

REDESCRIPTION OF *MALADERA MATRIDA* ARGAMAN
(COLEOPTERA : SCARABAEIDAE : MELOLONTHINAE)

Q. ARGAMAN

Department of Plant Protection and Inspection,
Ministry of Agriculture, P.O. Box 78, Bet Dagan 50250, Israel

ABSTRACT

Maladera matruda is redescribed and compared with its close congeneric relatives. KEY

WORDS: Coleoptera, white grub, Israel, *Maladera matruda*, redescription.

INTRODUCTION

A prolific and polyphagous white grub, *Maladera matruda* Argaman, has spread in Israel since 1980, invading most of the geographic areas with Mediterranean climate. Both adults and larvae are pests, damaging ornamentals, lawn grasses, fruit trees, carrots, potatoes, sweet potatoes and ground nuts. In addition, adult males in large numbers are attracted into lighted houses, causing a nuisance especially in the evening. A preliminary description of this species was published, almost entirely in Hebrew (Argaman, 1986), with a view to facilitate the intensive biological studies and ensure a name for the program of biocontrol. The present redescription, in English, together with a comparison to closely related congeners is given to make the name and concepts of the new species available to a wider audience.

Maladera matruda Argaman, 1986
(Figs. 1-6, 11)

Maladera matruda Argaman, 1986:68.

Diagnosis

Closely related to *Maladera japonica* Motschulski, 1860 and *M. castanea* Arrow, 1913, from the Far East. External morphological differences between adults of these species are slight. However, they can readily be separated by differences of male genitalia. In *japonica* both parameres are generally straight and the right paramere is bilobed (Fig. 12); in *castanea* the right paramere is straight and apically notched, the left paramere strongly curved, almost V-shaped (Fig. 10); in *matruda*, the right paramere is straight, the left paramere is gently curved, and both are apically hooked (Figs. 3, 11).

Redescription (based on holotype male)

Length 9 mm. Body and appendages light reddish brown, tibial dentation dark reddish brown. Front, pronotum, scutellum, elytra, ventral aspect of body, femora and basal third of hind tibia with weak but conspicuous steel-blue iridescence or pruinose 'bloom', rather visible in oblique incident light, on unabraded specimens. Body setulae yellowish red, large spines of legs brown. Clypeus subtrapezoidal, anterior margin upturned, forming complete ridge; disc medially slightly,

shallowly and triangularly emarginate below, and also triangularly penetrates into the front above; middle of disc with longitudinal, crest-like protuberance. Surface of clypeal disc with moderately large punctures, 2–3× as large as on the pronotum; interspaces narrow, undulated, covered with minute punctures. Clypeal width and length ratio 1.85:1.0. Front thrice as wide as eye. Lower front punctate like clypeus. On upper front the punctures become much smaller, horseshoe-shaped (opening directed backwards), and this form of punctures present everywhere on the body. Inner orbits with two erect setulae. Pronotal width and length ratio 1.85:1.0. Anterior margin of pronotum with complete but delicate ridge. Lateral pronotal angles produced anterad $\frac{1}{3}$ eye length in lateral view; hind angle evenly arcuate, almost square. Posterior margin of pronotum not bordered by a ridge. Pronotal disc covered with fairly uniform punctures; interspaces 2–3× greater than diameter of punctures. Anterior pronotal margin with 6–7 setulae on each side behind eyes, with 12–14 hairs on inner groove of lateral border. Scutellum an equilateral triangle, punctate like pronotal disc, setae of setiferous punctures shorter than length of interpunctal spaces. Elytra fairly uniformly punctures in longitudinal rows, with the humped intervals mainly impunctate; few scattered setae occur on disc and on apical declivity; lateral epipleural margin more densely setose, its bordering carina complete. Pygidium length 1.8 mm, width 3.1 mm. Surface of pygidium densely punctate throughout, with interspaces narrower than diameter of the shallowly impressed punctures; each puncture with a short hair, not longer than the punctures themselves. Apex and sides of pygidial area with moderately long pubescence. Antenna (Fig. 2) 10-segmented; length of segments 1–7 together 0.92 mm. Segment 1 as long as following four segments together; segments 8–10 lamellate, subequal in length, 0.7 mm each. Maxillary palpus four-segmented, segment 1 subquadrate; segments 2–3 about 2× as long as wide; last segment as long as preceding two segments together. Labial palpus three-segmented, segment 1 broader than long; segments 2–3 subequal, 2.2× longer than wide. Antero-ventral aspect of fore coxa, on the apical quarter, with 12 strong setulae in a group. Inner aspect of fore femur, on a semicircular area, distinctly pruinose and densely haired. Mesosternal apophysis flat, without horizontal surface, sinuately sudate between mid coxae, with dense patch of long hairs directed anterad. Fore tibia with a single acute tooth on outer edge, in addition to apical process. Fore tarsus about as long as fore tibia. Hind tarsus without ventral setulae but with two longitudinal crests, the inner denticulate, saw-like. Claws (Fig. 4) cleft, with inner tooth subequal to apical tooth. Genitalia (Fig. 3) with aedeagus trumpet-shaped, and parameres composed of two asymmetric lobes; left lobe about twice as long as right lobe (Fig. 11) and freely articulated on the basal ring. Right lobe is immovably consolidated to basal ring. Left lobe triangular in cross-section, gradually narrowed toward apex, where it is twisted and recurved, hook-like. Right lobe subparallel in lateral view, its inner face provided with a longitudinal groove, apex tapering, recurved.

Male variability

Little variation exists concerning size, shape and coloration of elytra; shape varies from almost parallel-sided to ovoidal. Coloration varies from occasionally vivid castaneous to blackish ground color. Length varies from 8.5–12.7 mm, averaging 10.6 mm. The genitalia, however, demonstrate no substantial differences in these extreme individuals. The question whether the melanic color pattern is correlated with seasonal changes of temperature or humidity was not studied, and only laboratory rearings can elucidate this point.

Female

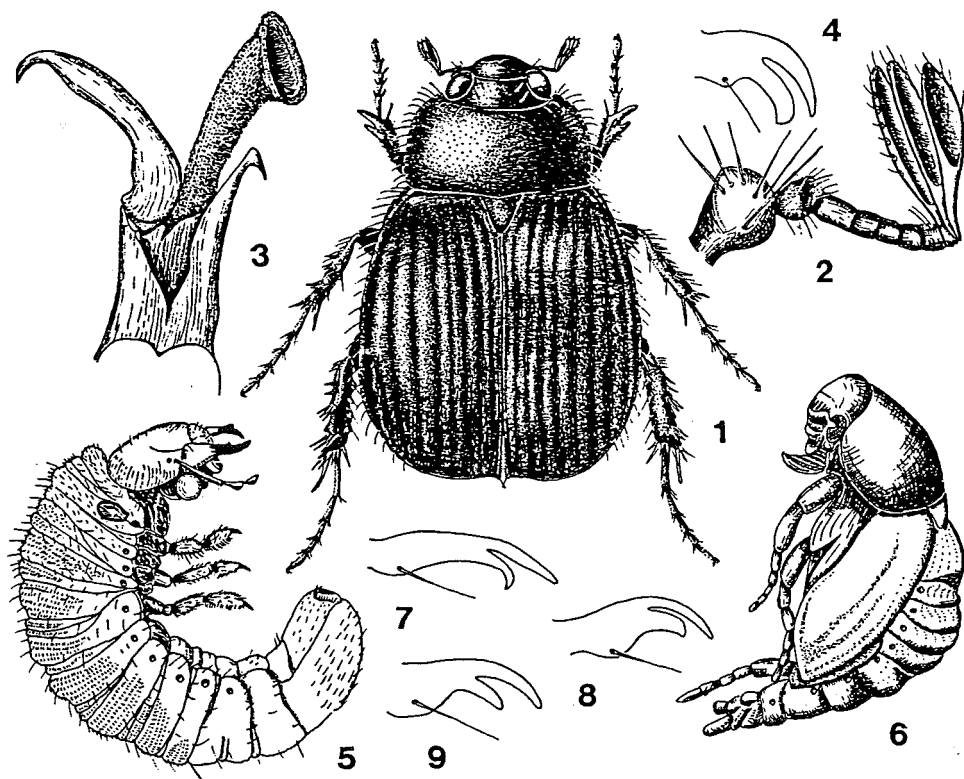
Similar to male in all main features, save clypeal lobe more conspicuously polished, with interpunctal spaces 2–3× greater than diameter of puncture; intervals are flatter and often entirely devoid of minute punctures. Even along the fronto-clypeal suture the punctures are scattered, separated from one another by their own diameter, or nearly so.

Chorion of egg

Length 1.62 mm, width 0.375 mm. Elongated fusiform. Vitreous with weak opalescent iridescence except in the region of micropyle obscure. Surface neted and shining.

Mature larva

Length 18–21 mm, maximum width 4.2 mm (Fig. 5). White, with yellowish brown head. Mandibles brown with black apices. Apex of appendages dark brownish. Cephalic capsule length 2.53 mm, width 2.6 mm. Mandible 1.8 mm long, with a strong triangular, apical tooth. Right mandible with one inner tooth, left mandible with two inner teeth. Bulb of maxilla length 1.26 mm, width 0.66 mm. Clypeal lobe transverse, twice as broad as long. Labrum pentagonal, twice as broad as long. Raster with a semicircle of 20–22 spinules, lateral spinules 1.5× longer than middle spinules. Septula separated by a deep, longitudinal mesal furrow into two distinct glabrous areas. This furrow bifurcates dorsally in a Y-shaped rami. Each of these lateral areas are subsequently divided medially by a short, vertical furrow, possessing stout spinules inwardly and thin setulae outwardly. Tegilla clothed with rather long, thin hairs.



Figs. 1–9. 1–6: *Maladera matrida*; 1: adult, habitus, 2: antenna, 3: male genitalia, aedeagus and parameres, ventral view, 4: tarsal claw, 5: mature larva, 6: pupa. 7: tarsal claw of *M. holosericea*; 8: tarsal claw of *M. modesta*; 9: tarsal claw of *M. punctatissima*.

Pupa

Length 19.5 mm, width 5.3 mm (Fig. 6), a little darker than adult, and without metallic lustre.

MATERIAL EXAMINED: holotype male labelled "Israel, Rehovot, 4.X.1984, S. Elhanan legit" (holotype deposited at Tel Aviv University, Tel Aviv). Paratypes: 196 males and 25 females, all from Israel, Coastal Plain: Bat Yam V-VI, 1981, M. Tager; Tel Aviv, Wolfson Park, VIII.1981, H. Chen, Z. Klein and Q. Argaman; Yavne, VIII-IX.1983-85, Q. Argaman. Paratypes are deposited at Department of Plant Protection and Inspection, Bet Dagan; Department of Zoology, Tel Aviv University, Tel Aviv; British Museum (Natural History), London; National Museum of Natural History, Washington, D.C.; Zoological Department of Hungarian Natural History Museum, Budapest; and in the author's collection.

Etymology

The species name is a transliteration of the Hebrew adjective "matrida" (= bothersome); name selected due to the nuisance caused by swarming males which fly in large numbers into homes during summer evenings.

SYSTEMATIC PLACEMENT

The genus *Maladera* Mulsant, 1842 needs a revision (see Pope, 1960). Now it contains all species formerly placed in the separate genera: *Aserica* Lewis, *Autoserica* Brenske, *Euserica* Reitter and some other smaller, little known genera from the Far East.

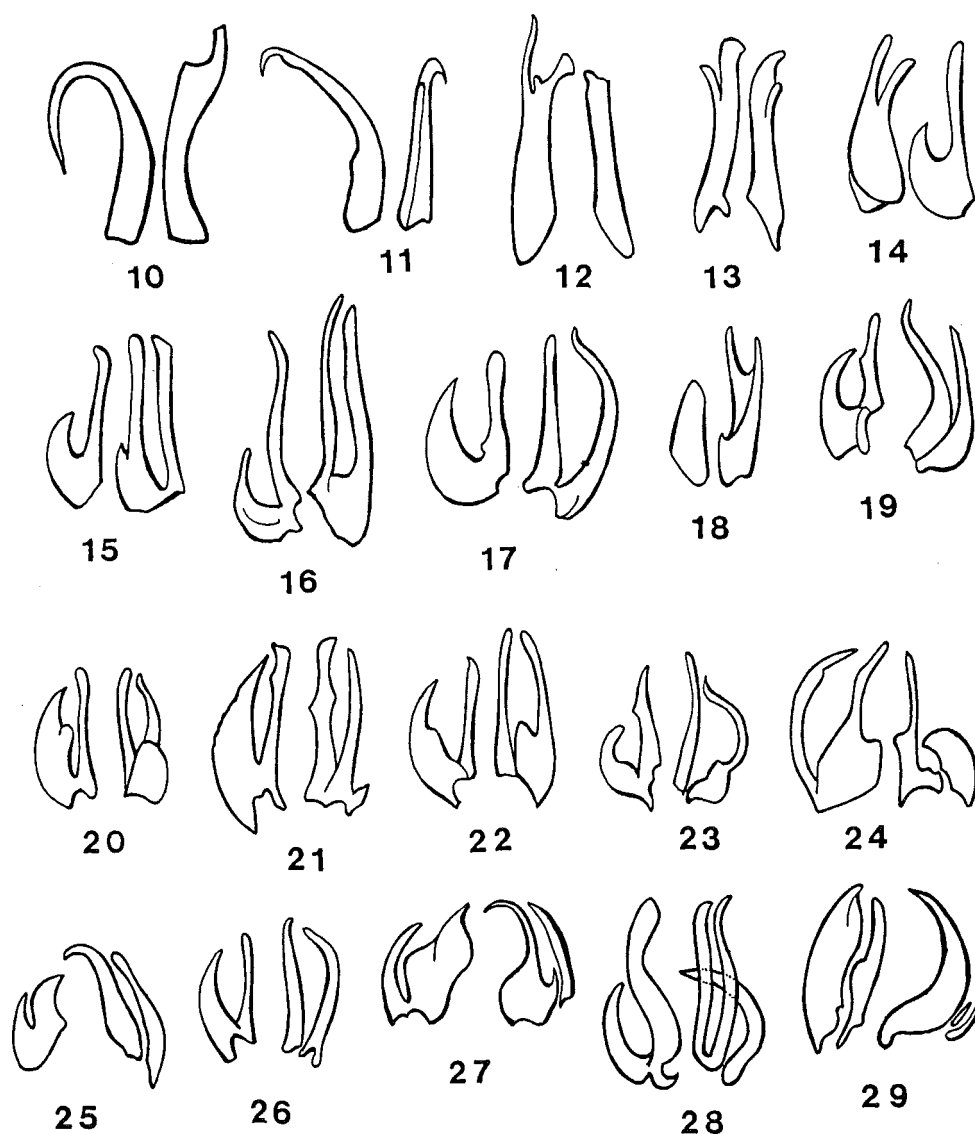
M. matrida belongs in a group of species characterized by the spinose but not pectinate lower aspect of hind tarsi. About 50 species belong to this group, 20 of which are known from East Mediterranean countries. Only two of these, *holosericea* Scopoli, 1772 (Fig. 13) and *lodosi* Baraud, 1965 possess almost perfectly symmetrical parameres. In all other species the parameres are asymmetrical (Figs. 14-29). Moreover, in all the East Mediterranean species one of the parameres, often both, are deeply incised longitudinally, forming two (often three) equal or unequal lobes.

Maladera matrida, possessing two strongly asymmetrical parameres, clearly belongs to this group of species. At the same time, because none of the parameres are divided, it is not very closely associated with any of the already known species from the Near East. Therefore, it was suspected from the first discovery of *M. matrida* in Israel that it was accidentally introduced, through commerce, from Southern Asia or from the Far East. The large population that has recently developed indicates that *matrida* does not have enough active natural enemies in Israel, which also supports the idea of recent introduction.

Subsequently, a comprehensive study was extended upon the following species of *Maladera*: *adjuncta* Brenske from North Iran; *lugubris* Brenske and *nathani* Frey from India; *japonica* Motschulski, *orientalis* Motschulski and *castanea* Arrow from the Far East; and *lanata* Escalera from Morocco. All these species manifest local swarming and territorial expansion, and cause damages to field crops. The most remarkable is *japonica*, which spread westward, at a relatively rapid rate, reaching the eastern coast of the Black Sea in 1958 (Kryjanovski & Ter-Minasian, 1958). *M. japonica* is the closest relative of *matrida*, according to their external morphology.

It is noteworthy that different species of *Maladera* may be accurately identified only on the basis of the general shape of male genitalia. Therefore a comprehensive study of these anatomical structures was made, and the results are succinctly presented in Figs. 10-29.

It is also noteworthy to enumerate some external characters as well, with which the most common *matrida* may be separated from other representatives of the genus in Israel. The metasternal apophysis of *matrida* is flat, blade-like, entirely appressed to metasternum. The shape of this



Figs. 10–29. *Maladera* spp., parameres of male genitalia, aedeagus omitted. 10: *M. castanea* Arrow, 1913 (Kerulen, North China); 11: *M. matrida* Argaman, 1986 (holotype); 12: *M. japonica* Motschulski, 1860 (Tsonndtsin, Korea); 13: *M. holosericea* Scopoli, 1772 (Larnaka, Cyprus); 14: *M. bruschii* Sabatinelli, 1977 (Tuz Golu, Turkey); 15: *M. apfelbecki* Petrovitz, 1969 (Mt. Olympos, Greece); 16: *M. phoenicia* Petrovitz, 1969 (Sur, Lebanon); 17: *M. villersi* Petrovitz, 1969 (Aleppo, Syria); 18: *M. cerrutii* Sabatinelli, 1977 (Greece); 19: *M. krueperi* Petrovitz, 1969 (Saloniki, Greece); 20: *M. punctatissima* Faldane, 1835 (Mikhmoret, Israel); 21: *M. wewalkai* Petrovitz, 1969 (Smyrna, Turkey); 22: *M. armeniaca* Reitter, 1896 (Araxa Valley, USSR); 23: *M. taurica* Petrovitz, 1969 (Anatolia, Turkey); 24: *M. syriaca* Petrovitz, 1969 (Mt. Carmel, Israel); 25: *M. lyciensis* Petrovitz, 1969 (Turkey); 26: *M. graeca* Petrovitz, 1969 (Kriti, Greece); 27: *M. attaliensis* Petrovitz, 1969 (Konya, Turkey); 28: *M. modesta* Fairmaire, 1881 (Lower Galilee, Israel); 29: *M. seleuciensis* Petrovitz, 1969 (Malatia, Turkey).

apophysis is entirely different in *punctatissima* Faldane, *caifensis* Brenske and *syriaca* Petrovitz, forming a horizontal pad between the mid coxae, with the dorsal surface polished and shining, and anteriorly rugosely covered with piliferous punctures.

In *holosericea* Scopoli and *modesta* Fairmaire this character, however, cannot be used. The claws of *matrida* are cleft (Fig. 4), with both inner and outer teeth of the same length, whereas in *holosericea* the inner tooth is only half as long as the outer tooth and it is strongly incurved (Fig. 7). In both *modesta* (Fig. 8) and *punctatissima* (Fig. 9) the inner tooth is about $\frac{1}{3}$ shorter than the outer tooth, and the combined width of teeth is much narrower than the base of claw, while in *matrida* they are of the same width. The separation of *matrida* from *japonica* and *castanea*, however, cannot be achieved without a study of male genitalia.

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