New Record of Sarcophaga ruficornis, Fabricius, 1794 (Diptera: Sarcophagidae) from Iran, A Flesh Fly Species of Medical and Forensic Importance

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Abstract

The study of diptera is necessary in forensic entomology field. This can be important in determining the post-mortem interval (PMI) and also obtain information about the place of death. The aim of this study was to introduce the Sarcophagaruficornis on rat carrion as a forensic important species. This study was carried out using a laboratory breed rat (Wistar rats) weighing 352 as a model for human decomposition. Observations and collections of flies were made daily during May to July 2015. In this study, S.ruficornis was seen in the fresh to post decay stages of body decomposition. Highest number of this species caught in the decay stage. The species of fly found in this study could be used in forensic investigations in future.

Keywords: Diptera; Forensic Entomology; S.ruficornis; Iran

Introduction

Forensic entomology is the study of cadaveric insect and other arthropods to medico-legal subjects in the judicial system [1]. The study of diptera is imperative in the forensic entomology field. This can be beneficial in determining post-mortem interval (PMI) and also obtain information about the site of death [2]. Insects have a specific pattern to occurrence the bodies, as diptera are mostly found in the early times of body decomposition [3]. Two main groups of insects are mostly attracted to corpse and provide valuable evidence in criminal investigation; the flies and the beetles [1]. The application of the entomological technique to determine the time of death consists of two main measures; the estimate based on the age of the oldest maggots that have developed on the body and estimate based on the development patterns [4].

The order dipteral comprises a number of forensically important families, viz. Sarcophagidae, Calliphoridae, Piophilidae, and Fanniidae [5]. Sarcophagidae are a large family with approximately 2510 identified species. They are frequent in warm climates. Three subfamilies have been identified: Miltogramminae, Sarcophaginae and Paramacronychiinae. Sarcophaginae contains species that are important in medical entomology field [6]. Sarcophaginae larvae feed on excrements and carrions [1]. Sarcophagaruficornisis of certain interest in many parts of the world, either as a myiasis producing cause or fly seen in a forensic entomology context. Geographically, this species has been recorded in both old and new world [7,8]. But this species has never been reported in Iran so far. S. ruficornis, is mainly larviparous (laid 40-80 first instar maggots) and sometimes oviparous. The larva are vermiform and the length of the first, second, third instar and Pupariais 6.8±0.45 mm, 11.8±0.07 mm, 16.9±0.08 mm and 11.7±0.14 mm, respectively [9]. Myiasis caused by S. ruficornis reported in some cases [10,11]. Study on the life cycle and seasonal activity of this species can be useful in medico legal investigations in the study area.
Methods

Study site

The study was carried out in an outdoor location (N°44°19'31", E°48°45'38") in Ahvaz city, Iran. Ahvaz is the capital of Khuzestan Province, located in the southern part of the country and bordering Iraq and the Persian Gulf (Figure 1). The climate of Khuzestan is generally very hot and occasionally humid, particularly in the south, while winters are much more cold and dry. Summertime temperatures routinely exceed 48°C and in the winter can drop below freezing, with occasional snowfall, all the way south to Ahvaz. The averages of temperatures at the time of this study were 37.3°C.

Study animal and insect collection

This study was carried out using a laboratory bred rat (Wistar rats) weighing 352 g as a model for human decomposition (Figure 2). The mice were killed by contusion and placed in an outdoor location. Observations and collections of flies were made daily during June to July 2015. Larvae were collected and divided into two groups; some immature individuals were killed in hot water and stored in 70% alcohol, while others were transferred to the laboratory of entomology for rearing. The live larvae were reared on blood agar media in a thermostatic room (Figure 3). The adult flies were killed with ethyl acetate and then pinned with entomological pins for identification. Valid taxonomic keys were used for the identification of different species [5,12,13].

Results

In this period of time, fly maggots of the Dipterous family Calliphoridae and Sarcophagidae were collected from the body. S. ruficornis was collected during the larval stage. Decomposition time for two rats lasted 39 days, from June 8 to July 17, 2015. S. ruficornis was seen in the fresh to mid of post decay stages of body decomposition. Five decaying stages were identified by the morphological changes of the carrions: Fresh, Bloated, Decay, Advanced decay and Remains. Highest number of this species caught in the decay stage. The averages of minimum and maximum temperatures in any stage were shown in (Figure 4). The first maggots were seen in the fresh stage which belonged to Sarcophagidae species. Anterior spiracles of S. ruficornis larvae having 11-15 papillae settled in a single row and the posterior spiracle have distinct inner projections between the spiracular slits (Figure 5). In the adult stage, 2nd and 3rd antennomere are at least partly yellow and terminalia is red or orange in ground color.

Discussion

Since insect lives on decomposing body tissues both as a food source and as a natural environments to develop to their next stages, they can skew the validity of the estimated PMI [2]. Forensic entomology is a neglected field among forensic sciences in Iran. This is the first documented report of insect evidence from a model for human decomposition in the city of Ahwaz, south of Iran. Therefore, research in this field is essential and the main aim of this study was to introduce the S. ruficornis on rat carrion as a forensic important species in the study area. Studies on insects associated to carrion are well documented.
in different regions. Kavitha reported S. ruficornis on human cadavers in Malaysia [14]. S. ruficornis has been recorded from pig carriions in northern Thailand and southeastern Brazil [15,16]. S. ruficornis was reported as the most abundant flesh fly in Kuwait.

In that study, first larvae of S. ruficornis were seen after two days and they remained until the last rabbits were collected after 14 days [17]. This report is somewhat similar to the present study. Study on the rates of development of S. ruficornis show that the range of optimum temperature for the development of this species is between 20 and 35°C and the longest times of development is in the lowest temperatures [18]. Some species of Sarcophagidae family associated with carcasses were reported from Iran [19,20]. All larval instars of this fly species have been described by scanning electron micrograph (SEM) [7], highlighting the sensory organs (dorsal, terminal and ventral organs) located on the cephalic segment as well as strong, slightly curved mouth hooks. Puparia of P. ruficornis were measured as 11.7±0.14 mm in length and a very short pupal respiratory horn was observed dorso laterally in the first abdominal segment [7,9].

The prime characteristics of P. ruficornis differ from two other forensically important species; P. dux and P. peregrina, which have yellowish orange third antenna and palpus [8]. Informative characteristics of male genitalia of this species, particularly the distiphallus, have been displayed using SEM [21]. Investigation on the island of Oahu, Hawaii, USA indicated that this species was an early invader and insect colonizer of the death scene [22]. A document reporting from Kuwait demonstrated the significance of post feeding third instar P. ruficornis, which was collected from the blanket which the body remain was wrapped. Based on the age of P. ruficornis collected and the location of the body, ~7.5–8.5 days PMI min was estimated [23]. This species can be helpful for the development of forensic entomology in the study area. For estimation of PMI using this insect, it is important to study the rates of development of instars and adult stages. Because insect species are poikilothermic creatures, they usually show different growth patterns depending on the temperature at which they develop.

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References


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