

New Record of the Species *Synthesiomyia nudiseta* (van der Wulp, 1883) (Diptera, Muscidae) with Forensic Study from Kerbala City, Iraq

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Abstract

The present study aimed to investigate *Synthesiomyia nudiseta* (van der Wulp, 1883) in the carcasses of dogs and rats in four different localities of Kerbala governorate. during four seasons. The results indicated the appearance of *S. nudiseta* only in the spring and autumn seasons within the urban and agricultural areas, as well as the appearance of this species on the bodies of dogs only without rats. Taxonomy and morphological features were described. *S. nudiseta* is belonging to the family Muscidae (Order: Diptera) is described as a first time recorded in Iraqi entomofuna. The specimens were collected from carcasses of dogs and rats at agriculture and urban regions of Kerbala city. The diagnostic characters and mean morphological features were photoed.

Key words: Diptera, Forensic Entomology, Iraq, Kerbala City, Muscidae, *Synthesiomyia*.

Introduction

The species *Synthesiomyia nudiseta* (van der Wulp, 1883) is a wide distributed in the tropical and subtropical regions of the old and new world ⁽¹⁾. This fly has contributed to criminal investigations for many countries such as Costa Rica, India, Malaysia, Thailand, and USA ⁽²⁻⁹⁾.

This species has been recorded in numerous studies on human bodies in Mexico and Peru ⁽¹⁰⁾. It is often recorded on human bodies in urban areas because it feeds on rubbish and decaying vegetables ⁽¹¹⁾. Larval stages were found as well as the presence of adults on the body of a woman in a 13-storey building in Malaysia, the presence of its larvae determined the time of death was nine days ⁽¹²⁾. Larval stages of this species on human corpses have been studied in detail in Europe, specifically in the Institute of Forensic Medicine as well as the Spanish Legal Institute because of its importance in criminal investigations ⁽¹³⁾.

The larval stage is very important in future of criminal investigations because its presence on human bodies is evidence that the body was in indoor or urban environments ⁽¹⁴⁾.

In recent years, high temperatures have affected the distribution of these insects, so it is necessary to know the temperature of those areas from which the samples were taken and where they are distributed in the same area, and the association of this species with bodies as well as wounds plays an important role in determining the time of death post-mortem interval (PMI) ⁽¹⁵⁾. The aim of current study to investigate the presence of this species on the bodies of animals (dogs, rats) in different localities of Kerbala city.

Materials and Method

The study was during the period from 1/3/2018 to 28/2/2019 within the four seasons (spring, summer, autumn and winter). Two types of vertebrate animals were used in the study (dogs and rats) as shown in Table (1).

The animals used in the experiment were killed in two ways: the first using a sharp knife and the second by a toxic substance (Strychnine sulfate tablet), with dissolving 1 gm of the Strychnine in 5.0 ml of water and administered orally to rats at a dose of 3 ml using a medical syringe, while dogs were given the tablet directly, after killing the animals by the proves kill

methods of *S. nudiseta* was investigated after the corpse was placed on the ground after killed immediately to the point of complete decomposition ⁽¹⁶⁾.

Use three duplicates in each of the above-mentioned transactions. The insects were collected by air net and fly roll trap. The samples were taken to the laboratory and killed by freezing (24h) and so as they mounted

by insect pins, the locality and date of collection were recorded. ^(17,18)

For identification of genus and species were using taxonomical keys: ^{(13) (19-21)}.

The habitat and morphological features were taken photos by the aid of the digital microscope dino-light with scales of measurements.

Table (1) showed animals with their weights.

Type of animal	Order and family	Scientific name	Wight of carcass kg
Dogs	Carnivora: Canidae	Canis Lupus familiaris (Linnaeus ,1758)	10 - 7
Rats	Rodentia:Muridae	Rattus rattus (Linnaeus ,1758)	0.5-0.35

Results and Discussion

Morphological study

In the current study, the genus *Synthesiomyia* and species *nudiseta* were registered as new record to fauna of Iraq. this genus can be recognized from closely genus by: Arista bare; prosternum setulose; scutellum with numerous setae on sides (plate: 1) it has one species (19).

Synthesiomyia nudiseta (van der Wulp, 1883)

Scientific classification

Order: Diptera

Suborder: Brachycera

Family: Muscidae

Subfamily: Azeliinae

Trib: Reinwardtiini

Genus: *Synthesiomyia* Brauer & Bergenstamm, 1893: 9, 110, 178

Species: *S. nudiseta*

Synonyms: *Cyrtoneura nudiseta* Wulp, 1883

Hyadesimyia grisea Gigliotos, 1893

Synthesiomyia brasiliiana Brauer & vonBergenstamm, 1893

Discretion of the species: *S. nudiseta* can be diagnostic easily by the antennae and palpi are orange \ yellow in color, the last terminal segment of the abdomen is yellow.

Body: grey to black in color; length about 7-10 mm male and female (Figure 1 A, B)

Head: compound eye bare without hairs, dioptic in male but in female holoptic; antenna, pedicel with clear longitudinal fissure and has hard short bristles, flagellum yellow with arista bear; maxillary palpi yellow (Figure 2 A, B)

Thorax: consists of four longitudinal vittae on mesothorax, sternopleuron triangular with four long bristles, the interior is longer and thicker than other.

Legs: black in color, the hind coxa with hairs at inner posterior margin

Wing: hyaline, costa expanded to R₃₊₄, subcostal not striate, apical section of vein M strongly curved forward (Figure 1B)

Abdomen: gray with checker board and differ from sarcophagids flies by the terminal segment is yellow.

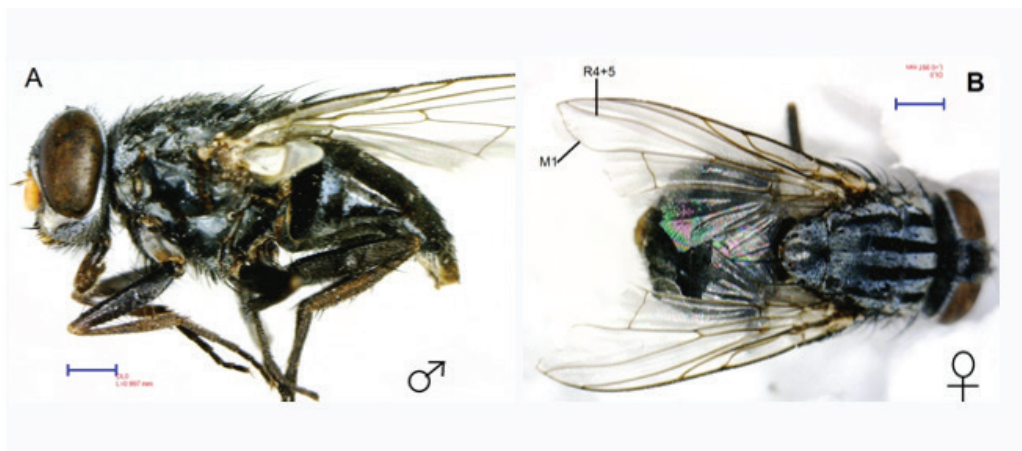


Figure1: (A) Adult male of *S.nudiseta*; and (B) Adult female of *S.nudiseta* with wing M1, R4+5, wing veins.

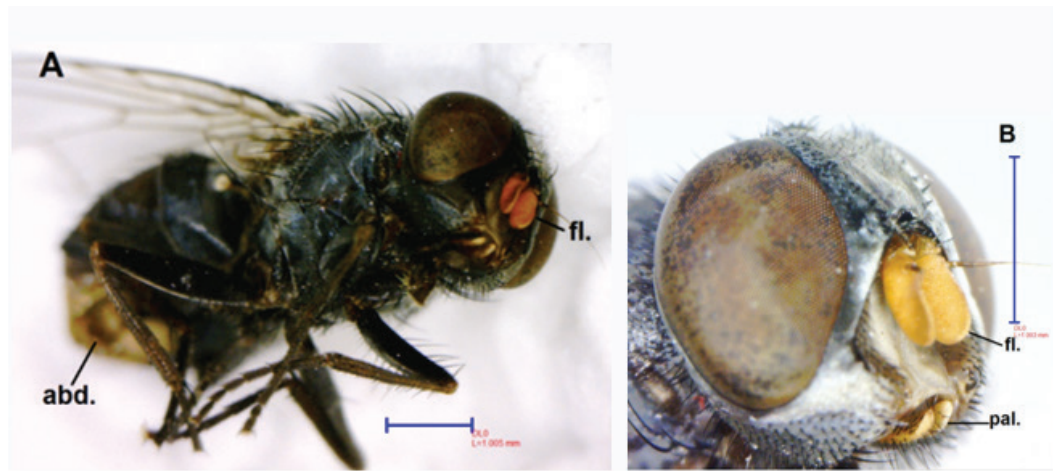


Figure 2: (A) *S.nudiseta*, with orange flagellomere(fl) and tip of abdomen (abd); and (B) head of *S.nudiseta* with flagellomere(fl) and palpe orange.

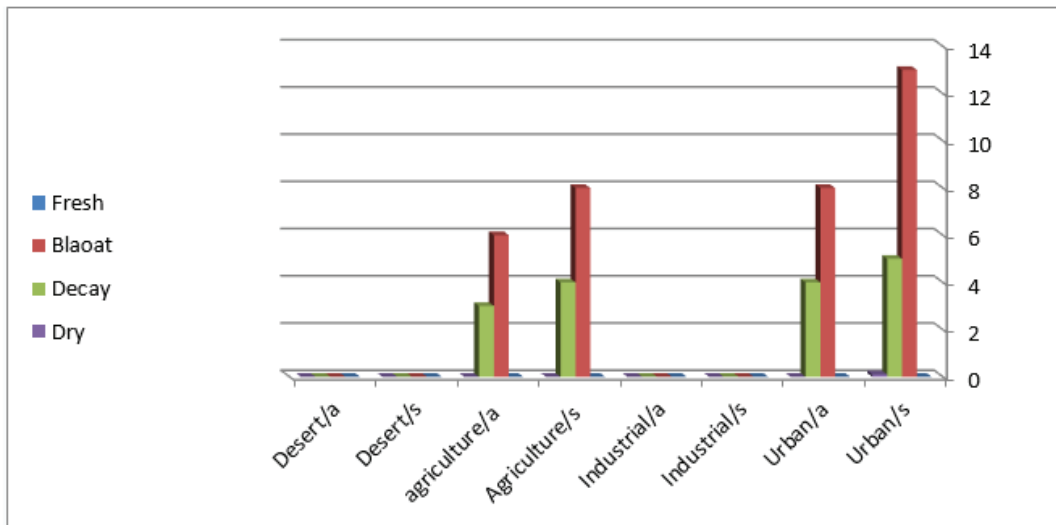


Figure (3) Level of appearance that *S. nudiseta* abut, a= autumn; s= summer

Environmental Study

The results of the study indicated the effect of attracting *S. nudiseta* insect species according to the type of animal as a number of adults were collected near the bodies of dogs, while no insect was collected near the bodies of mice may be due to the difference in the size of the body⁽¹⁷⁾. The size of the body has an effect on insect attraction.

As for the method of killing the animal, it has had a great influence in attracting insects. The results of the research indicated that all the insects collected were near the dead bodies with a sharp knife, while no insect was found in the dead bodies using the poison. The amount of blood accompanying the dead body is injurious and does not exist in the case of poisoning⁽²²⁾.

The temperature had an effect on the appearance of *S. nudiseta*. It was observed during the research that the insect is present during the spring and autumn seasons and not found in winter and summer. The study has indicated that the appropriate thermal range for the appearance of the insect within a temperature range of 20-30 and this is consistent with^(23,24).

The results in Figure (3) indicate the geographical area of the environment has had a significant impact on the presence of the insect *S. nudiseta* as it appeared in urban and agricultural areas and does not appear at all in the desert and industrial areas. The puffiness stage is fresh⁽¹²⁾⁽²⁴⁾.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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