Determination of Forensically Important *Coleoptera* and *Calliphoridae* (Diptera) Species on Decomposing Dog (*Canis lupus familiaris* L.) Carcass at Ankara Province

Ankara İlinde Çürümekte Olan Köpek (*Canis lupus familiaris* L.) Leşi Üzerinde Adli Önemi Olan *Coleoptera* ve *Calliphoridae* (Diptera) Türlerinin Tespit Edilmesi

Research Article

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ABSTRACT

In this study, decomposition process of a dog (*Canis lupus familiaris* Linnaeus 1758) carcass was examined and 21 species belonging to the families *Staphylinidae, Histeridae, Dermestidae, Nitidulidae, Cleridae, Scarabaeidae, Carabidae (Coleoptera), Calliphoridae, Sarcophagidae, Muscidae (Diptera)* and *Vespidae (Hymenoptera)* were collected during two months period at Hacettepe University Beytepe Campus Ankara in 2002. This is the first study in Turkey on forensic entomology and the insect fauna of a dog carcass.

Key Words
Dog carcass, Forensic Entomology, Coleoptera, Diptera.

ÖZET

Bu çalışmada, 2002 yılında Ankara Hacettepe Üniversitesi Beytepe Kampüsünde iki aylık dönem boyunca köpek (Canis lupus familiaris Linnaeus 1758) leşinin çürüme süreci incelenmiş ve *Staphylinidae, Histeridae, Dermestidae, Nitidulidae, Cleridae, Scarabaeidae, Carabidae (Coleoptera), Calliphoridae, Sarcophagidae, Muscidae (Diptera)* ve *Vespidae (Hymenoptera)* familyalarından 21 tür toplanmıştır. Bu çalışma Türkiye'de adli entomoloji ve köpek leşi böcek faunası üzerinde yapılan ilk çalışmadır.

Anahtar Kelimeler
Köpek leşi, adli entomoloji, Coleoptera, Diptera.

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INTRODUCTION

Forensic entomology is an extensive discipline that uses entomology in the judicial system. Forensic entomology, with a focus on justice trial, is separated into three main areas; urban entomology, stored products entomology, and medico-criminal entomology [1].

Insects and other invertebrates feeding on carrion form a distinct faunal succession associated with the various stages of decay [2]. According to Payne [3], approximately 400 insect species are found at different decomposition stages on carcasses. Determination of the insect fauna in a specific area, identification of different immature stages of the insect species (egg, first, second, third instar larvae, and pupa) that appear on carrion, and the knowledge of the development time of these insect species at different temperatures can provide reliable evidence for the determination of PMI (Post Mortem Interval) [2, 4, 5].

Anderson [6] indicated that every stage of decomposition is attractive to different group of sarcosaprophage arthropods, primarily insects. Two major groups of insects are predictably attracted to cadavers and provide the majority of information in forensic investigation; the flies and the beetles [7]. In decomposition process *Calliphoridae*, known as blow flies, come to carcass within minutes after death and start to oviposit their eggs [8]. After blow flies, species belonging to Coleoptera begin to come around the carcass.

The main aim of this study was to determine *Diptera* and *Coleoptera* species on dog carcass in Ankara province at Hacettepe University Beytepe Campus.

MATERIALS AND METHODS

Dog (*Canis lupus familiaris* L.) carcass was provided from Animal Shelter of Municipality of Yenimahalle in Ankara. The dog was killed by a veterinary employed at municipality in according to B.30.2.HAC.0.01.00.05 numbered "The Permission of Hacettepe University Experimental Animals Ethics Council" and transferred to the study area following its death. A forestation area at Beytepe Campus, Hacettepe University, were chosen as study area. The flora of the study area consisted mainly of dark pine (*Pinus nigra* L.). Samples were collected from the carcass every day in the morning, in the afternoon, and at sunset. Attention was paid to collect samples in the afternoon when fly and beetle activity was high. The adult samples on carrion were collected using net and forceps A few of the adult samples were killed using ethyl acetate to keep them for collection. The others were preserved in 70% ethanol. Each sample box was labeled accordingly.

RESULTS AND DISCUSSION

In this study, detection of Diptera and Coleoptera families on dog carcass and species of these families were aimed. This preliminary study was conducted between 25 September - 17 November 2002 and the insect fauna on a dog carcass was detected within the bounds of possibility.

The insect fauna on a dog carcass was observed for the first time in Turkey during decomposition; 6 species from *Calliphoridae, Muscidae* and *Sarcophagidae* families of order *Diptera*; 14 species from Cleridae, Dermestidae, Histeridae, Nitidulidae and Staphylinidae of order *Coleoptera* were determined. Apart from this, Scarabaeidae and Carabidae from Coleoptera, *Vespula germanica* (Hymenoptera: Vespidae), which do not have importance for forensic entomology, were collected from carcass (Table 1).

In this study, from the beginning of succession it was detected that the first insects arriving to the carcass were flies from Calliphoridae family. Calliphoridae samples were followed by Sarcophagidae and Muscidae families. After the colonization of Diptera it was seen that samples of Coleoptera arrived on the carcass.

In the studies in which insect fauna on carcass are determined; generally pig carcass has been used [9-12]. When the available literature is observed, apart from this study, the study of Reed [13] is regarded as the only study carried on dog carcass.

Table 1. Detected species from dog carcass.

ORDER	FAMILY	SPECIES
DIPTERA	CALLIPHORIDAE	*Chrysomya albiceps* Wiedemann, 1819
		Calliphora vomitoria Linnaeus, 1758
		Calliphora vicina Robineau-desvoidy, 1830
	SARCOPHAGIDAE	*Sarcophaga* sp.
	MUSCIDAE	*Musca* sp.
		Hydrotaea ignava (Harrris, 1780)
COLEOPTERA	STAPHYLINIDAE	*Creophilus maxillosus* (Linnaeus, 1758)
		Aleochara clavicornis L.Redtenbacher, 1849
		Gyrohypnus punctulatus (Paykull, 1789)
		Philonthus sp.
		Oxypoda sp.
	NITIDULIDAE	*Nitidula flavomaculata* Rossi, 1790
		Nitidula rufipes (Linnaeus, 1767)
		Nitidula flavomaculata Rossi, 1790
		Nitidula rufipes (Linnaeus, 1767)
	CLERIDAE	*Necrobia violacea* (Linnaeus, 1758)
		Necrobia rufipes (De Geer, 1775)
	HISTERIDAE	*Saprinus* sp. 1
		Saprinus sp. 2
	DERMESTIDAE	*Dermestes frischii* Kugelann, 1792
	SCARABAEIDAE	*Sisyphus* sp.
	CARABIDAE	*Harpalus* sp.
HYMENOPTERA	VESPIDAE	*Vespula germanica* Fabricius, 1793

In the scope of this study, species of *Chrysomya albiceps, Calliphora vomitoria* and *Calliphora vicina* from Calliphoridae family of Diptera; *Sarcophaga* sp. from Sarcophadiae family; *Musca* sp. and *Hydrotaea ignava* from Muscidae family were observed on dog carcass. On a similar study carried on dog carcass Reed [13] stated that he found the species of *Calliphora vicina*, *Calliphora vomitoria,* and *Hydrotaea ignava*. *Sarcophaga* sp. and *Musca* sp. show similarity on the basis of species with Reed [13]. Three species from Calliphoridae family are parallel to the findings of Şabanoğlu and Sert [12] carried on pig carcass in Beytepe Campus. According to Reed [13], parallel to our study, species of *Nitidula flavomaculata* and *Nitidula rufipes* from Nitidulidae family, *Necrobia rufipes* and *Necrobia violacea* from Cleridae family, *Creophilus maxillosus* from Staphylinidae family were detected. Similarly, these findings are coherent with the findings of Özdemir and Sert [11] on pig carcass in Beytepe.

All Staphylinidae genera detected in this study, apart from *Oxypoda* Mannerheim 1830, are parallel to the ones detected in the study of Reed [13] on the basis of species. Samples of *Aleochara* sp. are intensely found on the carcass. [13, 14]. Özdemir and Sert [11] have found species of *Aleochara* Gravenhorst 1802, *Philonthus* Stephens 1829 and Creophilus Samouelle 1819 on pig carcass, parallel to our study. When the available literature is reviewed, there is no study in which

the species of *Aleochara clavicornis* is found on the carcass. Similarly, *Gyrohypnus* species is the rare Staphylinidae samples observed on the carcass [14]. However, since there is no previous study on the observation of *Gyrohypnus punctulatus* species on a carcass; it is regarded as the first detection on carcass.

It has been detected that there are two *Saprinus* Erichson 1834 species of Histeridae family but these species could not be identified. Saprinus species detected in the study of Özdemir and Sert [11] have been compared however it was seen that it is different from the species detected in this study. It has been detected that the findings of *Sarpinus* species of Reed's study [13] and the findings of Özdemir and Sert [14] are parallel with the findings of this study on the basis of gender yet; it has not been concluded definitely though it was understood that there is a difference on the basis of species.

In the study, *Dermestes frischii* is the only Dermestidae species detected. Similarly, it is one of the two Dermestidae species detected on carcass in the study of Arnolds et al. [15]. In another study on pig carcass, Özdemir and Sert [11] have stated that *Dermestes frischii* is the most abundant species of Dermestidae.

This study is the first preliminary study carried on dog carcass in the field of forensic entomology in Turkey. The variety of fauna on animal carcass used in this field has been stated in most of the literature [3, 10, 16], this difference has been partially detected in this study as well. It is especially important that two species (*Aleochara clavicornis* and *Gyrohypnus punctulatus*) which had not been observed in any other studies before were determined with this study. However repetition of this study which was completed in two months annually or biannually would contribute to attainment of new data both for scientific world and for our country.

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