Seasonal Abundance of Adult Beetles Species on the Exposed Carcasses in Baghdad City

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Abstract

Beetles specimens were collected from exposed animal carcasses in Baghdad city; and prepared for farther taxonomic study. The investigation started from February2006 till January 2007.The results obtained showed that beetles could be collected during late winter to early autumn with variation of their population density at different seasons. The majority of the collected species were abundant during spring and early summer. In this investigation, four species confined to three families were identified. The species *Saprinus* sp . 1 (family: Histeridae) was the most abundant followed by *Dermestes maculates* De Geer (family : Dermestidae) , while *Saprinus* sp . 2 and *Necrobia rufipes* (De Geer*)* (family: Cleridae) were the least abundant species .

Introduction

Necrophagous insects, mainly Coleoptera , are attracted to specific stages of carcasses decomposition, in process of faunistic succession [1] , these animals feed , live or breed in and on the corpse , depending on their biological preferences and on the state of decomposition [2 , 3] .The Knowledge of this succession is an important tool in forensic studies to estimate the interval since death from the species of organisms is found on the body [4].

The habits of beetles , are extremely varied such as various decaying animals , dung and carrion [5] , Many types of beetles are attracted to carcasses such as ; Histeridae , Dermestidae , and Cleridae [6 , 7] . The Histeridae are a large family, of compact hard, shining beetles with geniculate and strongly clubbed antennae, The elytra are truncated behind leaving the two apical segments exposed, for the most part they are black or brown insects, But in some cases the elytra are marked with red, and a few species are metallic [5] .

The prosternum is very important in the taxonomy of Histeridae. The central region, which is usually somewhat prominent, is the prostenal keel. Some species show pairs of strinae on the keel, the carinal striae, located toward the middle, and the lateral striae, Some species of saprininae also bear a pair of fovea in the anterior part of the keel , referred to as the preapical foveae , several species of Histeridae have in front of the prosternal keel a lobe called the prosternal lobe which extend laterally[8].The species of; *Saprinus foveisternus* Schm. ,*S.interruptus* Paykull and *S.ornatus* Erichson were found in Iraq [9] .

Dermestid beetles (Fam.: Dermestidae) , an elongate broadly oval , covered with scales or hairs , black or brownish , sometimes patterned , antennae short , clubbed ,fitting in grooves below sides of pronotum , dermestids feed on a great many things such as animals decompositions and storages skins [6 , 10].

On the other hand, the family Cleridae (checkered beetles) are often highly colored with intricate patterns, they are small to medium in size, often cylindrical and usually hairy [10].

Adults body of checkered beetles, elongate – narrow with long erect pubescence, pronotum narrower than forewing, head usually as wide as or wider than pronotum, antennae variously clubbed or threadlike 3- 24 segments. Some adults and a few larvae are pollen feeders , one species ; the Red - legged Ham beetle , *Necrobia rufipes* (De Geer) , is destructive to stored meats ,and the adult are found near spoiled fish and dead animals in the field [6]. The adults of *N. rufipes* are found on dried fish, skins and bones of dead animals and other carrion where they are saprophagous and predaceous [7] .This species was recorded in Iraq [11] .

Because of rare information about those species of Iraq, this investigation is suggested to know beetles species which are attracted to exposed carcasses in Baghdad city.

Materials and Methodes

A survey of adult beetles was undertaken during the period of Feb. 2006 to Jan.2007, using decomposed fish and rabbit carcasses placed in the garden of Iraq Natural History Museum – Bab-Almudham. The rabbits were killed by using chloroform; the carcasses were placed together in a metal cage and exposed to direct sunlight [12], This method is replicated monthly. Collection and samples were performed randomly among the carcasses. Adult beetles were captured by forceps and put in test tubes, and the sampling were killed by freezing and mounted on entomological pins.

The specimens were identified by numerous taxonomical keys [6, 8], and the sampling compared with specimens which they store in Iraq Natural History Museum to assured identification.

Resultes

Adult beetles collected on exposed carcasses (fish and rabbit) during the period of investigation from the garden of Iraq Natural History Museum were found to belong to different three families. Their seasonal abundance and the relative annual abundance were given in table (1) and figure (1), while the results in table (2) showed the temperatures and relative humidity that recorded in Baghdad city during investigation period.

The three families were as follows:

(I) family Histeridae: Two species were collected; these were:

***Saprinus* sp .1** : It started with low numbers during February , then steadily increased during the next three months , followed by decline from July to September , then again increased during October. No beetles were collected during November to January. The population showed one peak during early summer; on the other hand, the population was the lowest during August.

***Saprinus* sp . 2**: The numbers captures of this species were fluctuated during the investigation period which were the highest in Jun and the lowest in October. No beetles were collected during February, March, May, July, August, September, November, December and January.

(II) Family Dermestidae : Only one species was collected :

Dermestes maculatus De Geer ; its seasonal abundance showed a high peak during late spring and early summer . Another, but much lower peak was noticed during March, July and October.

No beetles could be collected during August, September, November, December and January.

(III) Family Cleridae : Only one species was collected :

Necrobia rufipes (De Geer) : Beetles were abundant during spring , the highest peak was reached in May , the lowest peak was in March and October . No beetles could be collected during February, July, August, September, November, December and January.

The results showed that relative annual abundance of these families was; 79.87, 13.98 and 6.15 % respectively.

Disscussion

A summary of the relative annual abundance of the collected species of Coleoptera in the garden of Iraq Natural History Museum on exposed carcasses is given in figure -1. These results showed different seasonal abundance of beetles. In the present study, Histeridae was most abundant during period from February to October compared with Dermestidae and Cleridae . The occurrence of these beetles is as follows: Histeridae and Cleridae, respectively in spring, while Histeridae, Dermestidae and Cleridae during summer, also during fall. In winter, Histeridae species were the only species observed [4], which in general are in an agreement with our results. While the adult Histeridae, Dermestidae and Cleridae were collected on pig carcass during August and September [13].

In the present studay ; *Saprinus* sp . 1 was collected at its highest rate during June (mean temperature 25.5 C^o min . &44.2 C^o max . & 20% r. h .) ,wherease its lowest was in August (at 26.5 C^o min. & 42.7 C^o max . & 33% r.h.). On the other hand, *Saprinus* sp .2 was very scarce in this investigation. The species of *Saprinus chalcites* (Illiger) was found on exposed carcass in summer ; whereas in winter , the family was well represented by *Saprinus subnitescens* Bickhardt and *S . chaleites*. In spring, only *Saprinus subnitescens* and *S . semipunctatus* (Fab.) were present on carcass [14], whereas Koller et al. [15] found that the larger population levels of Histeridae were observed from October to May and from 17 July to 2 October ; *Saprinus aeneus* appeared on carcass at rate of 1.48% (45, 20 specimens in July and August respectively) [16] . Also Centeno et al. [4] found that *Saprinus* sp . have a high level in summer (at mean temperature of 41.75 C^o) and the lowest level was in winter (at 23.8 C^o). Meanwhile, Oliva and Ravioli [17] noticed that *Saprinus patagonicus* was appeared in small numbers during March (at temperature below 22 C^o)

The species of *Dermestes maculatus* (Dermestidae) was recorded in Iraq [18] .In this study, this species was appeared in high number in June , whereas it was found in the lowest number in March , July and October . According to Azab et al. [19] the best condition for rearing *D. maculatus* adult stages was 21.5 C^o and 64.8% r.h. during autumn , while, at 28.2 C^o and 61.6% r.h. in summer was given shortest longevities. The D. *maculatus* only reaches full development when the temperature remains constant at above 18 C^o (20), also *Dermestes maculatus* was found on pig carcass in summer and rain fall season at mean temperature 18.73 C^o&41. 75 C^o respectively [4], while Iannacone [16] in his study on pig carcass (17 July to 2 October) found that *D. maculatus* was more abundant compared with other species. The adult *D. maculatus* was collected on pig carcass during August and September [13], also the species was found feeding on meat exposed in June [21]. Adult of *Dermestes* spp . associated with man cadaver in March (at temperature below 22 C^o) [17]. On other hand , Cleridae species was found in the present study , represented by *Necrobia rufipes* on exposed carcasses , in high numbers during May (22.5 C^o min & 38.2 C^o max & 33% r.h.) ; whereas its lowest was in March (11.5 C^o min & 26.6 C^o max & 43% r.h.) , Also the results indicated that there is no presence of beetles at hot and cold seasons . The previous studies ; found that Cleridae species (*Necrobia spp* .) , could be appeared in a carrion as necrophagous species (feeding and breeding) and as predators [22] . *N . rufipes* was the clerids recovered on carrion, and was predominant presence in the decay stage in summer , winter and spring ; associated with fly maggots inside carcasses [14]. The previous studies stated that *N. rufipes* is necrovorous only [23, 24], whereas the species

of *N . rufipes* is found necrovorous as well as predaceous [25]. Adult of *N . rufipes* was found on dried fish , skins and bones of dead animals and other carrion where they are saprophagous and predaceous , also this is a cosmopolitan species probably originally from the Palearctic region [7].

The species of *N . rufipes* was registered on pig carcass at the rate of 0.45% from total beetles collected during the period of 17 July to 2 October [16] . The results showed that the lowest level is comparable with Dermestidae and Histeridae species; it's appeared in July and August only. These results assured Centeno et al. [4] , they observed no clerids species collected in rain fall and winter at mean temperatures of 18.73 C^o& 20.5 C^o respectively , whereas this species was appeared in spring and summer but in lowest level compared to other beetles (such as Histeridae and Dermestidae) .

On the other hand, differences between the results might be due to the geographical region and season [26, 27].

Generally, field observation in the present study showed that most , if not all , species of collected beetles are more abundant during the moderate and warmer temperature of spring , early summer and early autumn seasons than during cold winter and late summer .

Finally; it was found that *Saprinus* sp . 1 was the most abundant species of coleopteran during this investigation.

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Table (1):Seasonal abundance of beetles on exposed carcasses in Baghdad Governorate during the period from Feb. 2006 to Jan. 2007

Coleopteran species	Number of beetles in monthly collection											
	Feb.006	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan-007
Fam.:Histeridae												
***Saprinus* sp.1**	9	25	438	63	15219	14	2	6	342	–	–	–
***Saprinus* sp.2**	–	–		–		–	–	–		–	–	–
Fam.:Dermestidae												
Dermestes maculatus	6	1	3	15	39	1	–	-	1	–	–	–
Fam.:Cleridae												
Necropia rufipes	-	1	3	16	7	-	-	-	2	-	-	-

Table (2):The temperature and relative humidity dominated the period of study (According to Iraqi meteorological office)

Months	Feb-2006	March 2006	Apr-2006	May 2006	Jun 2006	Jul-2006	Aug-2006	Sep-2006	Oct-2006	Nov-2006	Dec-2007	Jan-2007
Min C°	8.7	11.5	17.0	22.5	25.5	27.0	26.5	20.9	18.5	8.1	3.1	3.0
Max C°	19.6	26.6	30.3	38.2	44.2	45.3	42.7	40.0	34.0	22.7	15.7	14.0
R.H%	63	43	49	33	20	22	23	28	43	49	62	67

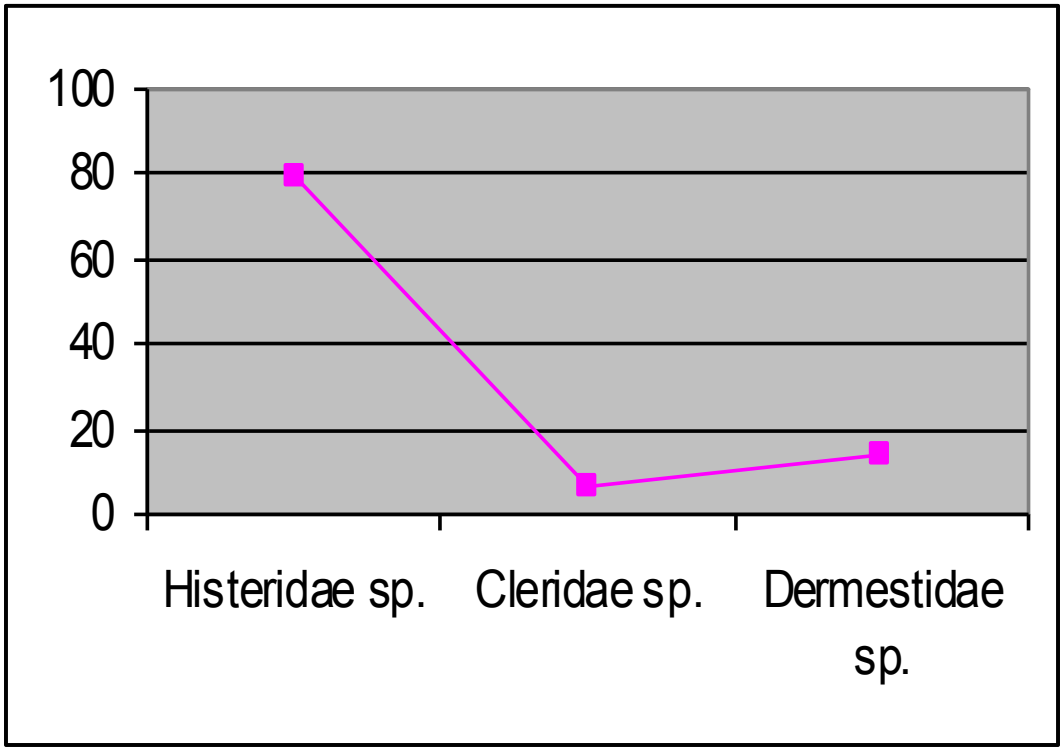

Fig. (1): Percentages of beetle species collected from dead animal carcasses during Feb.2006-Jan.-2007

التواجد الموسمي لأنواع الخنافس(الدور الكامل) على الجثث المكشوفة في مدينة بغداد

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الخلاصة

جمعت الخنافس المتجمعة حول الجثث الميتة للارانب و الاسماك المكشوفة في دراسة تعد الأولى في مدينة بغداد التي أجريت للفترة شباط 2006 و الى كانون الثاني 2007 .

بينت النتائج أنه بالإمكان جمع انواع من الخنافس في نهاية موسم الشتاء ولغاية بداية الخريف بكثافة سكانية متباينة حسب النوع والموسم،و أظهرت الدراسة وجود أربعة أنواع تعود إلى ثلاث عوائل وهي :

النوع 1 . *Saprinus* sp عائلة Histeridae اذ كان الأكثر وفرة، تلاه النوع De Geer *Dermestes maculatus* العائلة Dermestidae .بينما كان النوعان 2 . *Saprinus* sp من العائلة Histeridae و *Necrobia rufipes* De Geer عائلة Cleridae هما الأقل وفرة خلال تلك المدة.