



# Redescription of *Hybosorus illigeri* Reiche 1853 (Coleoptera: Hybosoridae) from Erbil Governorate, Kurdistan region–Iraq

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## ABSTRACT

The present study includes a detailed description of *Hybosorus illigeri* Reiche 1853 for the first time in Iraq. Special characters of the species are, Labrum brown, protruding beyond clypeus, posterior margin with 7-9 of short teeth. Mandibles are sickle-shaped, the tooth very long and acute. Terminal maxillary palpomere tubular shaped, 3 times as long as 2<sup>nd</sup> palpmere. Antennae composed of 10-antennomeres and prominent with a club of 3-segments in which the basal segment of the club is hollowed out to harbor the last couple of antennomere, 8<sup>th</sup> antennomere 2 times as width as 9<sup>th</sup> onc. Outer margin of protibial has three long teeth. Elytra are a short, rounded-oval, dark brown black with nine striae. Parameres are a symmetrical, with the left paramere resembling a hammer and a slender and long acuminate lower lobe. Right paramere triangular, apex is acute. The habitus and diagnostic characters of the species were photographed.

**Keywords:** Redescription, *Hybosorus illigeri*, Coleoptera, Hybosoridae, Iraq.

## INTRODUCTION

The Hybosoridae is a family within a Scarabaeoidea superfamily and order Coleoptera, with (210) species within (32) genera (Ocampo, 2000). It is a well-known family in the world that thrives in the tropic areas. The family is also known as scavenger scarab beetles. The tropics are habitat to 690 species in 97 genera, but little is known about their biology. The family contains over 220 extant species classified into 35 genera. Currently, 22 fossil species from five subfamilies are known: Hybosorinae, Ceratocanthinae, Anaidinae, Mimaphodiinae, and Liparochrinae (Allsopp, 1984; Ocampo and Ballerio, 2006; Krell 2007; Nikolajev, 2008, 2010;

Nikolajev *et al.* 2010; Kirejtshuk *et al.*, 2011). The family characteristics by, the adults have prominent mandibles and possessing antenna of nine or ten segments. The first segment of the club usually hollowed out to harbor the second and third segments (Arnett *et al.*, 2002; Grebennikov, 2004; Triplehorn and Johnson, 2005). *Hybosorus* MacLeay and *H. illigeri* Reiche are the most important genera and species belonging to this family. The antenna is differentiated by a 3-segmented club which having hollowed out basal antennomere that receives the last two segments (Ocampo, 2002a). The species is found throughout the ancient times (in some parts of Europe, India and Africa) (Woodruff, 1973), the

Mediterranean, and most of temperate and tropical Asia as far south as China. Furthermore, the species is susceptible to passive transport and has been introduced into the United States, Central America (Haiti, Cuba, Jamaica, Bahamas, Mexico, and Nicaragua), and Venezuela (Ocampo, 2002; Ocampo and Ballerio, 2006). Adults have been observed feeding on invertebrate and vertebrate carrion in the early stages of decomposition, with some being found in dung (Arnett *et al.*, 2002). The larvae are found near roots or in plant debris (Costa *et al.* 1988; Grebennikov, 2004). *H. illigeri* is one of the few Scarabaeoidea known to be a predator (Rozas *et al.*, 1991) and has been reported as a nuisance pest on golf courses in some areas (Buss, 2006). This species also scavenges dead beetles at lights, implying that they are present in carrion and dung as insect predators rather than feeders (Woodruff, 1973; Ocampo, 2006). The larvae develop in the soil and among the roots of fennel and bermuda grass turf (Grebennikov *et al.*, 2004).

The major goal of this study is to provide a detailed description of *Hybosorus illigeri* Reiche and photographing the important characteristics of the species.

## MATERIALS AND METHODS

Collecting of specimens was carried out from dung and carrions in different area throughout Erbil Governorate, Kurdistan Region of Iraq, between March and August of 2022. To soften the specimen parts, were immersed in boiling water for 10-15 minutes. The mouthparts and abdomen were separated and cleared in a hot 10% KOH solution for 24 hours. Thereafter the parts

were examined under immersion in distilled water (Abdulla *et al.*, 2020; Faraj *et al.*, 2022; Mawlud *et al.*, 2022). A digital camera (Ucmass series microscope camera) was used to photograph the habitus and important parts. The body's length was measured using an eye piece linear micrometer from the apex of the clypeus to the apex of the elytra, and the body's width was measured at the base of the pronotum (with the sample in dorsal view). With the help of the key, the genus and the species were identified (Kuijten, 1983; Ocampo, 2002). The specimens were put in the museum of insects at Salahaddin University-Erbil, College of Agricultural and Engineering Science, Plant Protection Department.

## RESULTS and DISCUSSION

### Description

#### *Hybosorus illigeri* Reiche 1853

#### Synonyms

*Hybosorus carolinus* LeConte, 1848

*Hybosorus roei* Westwood, 1845

**Body (Male):** Oval, dark reddish- brown, underside yellowish brown. Length 6.8 – 8.6 mm.

**Head:** Dark brown, nearly trapezoid, width longer than the length. Frons is dark brown, with densely coarse setigerous apertures alongside the frontal margin and a weak transverse ridge alongside the rear margin. Clypeus is dark brown; with sparse of fine punctures at upper part, a nearly straight anterior margin, and straight and strongly divergent lateral margins. Eyes circular in shaped, length 0.4-0.5 mm, and canthus dorsally concave slightly and bears a tuft of

8-9 inconstant long, yellow straight setae. Front clypeal suture not visible and without medial tubercle. Labrum (Fig.1a) nearly plates-shaped, protruding beyond clypeus, posterior margin with 7-9 short teeth, space between teeth with small, fine yellow seta; surface with a series of course setigerous punctures along anterior margin and a weak transverse ridge along posterior margin; lateral margin with sparse of short yellow setae. Mandibles (Fig.1b) are sickle-shaped, apical part with long and strong tooth; dorsal surface flat; scrobe with 5- 6 yellow variable long setae; molar area with height densely packed with fine short yellow setae. Maxillae (Fig.1c) brown, cardo nearly triangular, bare; stipes triangular, with sparse of yellow long setae; nearly trapezoid and bare; galea nearly rounded, outer margin with height dense of fine, short yellow setae; lacinia elongated oval, outer margin with height dense of fine, short brown setae. 1<sup>st</sup>-3<sup>rd</sup> maxillary palpomeres cup shape, sparsely dark brown setose, 2<sup>nd</sup> palpomeres are 2.1 times than 1<sup>st</sup> and 1.2 times as long as 3<sup>rd</sup>; terminal maxillary palpomere long, tubular, bare, 2.0 times than 2<sup>nd</sup> palpomere. Mentum (Fig. 1d) brown rectangular, with sparse of short, very long yellow setae, labial palps three segmented. 1<sup>st</sup> and 2<sup>nd</sup> segments cup shaped, the 2<sup>nd</sup> segment 2.5 times so long as the 1<sup>st</sup> segment, the 3<sup>rd</sup> segment cylindrical, bare, 1.3 times than 2<sup>nd</sup> segment. Antenna is brown - dark brown, 1.0- 2.2 mm in length, consisting of 10 antennomeres and ending in a unilateral three oval club; the 1<sup>st</sup> antennomere is oval, long nearly cylindrical, 4 times as long as the 2<sup>nd</sup> ; 2<sup>nd</sup> antennomere is circular, 2 times as long as the 3<sup>rd</sup>; 3<sup>rd</sup> and 4<sup>th</sup> antennomeres with the same length; 8<sup>th</sup> –

10<sup>th</sup> antennomeres formed of the club, 8<sup>th</sup> antennomere 1.2 times as long as 9<sup>th</sup> one, and 2.2 times as the width; 9<sup>th</sup> and 10<sup>th</sup> antennomeres sub-equal in length and width (Fig. 2e).

**Thorax:** Pronotum dark brown, anterior margin is slightly concave, posterior margin is striate and slightly convex at the literal sides; lateral margins moderately curved, antero-lateral angles round; postero-lateral angles sharp and strongly protruding; dorsal surface of the pronotum covered in sparse, fine, round punctures, and a fringe of long setae. Scutellum dark brown, triangular, apex slightly rounded, surface with sparse of setigerous punctures at base. Prosternum is dark brown, anterior margin weakly quadrisinuate before bases of fore coxae. Elytra (Fig.1f) brown, nearly elongated triangular, lateral margins moderately curved; surface completely hairless, with nine series of small, round punctures (striae) arranged longitudinally between the suture and the humeral umbone. Legs are brown; fore-coxae are conical shape, fore femora expanded oval. Protibia (Fig. 1g) flattened, external lateral margin possesses three teeth with long apical which is quite curved, 2.1 times longer than the median once, the basal is significantly smaller; between small teeth and basally three of very small blunt accessory denticles. Fore tarsus five segmented, an apical with 4-5 variously long yellow setae. 1<sup>st</sup> -4<sup>th</sup> segments nearly cup shaped; 1<sup>st</sup> segment 1.2 times as long as the 2<sup>nd</sup>, 2<sup>nd</sup> -4<sup>th</sup> segments nearly same length. 5<sup>th</sup> segment is the longest, tubular, and 1.2 times as long as the 1<sup>st</sup> one. Claw simple, short, moderately curved. Middle legs resemble to fore legs except, mesotibia

elongated oval and smaller external lateral margin without teeth; past middle of external surface with a transverse ridge contain of a short series of spiniform setae; apical part with a crown of stiff yellow setae. Hind legs similar to fore legs except, metacoxae bot shaped, and the teeth of outer lateral margin metatibia absent; past middle of external surface with a transverse ridge contain of a short series of spiniform setae; apical part with a crown of stiff yellow setae.

**Abdomen:** Yellow-brown, six-segmented, sclerotized; 1<sup>st</sup> -5<sup>th</sup> abdominal sternites transvers, 1<sup>st</sup> -3<sup>rd</sup> sternite equal in length; 1<sup>st</sup> sternites 1.1 times as long as the 4<sup>th</sup>. Anterior and posterior margins of the sternites 1<sup>st</sup> -5<sup>th</sup> are moderately convex. The sternites covered with moderately dense of yellow long setae and punctures 6<sup>th</sup> abdominal sternite small and plate shaped. Pygidium (Fig.1h) cup shaped and sclerotized surface and margins with height dense of fine and variable long of yellow setae and somewhat rugosely punctate. Spiculum gastrale (Fig.1i) triangular, lateral part tubular, posterior part nearly clavate shaped. 10<sup>th</sup> abdominal sternite (Fig.1i) bilobed. 1<sup>st</sup> -6<sup>th</sup> abdominal tergites transvers and membranous.

**Male genitalia:** Aedeagus (Fig.1j&k) brown a symmetrical. Length 2.0- 3.1 mm. Left paramere nearly hammer like, possessing a long, slender acuminate lower lobe and the upper one is slightly shorter. Right paramere is triangular and simple with acute apex. Phallobase is large, oval and moderately curved.

## CONCLUSIONS

The single species of hybosorid, *Hybosorus illigeri* Reiche from the Iraq is recorded by Derwesh (1965). The present study includes a detailed description and photographing the important parts which used in species identification especially, mandibles, antenna, protibial and male genitalia. Therefore, a thorough investigation of the various areas of Iraq is required in order to gather samples and update the family Hybosoridae database.

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Fig.1: *Hybosorus illigeri* Reiche

a. Labrum    b. Mandible    c. Maxilla    d. Labium    e. Antenna    f. Fore tibia    g. Elytra  
 h. Pygidium    i. Spiculum gastrale    k. Aedeagus (Lateral view)    i. Aedeagus (Ventral view); Scale bare = 0.5mm except for a, g, and h=1mm.

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