



DESCRIPTION OF SAP BEETLES, *CAROPOPHILUS HUMERALIS* (FABRICIUS, 1798) (COLEOPTERA: NITIDULIDAE) FROM ERBIL GOVERNORATE KURDISTAN REGION, IRAQ

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Abstract

Sap beetles, *Carpophilus* https://en.wikipedia.org/wiki/Carpophilus_dimidiatus_humeralis (Fabricius, 1792) from Erbil governorate, Kurdistan region – Iraq is described. The specimens were collected from dried and fermented figs during April - September of 2018. The members of taxon are easily to be distinguished, where the mandibles bidenticated. Antenna 11 segmented ending in three club shorter than the stem. Elytra shiny black exposing three abdominal segments. Adeagus nearly L-shaped laterally. Parameters are sinuous, dagger shaped, curved to a sharp tip. The important taxonomic parts have been photographed, includes labrum; mandibles; antennae; protibiae, elytra, 5th abdominal sternites, spiculum gastrale and male genitalia.

Key words : Coleoptera; Nitidulidae; Description; *Carpophilus* https://en.wikipedia.org/wiki/Carpophilus_dimidiatus_humeralis; Kurdistan Region; Iraq.

Introduction

Sap beetles, family Nitidulidae Latreille, 1802 consist of more than 4500 described species worldwide, with diverse feeding habits, but mostly saprophagous and mycetophagous are feeding on decaying fruits and fermented plant tissues or dead animal tissue (Parsons, 1943; Hinton, 1945; Hayashi 1978; Jelinek *et al.*, 2010). These beetles can be also vector mycotoxin producing fungi to corn and strawberries (Dowd and Nelson, 1994). Some species occur on carrion, especially that in the last stages of decay where bones, dried tissue and sinews and hide are all that remain. Many species occur in decaying plant material ranging from compost and fermenting fruits, to mouldy grains and hay, under bark of recently dead trees and in compost. Some species are found on sap-flows or fermenting wounds on trees, hence the common name sap-beetle (Martin, 1977). *Carpophilus* Stephens, 1930 is important genus of the family which includes approximately 200 species distributed mainly in tropical and temperate regions of the World (Dobson, 1954; Gillogly, 1962; Leschen and Marris, 2005; Brown *et al.*, 2012). Several species of the genus

are important pests of crops and stored products, and are frequently intercepted as part of biosecurity operations. Many species are scavengers of rotting fruit, with both adults and larvae feeding on this substrate. Some species are also known to attack fruit on the tree, which are decreasing the commercial value of the crop, and they are considered to be important pests in orchards and agricultural situations. *Carpophilus davidsoni* Dobson, *C. hemipterus* (Linnaeus) and *C. mutilatus* Erichson have been emerged as serious pests of stone fruit in Australia (Hossain and Williams, 2003; James *et al.*, 1997). Several species are known agricultural pests of field and stored products. These include the dusky sap beetle, *Carpophilus lugubris* Murray on field and sweet corn; the corn sap beetle, *Carpophilus dimidiatus* on field corn; the complex *Carpophilus dimidiatus* (F.), *Carpophilus freemani* Dobson and *Carpophilus mutilatus* Erichson on stored maize (Arbogast and Throne, 1997). A lesser group of these beetles are regarded as economically important pests of stored products worldwide, in particular several species of the cosmopolitan genus *Carpophilus* which affect stored grain and products, dry fruits, oilseeds, cacao, and many

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other commodities (Audisio, 1993; Artigas, 1994; Jelinek *et al.*, 2016). Some species, like *C. mutilatus* Erichson, *C. hemipterus* and *C. dimidiatus*, are relevant in food industry when developing in accumulations of fruits because of the indirect damage, and they can cause as vectors of fruit diseases that seriously spoil the stored product (Leschen and Marris, 2005; Barth *et al.*, 2009). *Carpophilus humeralis* (Fab.) is an agricultural pest in many of the warmer parts of the world. It feeds on ripe fruit, transmits plant disease, and contaminates commercial products (Connell, 1981). The classification of the genus is confusing because there is no global treatment of the group, apart from world catalogue of then 191 known species by Williams *et al.*, (1983). There are six subgenera in Palearctic region (Jelinek, 2005), but all species have not been placed into these groupings. In Iraq, Derwesh (1965) indicated three species, which include *Carpophilus hemipterus* (L.), *C. fumatus* Boh. and *C. dimidiatus* (Fabricius). Al-Ali (1977) recorded four species, involving *Carpophilus hemipterus* (L.); *C. dimidiatus* (Fabricius); *C. obsoletus* Erichson and *C. lingneus* Murr.

Materials and Methods

The specimens were collected from dried and fermented figs in different localities at Erbil governorate, Kurdistan region – Iraq during April - September of 2018. The specimens were placed in boiling water for 10-15 minutes to soften their parts. Then the parts were separated and put in 10% KOH then placed in water bath for 10-15 minutes. After that placed in distilled water for 2-3 minutes in order to neutralize the alkali. These parts are placed in ethyl alcohol 25% and dissected under binocular microscope. The measured proportions of body parts are given in points of an eyepiece linear micrometer in a binocular microscope (Lane and Crosskey, Khalil *et al.*, 2018). Taxonomic identification was done using keys and descriptive comparative works on *Carpophilus* published by nitidulid experts, mainly: (Hinton, 1945; Dobson, 1954; Prado, 1987; Audisio, 1993; Leschen and Marris, 2005 and Jelinek *et al.*, 2010). Males were treated in hot 10 percent potassium hydroxide solution for three hours to facilitate this section. Mouthparts, eighth abdominal sternite, Spiculum gastrale and genitalia were dissected out under a binocular microscope. These structures were washed by distilled water, and transferred to 70 percent ethyl alcohol. The habitus and important parts have been photographed through a digital camera (Canon Digital IXUS 9515). Studied and identified specimens are deposited in the plant protection museum at College of Agriculture-University of Salahaddin. The species was confirmed by the help of Prof. Dr. Hussam

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Results and Discussion

Carpophilus humeralis (Fabricius) 1798.

Synonymes

Nitidula humeralis Fabricius, 1798. Ent.Syst.Suppl., 74

Brachypterus picinus Boheman, 1851. Boheman, Ins.Caffr. 1(2):560.

Carpophilus rickseckeri Fall, Trans. Amer. ent.Soc., 36:124.

Carpophilus foveicollis Murray, 1864

Description

Body (Male) Figs. (1 a,b and c)

Oval, shining black, subflattened dorsally and moderately convex ventrally. Length 2.7 - 4.1 mm and breadth 1.6-2.2 mm.

Head

Head black, broad but distinctly narrower than the pronotum with a rounded shallow high densely of punctures about 2.5 times as coarse of facets of eye. Eyes prominent, dark brown, rounded 0.2-0.3 mm long. Clypeus indistinct, slightly proreced. Labrum (Fig. 2 a) brown, bilobed, nearly rounded, posterior margins densely dark yellow setose. Mandibles (Fig. 2b) symmetrical, heavily sclerotized, bidentate, outer denticles 2 times as long as the inner, dorsal surface bare. Maxilla (Fig. 2c) brown-dark brown moderately sclerotized, lacinia yellow, broad and rounded at tip with densely dark yellow setose, maxillary palps dark brown, 4th segment cylindrical, bare 3 times as long as the 3rd segment. Labium brown, 3rd segment of labial palps cylindrical shaped 2 times as long as 2nd. Antenna (Fig. 2d) brown - dark brown and 0.7-1.1 mm long, consist of 11 segments ending in three club shorter than the stem; and the segments are sparsely dark brown setose. The 1st is enlarged and often widened on the outside, 1.8 times as long as 2nd segment; 2nd and 3rd segments cylindrical, 2nd about 1.2 times as long as 3rd segment; 9th and 10th segments cup shaped, 9th 1.2 as long as 10th; 11 segment sub-triangle as long as 9th segment. Antennal grooves moderately deep and convergent.

Thorax

Pronotum shiny black, moderately convex as broad as the elytra, it is broadest at the base, 1.6-2.1 mm long

and much broader than the long. Lateral margin moderately arcuate when seen from side, with apical part twice as thick as basal. Surface with punctures is slightly deeper than those of head. Scutellum shiny black, triangle shaped; 2/3 of apical contains small punctures. Elytra (Fig. 2f) shiny black, nearly rectangular, 1.4- 1.8 mm long and 0.9- 1.2 mm breadth exposing three abdominal segments. Apical margin of elytra with small yellow round spot, surface densely punctate like pronotum with short, black moderately dense of setae. Hind wings hyaline. Prosternum rectungule, shiny black, with coarsely punctures densely than the pronotum. Prosternal process widened and rounded posteriorly, reaching the mesosternum. Mesosternum trapezoidal without medial longitudinal carinae. Metasternum nearly rectangular 0.5-0.7 mm long, with medial longitudinal carinae. Legs are brown short, fore coxa (Fig. 2e) conical, fore femur nearly cylindrical, expanded at the middle, protibia triangle shaped, and apical part contains two small spurs and 3-4 short spines. protarsal 5 segmented. 1st – 3rd segments are cup shaped and densely yellow fine setose. The 4th segment is the smallest; while 5th segment long tubular, 3 times as long as the 3rd. fore claws are simple, long, weak and slightly curved. Middle legs are resemble to fore legs except coxa, which is oval shaped, mesotibia cylindrical and longer. Hind legs are resemble to fore legs except, metacoxae, as they are bot shaped, metatibia cylindrical and longer.

Abdomen

Abdomen shiny black, with 5 visible sternites. 1st -4th abdominal sternite transverse, anterior and posterior edge nearly striate. The 4th sternite is the longest about 3 times as long as 3rd sternite. Posterior margin of 5th sternite (Fig. 2i) is a round deep depression occupying of middle, the sternites with dense, fine pale yellow setae. In dorsal view, there are seven abdominal visible tergites, three of apical tergites (including pygidium) are exposed. Tergits 1st -6th are transverse, 1st -4th tergites are subequal in length. 6th tergite 1.2 as long as 5th. Pygidium cup shaped, apical margin oval. 8th tergite bot like, heavily sclerotized, surface with dense small dark brown setae. Spiculum gastrale (Fig. 2h) dark brown nearly inverted cup shaped, apical part sticky shaped equal in length with basal part.

Male genitalia (Figs. 2 h, i and j)

Aedeagus in lateral view (Figs. 2 h and i) brown-dark brown, 0.6 -0.9 mm long, nearly L-shaped. Parameres are sinuous, dagger shaped, heavily sclerotized, gradually curved to a sharp tip, distal part with short dark brown setae on both inner and outer margins; aedeagal apophysis narrow and slender, wide at

base, 0.9-1.2 mm; inner sac very long, 7-3.2 mm and tubular shaped, curved, more wavy on posterior half, and plate in inner sac is elongated oval. Dorsal view (Fig. 2j): Parameres elongated oval, apex pointed, sides are subparallel, apical margin with high density of short dark brown setae; phallobas V-shaped. Median lobe parallel to paramers, finger shaped, apical part acute.

Female

Visually is similar to the male except as follows : The posterior margin of 5th sternite is rounded without

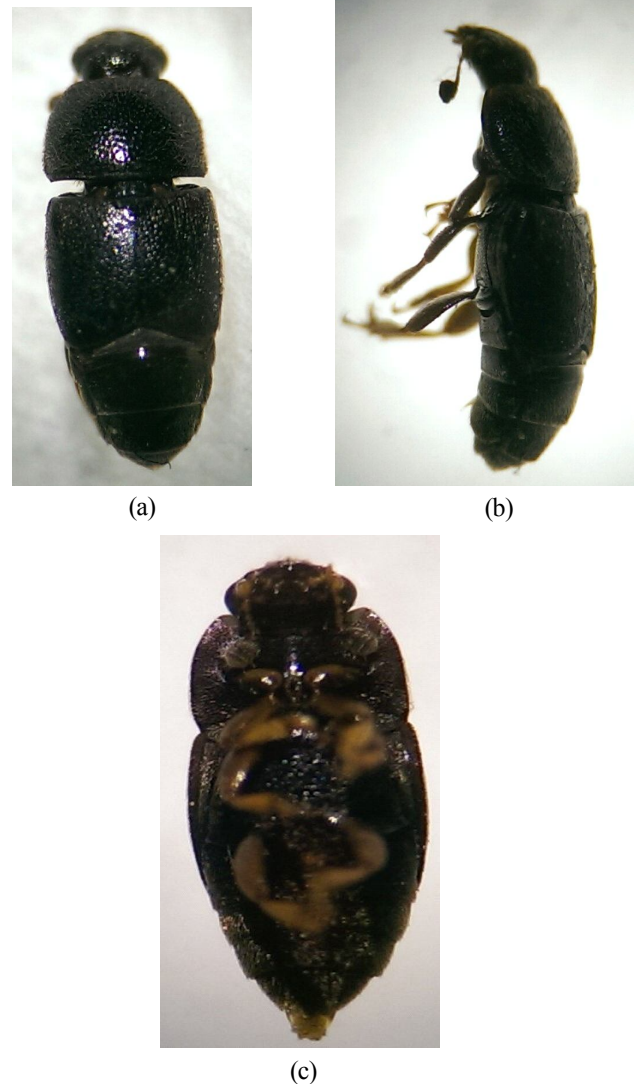


Fig. 1: *Carpophilus humeralis* (Fabricius) 20X
a. Dorsal view b. Lateral view c. Ventral view
depression. Apical margin of pygidium is strait.

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Fig. 2: *Carpophilus humeralis* (Fabricius)

a. Labrum b. Mandible c. Maxilla d. Antennae e. Fore leg f. Elytra g. 5th Abdominal sternites h. Spiculum gastrale i. Aedeagus(lateral view) j. Aedeagus (Lateral view) k. Aedeagus(Dorsral view) (Scale bars; All figures = 0.5mm except Fig. J = 0.25mm)

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