Introduction

Insect succession studies on animal carcasses were started a few years ago in Portugal. The fundamental objective was to obtain ecological information (community structure, seasonality and successional patterns) concerning cadaver colonizers, essentially Diptera and Coleoptera, in order to develop a database to be used for forensic purposes. During the course of works, there was the opportunity to study a large amount of specimens collected and several faunistic novelties were obtained for Portugal, especially regarding cadaver faunas, in general, is poor. The aim of this paper is to provide faunistic information obtained from the study of a part of the dipterous fauna attracted by dead piglets in Lisbon (Portugal) is presented. A total of 770 specimens, belonging to 4 families (Carnidae, Heleomyzidae, Lauxaniidae and Sphaeroceridae), have been studied and 42 species identified. Among the results we would like to highlight the following new records: a) 1 species (Telomerina levifrons Spuler) new to the Iberian Peninsula, b) 5 genera and 28 species new to Portugal, and c) 3 families, 13 genera and 12 species new to the Lisbon district. The paper makes a significant contribution to the dipterological knowledge of Portugal.

Key words: Diptera, Carnidae, Heleomyzidae, Lauxaniidae, Sphaeroceridae, pig carcass, faunistics, Portugal, Lisbon.

Material and Methods

The experimental study was conducted at the Instituto Superior de Agronomia, Tapada da Ajuda, Lisboa (UTM 29SMC88), a small patchy woodland park inside urban perimeter, mainly composed of Ailanthus altissima (Mill.) Swingle, Fraxinus angustifolia Vahl and Ulmus minor Miller, at an altitude of 80 m a.s.l. Four field experiments, one in each season, were performed from October 2006 to August 2007, in the following periods: Autumn, from 18.10.2006 to 2.01.2007; Winter, from 17.01 to 3.04.2007; Spring, from 16.04 to 16.06.2007; and Summer, from 27.06 to 27.08.2007. In each season, a new freshly killed domestic piglet (Sus scrofa L.) of approximately 8 kg weight was used. A modified version of the trap designed by Schoenly (Prado e Castro et al., 2009) was used to collect the entomofauna along the decomposition process. During the first 23 days the captures were performed daily, and afterwards in alternate days. A 40% ethylene glycol solution was used to kill and preserve the arthropods in the trap, after which they were moved to 70% ethanol.

Results

A total of 20.144 adult Diptera, belonging to 39 families, were collected during the four experiments. The identification of this material has brought interesting new records, some already published in Prado e Castro & García (2009, 2010) and Prado e Castro et al. (2010a, 2010b). Now, in this paper, we include data regarding 4 more families: Carnidae, Heleomyzidae, Lauxaniidae and Sphaeroceridae. Among 770 specimens, 42 (+1 unidentified) species were identified and are listed below.

For each capture, the date and number of specimens (in brackets) caught are shown. The material has been collected by the second author (CPC) and identified by the first one (MC-T) and it is deposited in the collection of the Department of Animal Biology of the University of Lisboa, a few specimens are deposited in the private collection of the first author.
List of species

CARNIDAE

This family mainly includes species related to decaying organic matter, i.e. coprophagous, saprophagous and necrophagous species, although it is usually collected in small quantities. Three species have been collected, one of them very interesting. New family for the district of Lisboa.


-New genus for the district of Lisboa and new species for Portugal.


-Very interesting capture, as only one specimen (holotype) was known up to now. Consequently, it is the second specimen collected since its description. The holotype was collected in 1960, at 70 m a.s.l., in the Granada province, in Spain, and now only at 80 m. Therefore, it is now recorded for the first time from Portugal.


-New species for Portugal.

-Homoenea notata-group Material studied: 19.5.2007 (2), 4.6.2007 (1), 30.7.2007 (1). Unfortunately, the females of this group have to be associated to males for their identification.


-This is a very common saprophagous species.


-This is a very common saprophagous species. New species for the district of Lisboa.


-A common saprophagous species. New species for Portugal.


SPHAEROCERIDAE

This is a very common family, with many species and a very wide range of biology. It includes mycetophagous, saprophagous, coprophagous, necrophagous, etc. species. So its presence on the dead piglets can be considered very normal, as the large number of species (31) found demonstrates. Coproica Rondani, 1861 species are mainly coprophagous (dung, excrements), but, in less quantity, they can also be found on cadavers. New family for the district of Lisboa.


-New genus for the district of Lisboa and new species for Portugal.
Coproica pusio (Collin, 1956)
New species for Portugal.

Coproica lugubris (Haliday, 1836)
Material studied: 10.7.2007 (1).
New species for the district of Lisboa.

Coproica vagans (Haliday, 1833)
Material studied: 3.7.2007 (1).
New species for Portugal.

Coproica rohaceki (Carles-Tolrà, 1990)
Material studied: 3.7.2007 (1).
New species for Portugal.

Coproica hirtula (Haliday, 1833)
Material studied: 3.7.2007 (1).
New species for Portugal.

Elachisoma aterrimum (Rondani, 1847)
Material studied: 3.7.2007 (1).
New species for Portugal.

Leptocera caenosa (Rondani, 1880)
New species for Portugal.

Ischiolepta pusilla (Fallén, 1820)
New species for the district of Lisboa.

Leptocera caenosa (Rondani, 1880)
New genus and species for the district of Lisboa.

Lotophila atra (Meigen, 1830)
New species for the district of Lisboa.

Minilimosina baculum (Marshall, 1985)
Material studied: 13.2.2007 (1), 29.3.2007 (1).
Interesting capture, as it is a rare species. New genus for the district of Lisboa and new species for Portugal.

Minilimosina parvula (Stenhammar, 1854)
Material studied: 16.11.2006 (1).
New species for the district of Lisboa.

Opalimosina mirabilis (Collin, 1902)
Material studied: 4.6.2007 (1), 5.7.2007 (2).
New genus and species for Portugal.

Pallimosina heteroneura (Haliday, 1836)
New genus and species for the district of Lisboa.

Puncticorpus lustanicum (Richards, 1963)
Material studied: 19.2.2007 (1), 23.4.2007 (2), 7.5.2007 (1).
New genus and species for the district of Lisboa.

Spelobia baeci (Papp, 1977)
Material studied: 13.2.2007 (1), 1.3.2007 (2), 4.3.2007 (6), 7.3.2007 (1), 10.3.2007 (1), 1.5.2007 (1), 9.5.2007 (1).
New genus for the district of Lisboa and new species for Portugal.

Spelobia parapusio (Dahl, 1909)
New species for Portugal.

Spelobia quaeclita Roháček, 1983
Material studied: 10.11.2006 (1), 23.2.2007 (1).
New species for Portugal.

Sphaerocera curvipes Latreille, 1805
Material studied: 16.3.2007 (1).
New genus and species for Portugal.

Spinilimosina brevicostata (Duda,1918)
Material studied: 11.7.2007 (1).
New genus and species for Portugal.

Telomerina flavipes (Meigen, 1830)
New species and species for Portugal.

Telomerina levifrons Spuler, 1925
Material studied: 19.3.2007 (1).
This species is recorded from the Holarctic and Oriental regions. It is known from Spain, but from the Balearic Islands only. New species for the Iberian Peninsula.

Trachyopella coprina (Duda, 1918)
Material studied: 3.2.2007 (1).
New species for the district of Lisboa and new species for Portugal.

Trachyopella lineafrons (Spuler, 1925)
New species for Portugal.

Trachyopella melanica (Haliday, 1936)
New species for Portugal.

Trachyopella straminea Roháček & Marshall, 1986
Conclusions

After the study of 770 dipterous specimens belonging to 4 families (Carnidae, Heleomyzidae, Lauxaniidae and Sphaeroceridae), 42 species have been identified. The richest family was Sphaeroceridae, with 31 species collected. The heleomyzid *Suillia variegata* (Loew), a mainly mycetophagous species, has been the most abundant species, with 140 specimens collected (18.18 %), followed by the lauxaniids *Minettia inusta* (Meigen) (119; 15.45 %) and *M. fasciata* (Fallén) (100; 12.98 %). We highlight the following new records: a) 1 species (*Telomerina levifrons* Spuler) for the Iberian Peninsula, b) 5 genera and 28 species for Portugal, and c) 3 families, 13 genera and 12 species for Lisboa district. Furthermore, it is also worth mentioning the finding, for the first time after its description, of *Meoneura granadensis* Lyneborg. With all these novelties, the knowledge on the biology of some species is improved and the dipterological knowledge of Portugal is notably increased.

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