Entomol.* **2008**, 52, 390-406.

⁴ Alves, A. C.; Santos, W. E. and Creão-Duarte, A. J. *Entomotropica*. **2014**, 29, 77-94.

⁵ Carvalho, L.M.L.; Thyssen, P.J.; Linhares, A.X.; Palhares, F.A.B. *Mem. Inst. Oswaldo Cruz*. **2000**, 95, 135-138.