

**New Record of the Dung Beetle, *Aphodius fimetarius* (L.)
(Coleoptera, Aphodiidae) in Iraq**

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Abstract

Dung beetle, *Aphodius fimetarius* (Linnaeus, 1758) (Coleoptera, Aphodiidae) was registered as a new record from Iraq. The important morphological features are redescribed in this study and illustrated. The members of the taxon are easily distinguished, where the mandibles are irregular in shape and bidenticles. The distal part of lacinia membranous is dense with very short yellow setose. The 4th segment of the maxillary palps is elongated, oval and as long as the 2nd segment. Antenna is lamellate and consists of nine segments and the; 1st segment is oval and 2.4 times as long as the 2nd segment. Pronotum is black with yellow angles anteriorly. The parameres are parallel from the dorsal view, slightly convex laterally, apex relatively weakly bent and hook like. The whole body and the important parts of the species were photographed to facilitate the classification process.

Keywords: *Aphodius fimetarius* (L.), Coleoptera, Iraq, new record.

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تسجيل جديد لخنفساء الروث (*Aphodius fimetarius* (Linnaeus, 1758)
في العراق (Coleoptera: Aphodiidae)

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الخلاصة

تم تسجيل ووصف خنفساء الروث *Aphodius fimetarius* لأول مرة في العراق. تم إعادة وصف الصفات المظهرية وتوضيحها. تتميز بكون الفكوك العلوية غير منتظمة الشكل وتحتوي على سنين. الجزء البعيد من الشرشرة غشائية تحتوي على شعيرات كثيفة وقصيرة جدا صفراء اللون. القطعة الرابعة من الملمس الفكي بيضوية متطاولة ويقدر 2.4 مرة طول القطعة الثانية. ظهر الصدر الامامي أسود اللون وزواياه الامامية سوداء اللون. القطعتان الجانبيتان متوازيتان في المنظر الظهري و هما قليلتا التحذب جانبيا، قمتهما مائلة قليلا شبيهتان بصنارة الصيد. تم تصوير الجسم والاجزاء المهمة تصنيفيا.

الكلمات المفتاحية: خنفساء الروث، غمدية الاجنحة، العراق، تسجيل جديد.

Introduction

Dung beetles can play a role in helminth transmission and dispersal when a fraction of ingested eggs survives passage through the beetle's masticatory and gastrointestinal systems [1]. Dung beetles are detritivorous insects that feed on and reproduce in the fecal material of vertebrates. This guild, which depends 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 [2]. Many species of dung beetles are a major intermediate host of the dog esophageal worm *Spirocerca lupi* [3, 4], and also play an important role in the transmission of some helminthes to human and cattle [5]. Species of the subfamily Aphodiinae are usually referred to as dung beetles because most (though not all) feed on feces; generally, these beetles are small, usually brown, black or gray, the elytra are

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with or without markings, and the pronotum is with or without sculpturing, and the members of the subfamily Aphodiinae are best characterized by the presence of 9-segmented antennae, a 3-segmented tomentose antenna club and small size (less than 15 mm); this subfamily contains over 300 species in North America and 49 species are found in Nebraska to date [6].

Aphodius illiger is important genus of Aphodiidae, currently contains more than 1.600 species [7] with over 190 species inhabiting in Western Europe; this area has been well surveyed; hence few new species have been surveyed in recent years [8]. There are 10 Palearctic and oriental species included in the revision which was conducted by Dellacasa [9], further three species were described by [10-12]. Thus, thirteen species of the genus have still been known from the Palearctic and Oriental regions. In Iraq, Derwesh [13] listed eight species that belonging to the five genera, *Aphodius granaries* collected from tomato field in Kirkuk Province [14] then; Abdul-Rassoul [15] recorded three species and Al-Ali [16] recorded 10 species. From the other hand, Shalli and Fathullah [17] recorded the species *Aphodius lividus* (A. G. Olivier, 1789) from Bazian - Sulaymaniyah Province.

The aim of this study was to conduct a comprehensive survey of different dung localities of Kurdistan region, Iraq to collect the specimens from the *Aphodius* genus of different animals (goat, sheep and cows). A detail description of dung beetle *Aphodius fimetarius* (Linnaeus) and photographing the important parts especially the male genitalia were performed in order to provide enough information to facilitate the identification of this species.

Materials and Methods

The specimens were collected from different areas of Iraqi Kurdistan region during March – July 2017 from dung pads and manures of different animals (sheep, goats and cows); the specimens were examined under Trinocular microscope and the measurements were recorded by using ocular micrometer. The habitus and important parts photographs were taken using a Canon MP-E 65mm/ 2.8 1–5× Macro on bellows attached to a Canon Digital IXUS 9515 camera. The genus firstly and then species was identified with the help of the available

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literatures [18, 19]. The specimens were deposited in Iraq Natural History Research Centre and Museum, University of Baghdad.

Results and Discussion

Redescription of the *Aphodius fimetarius* (L.) [20].

Description

Body

Figure (1 a, b): Shining red, moderately convex, broadly oval, dorsal view appearing stocky. Length 5.3-7.2 mm.

Head

Figure (1 a, b): Black and slightly convex; frons with distinctly impressed and irregularly shaped punctures, surface densely covered by short and long setae, laterally with moderately arise tubers; the distance between median tubercle of frontal suture and clypeal carina appearing more or less same as distance between clypeal carina and anterior margin of clypeus. Eyes, oval shaped and brown, 1.0-1.4 mm length; clypeus broadly rounded, lateral margins before genae straight, nearly parallel one with another.

Genae markedly auriculate, epistome moderately convex, surface sparsely, poorly defined, medium-sized punctures; frontoclypeal suture invisible. Mandibles figure (2a) irregular shaped, bidenticles, high sclerotized, upper part membranous, ventral surface slightly sclerotized, molar area with row of fine pale and yellow setae.

Epipharynx figure (2b) dark brown, cup shaped, epipharyngeal epitorma not sclerotized, the line of epipharyngeal undulate; bristles of chaetoparia rather thin, those of chaetopodium bristles are longer. Labial palp brown to dark- brown; mentum nearly rectangular, anterior edge slightly concave, posterior edge moderately invagintated, surface moderately size punctate with densely and very long dark yellow setae; 1st and 2nd segments cup shaped, each with 2-3 short setae, 1st segment 1.2 times as long as the 2nd, 3rd segment oval, bare as long as 1st. Maxilla figure (2c) dark brown, distal part of lacinia membranous, spherical, densely and

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clothed with very short yellow setae. Maxillary palp brown, bare, 1st segment is the shortest, 2nd segment 1.7 times as long as the 3rd, 4th segment elongate oval as long as the 2nd.

Antenna figure (2d): lamellate, brown, 1.2-1.6 mm in length, consist of nine segments, 1st segment oval 2.4 times as long as the second, 2nd segment nearly globular and 1.1 times as long as the 3rd, 4th – 6th segment semi-equal in length, 7th-9th segments lamellate, 7th and 8th segments semi-equal in length, 9th segment 1.2 as long as 8th.

Thorax

Pronotum figure (2e) black with yellow color at the anterior edges; matt in part, but generally more shiny, pronotal surface with coarse punctate and more impressed; in females on disc mostly denser and more evenly distributed, bare, a fringe of hairs may be present along the lateral sides, anterior angles with dark yellow to brownish spots; posterior angles of pronotum obliquely truncate and inward sinuate; frontal suture distinctly trituberculate, front margin of pronotum, in males, faveolated at middle, pronotal punctuation coarser and more impressed; in females the punctuation on disc mostly denser and more evenly distributed.

Scutellum triangular, black and very finely punctuated. Legs brown, fore coxae cylindrical shaped, trochanter triangular shaped, femur thick, cylindrical 0.7-1.1 mm in length, dorsal surface sparsely with pale yellow setae, fore tibia figure (2f) tridentate, teeth becoming progressively larger towards apex, with three blunt teeth anteriorly; apical tooth flat, moderately rounded and slightly outward from base to apex, middle and basal teeth triangular, middle tooth 1.2 times as long as basal once; dorsal surface impunctate; apical spur acuminate and curved slightly downward, apical part with single spur as long as 1st and 2nd tarsal segment combined; protarsus tubular, first segment shorter than second; nearly 0.4 times as long as 2nd, 2nd segment 1.3 times as long as 2nd, 3rd 1.1 times as long as 4th, 5th segment is the longest and nearly 1.1 times as long as 3th segment and claw simple, short slightly curved. Mid legs resemble fore legs except, mid tibia without teeth, surface with three rounded rows of short and equal spines, apical part of tibia with two spurs, 1st segment of the tarsus is the longest, nearly 3 times as long as the 2nd, 2nd segment 1.1 3 times as long as the 3rd, 3rd and 4th

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segments same length. Hind legs resemble fore legs except, coxa boat shaped, 1st segment of tarsus 2 times as long as the 2nd, 2nd segment 1.2 times as long as the 3rd, 3rd segment 1.1 times as long as the 4th, 5th segment as long as the 1st. Scutellum triangular equilateral, with straight sides.

Elytra figure (2g) distinctly red, less frequently yellowish red; elytra with nine intervals on disc in cross-section mostly flat or only weakly vaulted; rarely distinctly convex in cross section, 4th and 5th elytra interval before apex in the male figure (1c) mostly shortened; tip of elytra with dense, fine micro punctures and an overall smooth appearance; elytra apices are reticulate (at least in part) and the lines of reticulation include more roundish cells (in male), or less in female figure (1d), which are very small, convex, smooth and shiny. Fore tibia tridentate, teeth becoming progressively larger towards apex; dorsal surface impunctate; apical spur acuminate, curved slightly downward.

Abdomen

Consists of six visible segments, slightly convex, surface sparsely pale-yellow setae. Abdominal sternites black or dark brown, covered with short and yellow hairs; 1st – 5th abdominal sternites transverse, 1st segment 1.2 times as long as 2nd segment, 3rd segment 1.1 times as long as 3rd, 4th and 5th segments with same length approximately, 6th sternite elongated oval, 1st-5th abdominal tergites transverse, 6th tergite triangular, 9th abdominal segment membranous, clavate bilobed, 9th abdominal sternite figure (2h) clavate shaped, apical arm nearly tubular, basal part nearly oval, 10th abdominal sternite figure (2h) slightly triangular.

Male genitalia

Aedeagus figure (2 i, j) dark yellow, slightly sclerotized, 1.0-1.4 mm long; parameres cylindrical, parallel in dorsal view slightly convex laterally, apex relatively weakly bent and hook like, 0.4-0.6 mm long, the space between the apical 0.06- 0.08 mm; Basiphallus oval, 0.6 -0.8 mm long; medial lobe tubular and slightly shorter than the parameres; ejaculatory duct, dark brown, and tubular shaped.

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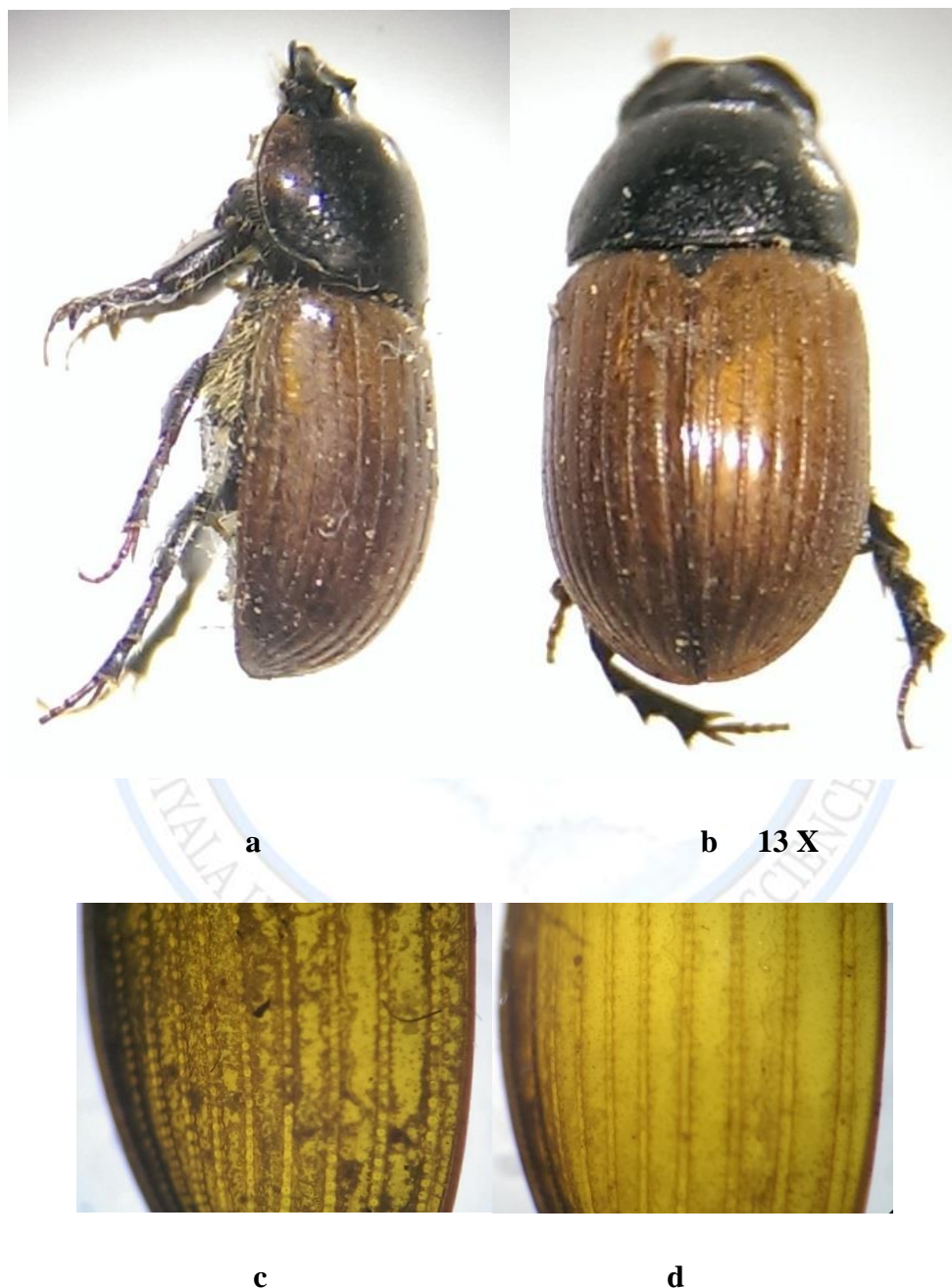


Figure 1: *Aphodius fimetarius* (male)

a. Dorsal view b. Lateral view c. Elytra (Male) d. Elytra (Female)

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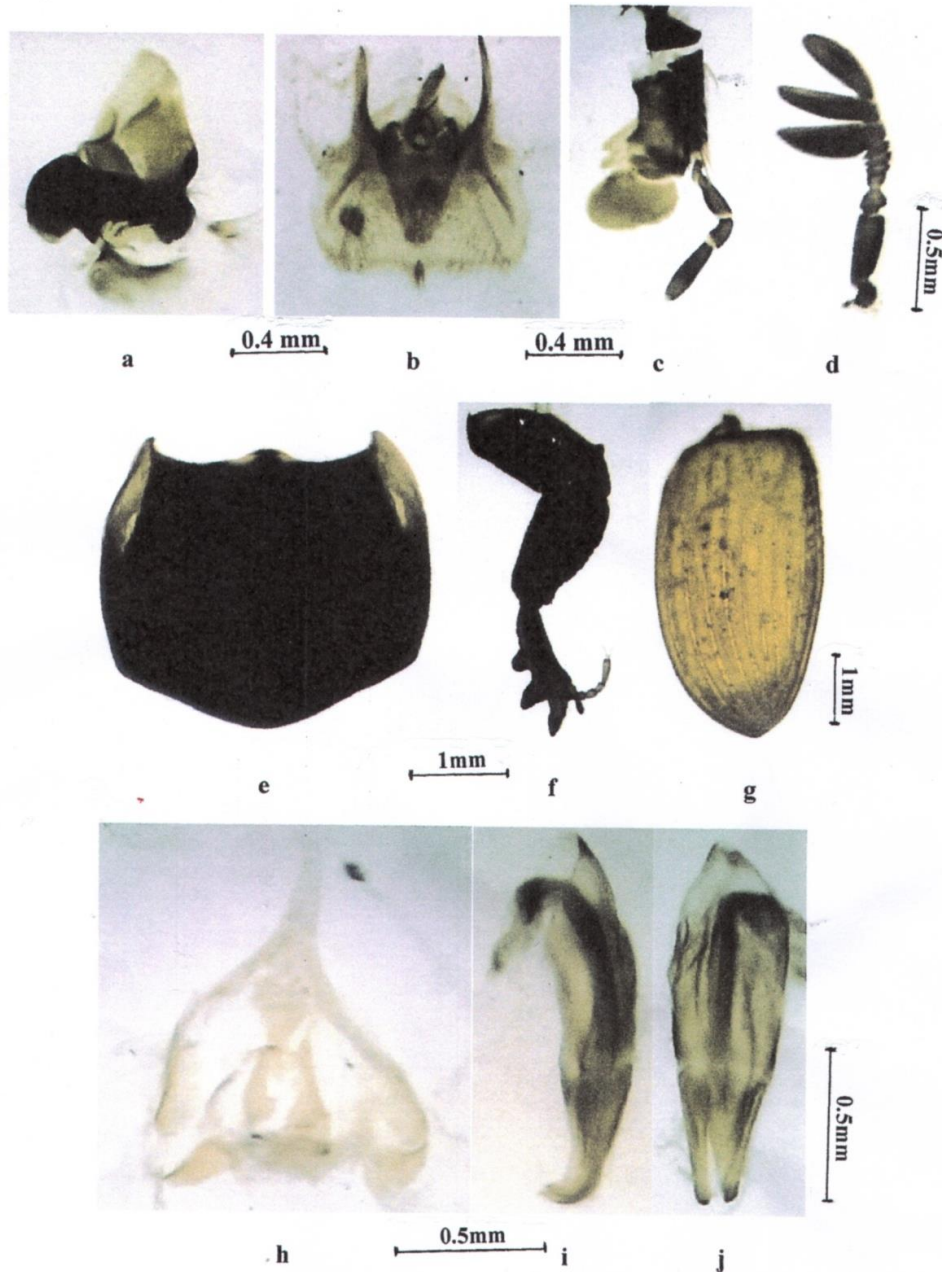


Figure 2: *Aphodius fimetarius*

- a. Mandible b. Epipharynx c. Maxillae d. Antennae e. Pronotum f. Fore leg
g. Elytra h. Spiculum gaster i. Male genitalia (lateral view) j. Male genitalia (dorsal view)

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References

1. Miller, A.; Chi-Rodriguez, E. a; Nichols, R. 9L., Am. J. Trop. Med. Hyg. 1961, 10, 748-754.
2. Nichols, E.; Gómez, A., Parasitology J. 2014, 141(5), 614-623
3. Gottlieb, Y.; Markovics, A.; Klement, E.; Naor, S.; Samish, M.; Aroch, I.; Lavy, E.; Lavy, E., Vet. Parasitol. 2011, 180(3,4), 378-382
4. Du Toit, C.A.; Holter, P.; Lutermann, H.; Scholtz, C. H., Medical & Veterinary Entomology, Bind 2012, 26(4), 455-457.
5. Mowlavi, G.; Mikaeili, E.; Mobedi, 1.; EB, Kia; E.B.; Masoomi, L.; Vatandoost3, H., Iranian J. Arthropod-Borne Dis. 2008, 2(2), 35-41
6. Ratcliffe, B. C., Transactions of the Nebraska Academy of Sciences 1988, XVI, 87-89.
7. Dellacasa, G., Memorie della Società entomologica italiana 1987, 66, 1-445.
8. Baraud, Jacques. Coléoptères Scarabaeoidea d'Europe. Vol. 78. Faune De France, 1992, 856.
9. Dellacasa, G., Annali del Museo Civico di Storia Naturale di Genova 1983, 84, 245-268.

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10. Stebnicka, Z., Entomologica Basiliensia 1982, 6, 319-327.
11. Stebnicka, Z., Revue Suisse de Zoologie 1985, 92, 359-366.
12. Emberson, R. M.; Stebnicka, Z., Acta Zoologica Cracoviensia 2001, 44,405-411.
13. Derwesh, A.I., Direct. Gen. Agri. Res. Proj. Baghdad. Bull. 1965, 121-123.
14. El-Haidari, H.; Fattah, Y. M.; Sultan, J. A., Contribution to the fauna of Iraq. Bulletin 1972, 18(4), 1-19.
15. Abdul-Rassoul, M. S., Nat. Hist. Res. Cent. Iraq, publ. 1976, 30.
16. Al-Ali, A. S., Nat. Hist. Res. Cent. Iraq, publ. 1977, 33, 142.
17. Shalli, R.A.; Fat-hullah, B.S., Appl. Agri. Res. Plant Protection Research Selection / Bekrajo1986, 1-63.
18. Andrew, B.; Smith, T.; Paul, E. S., A review of the Aphodiinae (Coleoptera: Scarabaeidae) of Southern South America Magnolia Press, Auckland, New Zealand 2007, 80.
19. Pivotti, I.; Agoglitta, R.; Zunino, M.; Piattella, E.; Dellacasa, M.; Corallini, C.; Mifsud, D., Bull. Entomol. Soc. Malta. 2011, 4, 85-124.
20. Linnaeus, C., Caroli Linnaei, Systema naturae per tria naturae 1758, 1, 824.