# A New Record of Dung Beetle, *Aphodius mayeri* Pilleri, 1953 From Iraq (Coleoptera: Aphodiidae)

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#### ABSTRACT

A new record of dung beetles, *Aphodius mayeri* Pilleri, 1953 is described from Iraq. The species is distinct by the 3<sup>rd</sup> segment of labial palps, ellipsoid, two times as long as 2<sup>nd</sup> segment. Antenna with nine segments, 7<sup>th</sup> segment is slightly larger than the others and the 7<sup>th</sup>-9<sup>th</sup> segments lamellate. Protibia with three blunt teeth anteriorly; apical spine flat. Parameres are symmetrical, parallel, slightly convex and slightly longer than the penis with acute apical part. The diagnostic characters of the species were illustrated.

Key words: Coleoptera, Aphodiidae, New record, Aphodius mayeri, Iraq.

## **INTRODUCTION**

Dung beetles are detritivores insects that feed on and reproduce in the fecal material of vertebrates. This dependency on vertebrate feces implies frequent contact between dung beetles and parasitic Helminthes with a fecal component to their life-cycle. Interactions between dung beetles and Helminthes are with both positive and negative consequences for successful transmission of parasites (Nichols and Gómez, 2014). Some species of dung beetles act as biological control agents for gastrointestinal Parasites of livestock, *Ostertagia osterta* (Fincher, 1973). Many species of dung beetles are major intermediate host of the dog esophageal worm *Spirocerca lupi* (Du Toit *et al.*, 2012). Dung beetles also play an important role in the transmission of some Helminthes to human and cattle (Mowlavi *et al.*, 2008). Khaustov (2010) described the mites, *Pseudopygmephorus aphodii* (Acari: Neopygmephoridae) from Crimea, Ukraine as phoretic on the dung beetle, *Aphodius fimetarius* (L.). Species from least 18 dung beetle genera have been reported as likely or confirmed as likely or

confirmed intermediate hosts of parasites of omnivores and carnivores, including Ascarops strongylina, Ascarops strongylina, Physocephalus sexalatus, Macracanthorhynchus hirudinaceus, Gongylonemaverrucosu and Spirocerca lupi (Gottlieb et al. 2011; Du Toit et al. 2012). The genus Aphodius illiger is an important genus of dung beetles, currently contains more than 1600 species (Dellacasa, 1987) with over 190 species inhabiting Western Europe (Baraud, 1992). There are 10 Palaearctic and Oriental species included in the revision by Dellacasa (1983), further three species were described (Stebnicka, 1981; Stebnicka, 1985; Emberson & Stebnicka, 2001). Thus, total of thirteen species of the genus have still been known from the Palaearctic and Oriental regions. In Iraq there is no any taxonomic study of the family except; Derwesh (1965) indicated eight species in five genera. El-Haidari et al., (1972) mentioned Aphodius granaries collected from tomato field in Karkuk Governorate. Abdul Rassoul (1976) recorded three species and Al-Ali (1977) recorded 10 species. Shalli and Fat-hullah (1986) recorded the species Aphodius lividus Oliv. from Bazian, Sulimani Governorate.

The purpose of this study is to conduct a comprehensive survey of different dung beetles localities of Kurdistan Region – Iraq to collect the samples and describe the new record of dung beetle*s*, *Aphodius mayeri* Pilleri from Iraq and drawing the important parts especially the male genitalia.

#### MATERIALS AND METHODS

The present paper is based on 60 specimens which collected from the period of January till June 2021 from from sheep and goats dung pads in some localities of Erbil and Sulimani governorates respectively (Khostapa and Benslawa) and (Kalar and Beckrajo) in Kurdistan region - Iraq. The specimens were placed in boiling water for 15-20 minutes to soften their parts. Then the parts were separated by two fine pins and put in 10% KOH, after that placed on fire (heater source) with shaking for about 15-20 minutes for dissolve the lipids. After that placed in distilled water for 3-4 minutes in order to neutralize the alkali. The parts are placed in ethyl alcohol 25% and dissected under binocular microscope, then transferred to ethyl alcohol 50% ,75% and 100% respectively for two minutes of each concentration to dehydration of water, so that placed in xylol for two minutes, Finley place each part on the slide with a drop of DPX solution then covered by cover slides to prepare slides for examination (Lane and Grosskey, 1993; Mawlood *et al.*, 2016). A digital camera (Ucmas series microscope camera) was used to photographing the habitus and important parts. The measured

proportions of body parts are given in points of an eyepiece linear micrometer in a binocular microscope. The species were identified with the help of available literature of (Andrew *et al.*, 2007).

## **RESULTS AND DISSECTION**

## Aphodius mayeri Pilleri, 1953;

#### Synonym: Calamosternus mayeri (Pilleri, 1953)

## Description

**Body:** Highly convex, broadly oval, glabrous, shining, prevalently dark brown - black (antennal clubs testaceous, palpi, antennal flagellum, pronotum anterior margin and tarsi reddish brown to brown). Length 5.4- 6.8 mm.

Head: Nearly taprozoid, dark brown. Eyes small, oval, brown, 0.9-1.1 mm, widest distance between eyes at apical part 1.3-1.6 mm, completely exceeding eyes, bearing short, fine setae. Frons with distinctly impressed but irregularly shaped punctures; smooth, impunctate zone behind these punctures. yellow, anterior margins strait, posterior moderately concave, surface densely short-long setose laterally with moderately arise tubers. Clypeus broadly rounded, lateral margins before gena straight, nearly parallel one with another. Gena markedly auriculate. Epistoma moderately convex, sparse surface, poorly defined, medium-Labrum (Fig. 2a) semispherical, anterior margin straight, sized punctures. posterior margin moderately concave at the middle, surface densely fine yellow setose. Mandible (Fig.2b) irregular shaped, upper part cylindrical, high sclerotized, apical rounded, lower part slightly sclerotized, molar area with row of fine pale yellow setae. Labial palp (Fig. 2c) brown, 2<sup>nd</sup> and 3<sup>rd</sup> segments cup shaped, 2<sup>nd</sup> segment 1.2 times as long as 1<sup>st</sup> segment, 3<sup>rd</sup> segment ellipsoid, two times as long as 2<sup>nd</sup> segment. Maxilla (Fig.2 d) dark brown, cardo and stipes triangular, bare, distal part of lacinia spherical, densely very short setose. Maxillary palp brown, bare, 2<sup>nd</sup> - 3<sup>rd</sup> segments of maxillary palp cup shaped, 2<sup>nd</sup> segment 1.2 times as long as 3<sup>rd</sup> segment, 4<sup>th</sup> segment oval elongate, 1.8 times as long as 3rd segment. Antenna (Fig.2e) lamellate, brown consist of nine segments, 1<sup>st</sup> segment oval three times as long as 2<sup>nd</sup>, 2<sup>nd</sup> segment nearly globular, 3<sup>rd</sup> – 6<sup>th</sup> segments cup shaped, 3<sup>rd</sup> segment 1.4 times as long as 4<sup>th</sup>, 7<sup>th</sup>-9<sup>th</sup> segments lamellate, 7<sup>th</sup> segment slightly larger than the others.

**Thorax**: Pronotum nearly cup shaped dark brown nearly widest at middle, slightly narrowed anteriorly and posteriorly towards moderately truncate posterior corners. Anterior margin slightly concave, posterior margin slightly

convex. Pronotum surface with double, fairly regular punctation: coarse punctures intermixed with fine ones; gibbous above posterior corner with only few coarse punctures. Scutellum triangular, dark brown with acute apex. Elytra brown, broad, without humeral teeth, with 10 striae and 10 intervals. Striae moderate deep, intervals rather flat, bordered with undulate lines, finely punctate, punctures partially arranged in two rows in each interval. Seventh striae strongly reduced anteriorly. Stigma of hind wing divided into two parts, the basal small triangular, the apical elongated oval, middle part of costa with a row of fine, very short pale yellow setae. Legs brown, fore coxae cylindrical shaped, trochanter triangular, femur thick, cylindrical 0.7-1.1 mm length, surface sparsely pale yellow setose. Protibia (Fig. 2f) with three blunt teeth anteriorly; apical spine flat, with moderately rounded and slightly outward from base to apex, middle and basal teeth triangular, middle tooth 1.2 times as long as basal one, apical part with single spur as long as 1<sup>st</sup> and 2<sup>nd</sup> tarsal segment combined, apical part of tibia has single spur. Protarsus tubular, 1<sup>st</sup> tarsus 0.4 times as long as 2<sup>nd</sup>, 2<sup>nd</sup> segment 1.1 times as long as 3<sup>rd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> segments with same length, 5<sup>th</sup> segment 2.1times as long as 4<sup>th</sup> segment, claw simple, short slightly curved. Middle legs resemble with fore legs except coxae oval, one-fourth apical of femur has 4-5 spines. Mesotibia with three of fringed equal setae, apical part of mesotibia have pair of spurs with row of spines, 1<sup>st</sup> tarsal segment 1.2 times as long as 2<sup>nd</sup>. Hind legs resemble the fore legs except, coxa plate shaped, metatibia with two strong transverse ridges, apex fringed with equal setae; apical part of mesotibia have pair of spurs with row of spines; basimetatarsite as long as metatarsus 2to 4 combined. Ventral side also shining, dark brown to black. Anterior femur finely punctate, with numerous setae; punctures mostly present in anterior half; setae mostly arranged along anterior and posterior margins. Intermediate femur sparsely, finely punctate, with more than ten setae in apical half (some of them along anterior margin and others arranged in a row parallel with posterior margin). Posterior femur finely punctate, with some setae along anterior margin, otherwise glabrous. Metasternum with numerous considerable punctures.

**Abdomen:** Consist of six dark brown visible segments, surface granulated, sparsely pale yellow setose.  $1^{st} - 5^{th}$  abdominal sternites transverse,  $1^{st}$  segment 1.2 times as long as  $2^{nd}$  segment,  $3^{rd}$  segment 1.1 times as long as  $3^{rd}$ ,  $3^{rd}$  and  $4^{th}$  segments nearly with the same length.  $6^{th}$ sternite triangular, anterior margin straight, posterior oval.  $1^{st} - 5^{th}$  abdominal tergites transverse,  $3^{rd}$  tergite is the longest. Surface of tergites sparsely yellow setose.  $6^{th}$ tergite cup shaped. Pygidium rugosely punctated, with few setae on its surface.  $9^{th}$  abdominal sternite

(Fig. 2h) clavate shaped, apical arm nearly tubular shaped, lateral arms triangular, basal part nearly oval. 10<sup>th</sup> abdominal sternite (Fig. 2h) nearly triangular.

**Male genitalia:** Aedeagus (Fig. 2g) simple, brown, moderately sclerotized, Length 4.1–4.8 mm. Basiphallus oval, slightly sclerotized, 2.1-2.8 long. Parameres symmetrical, cylindrical, parallel, slightly convex, apical oval, 2.1–2.6 mm long. Penis triangular, slightly shorter than parameres, apical part acute. Phalloapodeme rod shaped, strongly sclerotized.





Figure (1) Aphodius mayeri Pilleri

a. Habitus (Dorsal view) b. The mite (*Pseudopygmephorus* sp.) c &d . *A. mayeri* infested by mite parasitoid (*Pseudopygmephorus* sp.).



Figure (2) Aphodius mayeri Pilleri

a. Labrum	b. Mandible	c. Labial palp	d. Maxilla	e. Antenna
f. Protibia	g. Aedeagus	h. 9 <sup>th</sup> and 10 <sup>th</sup> abdominal sternites		

#### ACKNOWLEDGMENT

We would like to express our thanks to the specialist, Asst. Prof. Dr. Hanna Hani Al-safar in Iraq Natural History Research Center and Museum -University of Baghdad for their help to confirm the species.

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