



A NEW RECORD OF COMMON MALACHITE BEETLE, MALACHIUS BIPUSTULATUS (LINNAEUS, 1758), (COLEOPTERA: MELYRIDAE) FROM IRAQ

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Abstract

Beetles from the family Melyridae, belong to the order Coleoptera, which comprised of numerous genera and species. Malachite beetle is one of the most important insect associating with plants and weeds bearing flowers, they play a vital role in insect based pollination of flowers. Taxonomic study was conducted in Kurdistan region of Iraq including Sulaimanyah, Duhok and Erbil governorates, to investigate genus and species of insects associated with flowers within the Melyridae and Coleoptera, the Soft-winged flower beetles, Malachius bipustulatus (Linnaeus, 1758), was recorded for the first time in Iraq. In this study, taxonomic characteristics of the species including mandibles, antennae, elytra, abdominal tergite, sternite and aedeagus have been described and illustrated. According to description results: Mandibles have a couple of acute and equal length teeth. Antennae are slightly serrate and comprised of eleven segments (antennomeres): The elytra are of shining, metallic green in colour and at the apical end, there is a bright red colour spot. The Aedeagus is straight and cylindrical in shape, its colour ranges from brown to dark brown, and strongly stiffened (sclerotized).

Keywords: Coleoptera, Description, Malachius bipustulatus, Melyridae, Iraq.

تسجيل نوع جديد للخنفساء المعدنية الخضراء الشائعة
MALACHIUS BIPUSTULATUS (LINNAEUS, 1758),
(COLEOPTERA: MELYRIDAE)

في العراق

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الخلاصة

خنفاص العائلة Melyridae والتابعة لرتبة غمدية الاجنحة، والتي تتكون من عدد كبير من الأجناس والأنواع. تعتبر الخنفساء المعدنية الخضراء من أهم الخنفاص المرتبطة بالنباتات والأدغال ذات الأزهار وتلعب دورا رئيسيا في تلقيح النباتات المعتمدة على التلقيح بواسطة الحشرات. أجريت الدراسة التصنيفية في إقليم كردستان العراق والتي شملت محافظات السليمانية، دهوك وأربيل للتحري عن أنواع وأجناس الحشرات المرتبطة بالأزهار التابعة لرتبة الخنفاص Coleoptera، عائلة Melyridae. وتم خلال الدراسة تسجيل خنفساء الازهار ذات الاجنحة الناعمة (اللينة) *Malachius bipustulatus* (Linnaeus, 1758) لأول مرة. تم وصف ورسم الاجزاء المهمة من الناحية التصنيفية للنوع بما في ذلك الفك العليا، قرون الاستشعار، الجناح الغمدي، الصفيحة الظهرية والسفلية للبطن، وكذلك العضو الذكري. وفقا لنتائج الوصف: يتكون الفك العلوي من زوج من الأسنان الحادة، متساوية الطول. قرون الإستشعار تقريبا منشارية الشكل، تتكون من إحدى عشرة عقلة (antennomeres): الجناح الغمدي ذو لون أخضر معدني لامع، يوجد في النهاية القمية للجناح بقعة حمراء لامعة. العضو الذكري (القضيب) مستقيم وذات شكل إسطواني، يتراوح لونه من البني – البني الغامق ويكون متصلب بشدة.

كلمات مفتاحية: غمدية الاجنحة، الوصف، *Malachius bipustulatus*، Melyridae، العراق.

Introduction

The family Melyridae, Leach, 1815, belongs to the superfamily of Cleroidea within the order Coleoptera (2 and 12). The number of described genera and species exceeds 300 and 6000 respectively, and containing four subfamilies (18 and 24), including Malachiinae which is one of the most distributing subfamily globally excluding New Zealand, the individuals of this subfamily prefer to live in warm arid or semi-arid areas (19). In addition to Melyridae there are six families with the order coleoptera that synthesize cantharidin compounds, and they use this material against their natural enemies (8 and 25). *Malachius* Fabricius, 1775, is a common genus in this sub

family, and its species have been recorded in many countries including Palaearctic zone, East Asia, China, Madagascar, and Japan (4, 9, 29 and 30).

The adult stage insects commonly found on flowers in fields; they live by feeding on other small insects and also on flower pollen grains (17). However, their larvae are live in soil consuming locust eggs, and they may also live as scavengers and predator (10 and 11). Likewise, other researchers (28) reported that, the adults stages live on dead insects and pollen grains, otherwise, sometimes live as carnivorous by preying on some species of aphids, while the larvae which grew up in forests, are considered as predators and hunt other insects immature stages. They can be utilized in biological control, to some extent, of some insects effectively as generalist predator (22). They are univoltine insects, with adults emerging from both months of April and May, and they may be seen on flowers during the summer season where they consume pollen grains and nectar of flowers besides their feeding on small invertebrates. Taking the strong associations with flowers into account, the individuals of *M. bipustulatus* can be considered as occasional pollinators (14).

The Male individuals of adult stage possess a gland on the head in between the antennal bases which secret pheromone. These pheromones secreted by males play a vital role in attracting females during courtship. Females lay eggs in crevices of tree bark and on low understory vegetation. The larvae are active hunters that develop throughout the summer; however, adults may remain until late time of summer (13).

Many species of the genus *Malachius* including *bipustulatus*, have been recorded in Western Beskidy Mts (Poland) (28), likewise, this species also recorded in Iran (25). (20) Reported that there are 6,000 species and the melyrid lineage accounts for more than half of all Cleroidea, which includes eleven families. Most of them are soft-bodied, elongated, and oval-shaped beetles which their size is about 10 mm or less in length. The coloration of the elytra is green with bright brown and black marking (5 and 29).

There is no previous or recent literature studies for Palearctic and Nearctic species. Therefore, the following list reverses our best attempt based on the obtainable literature. (3 and 27) Provided keys for the genera of the family. Another researcher (15) used species key from the American Northwest. Species of the family are often sexual dimorphous, with males of enlarged antennae segments or complicated processes in the elytra ends (6 and 21).

As mentioned above, few researches have been conducted in the world regarding the taxonomical study of *M. bipustulatus* (7, 16 and 26), however, in Iraq no researches have been published on the current species. Therefore, the goal of current study was to carry out surveys in some various locations of the Kurdistan Region of Iraq for collecting insect samples with the ability of recording new species to record and enriching the Iraqi insects' museums with new and non-described samples.

Materials and Methods

Specimens collecting: The specimens were collected on flowers of plants belonging to the families of Rosaceae, Apiaceae and Asteraceae. Some specimens were collected from milk thistle, *Silybum marianum* (L.); *Malva pusilla* Sm., hoary cress, *Cardaria draba* (L.) from different localities of Sulaymaniyah, Duhok and Erbil governorates. Then, the study of anatomical structures was performed under immersion of the specimen parts within distil water (1 and 23).

Dissecting and photographing: Softening of the specimen's parts were done by placing it in water and boiled for about 10-15 min.; then the abdomen and mouthparts were separated and placed in a hot solution of 10% KOH for a day. The photographs of diagnostic important structures were taken by Ucmass series microscope camera (digital camera). The measurements of body size (length and width) were done by using an eyepiece linear micrometre. A dissecting microscope was used to study the anatomical parts which immersed in distilled water (1 and 23).

Species Identification: (3), was used for the genus identification, while the species was identified by the key constructed by (15). The identification of the genus was confirmed with the help of the Iraqi Natural History Museum and Research Centre belonging to the University of Baghdad. Normally diagnostic characters were easy seen, but this determined by male genitalia. The samples were placed in the insect museum of the Department of Plant Protection/ College of Agricultural Engineering Sciences, Salahaddin University-Erbil, Iraq.

Results and Discussion

Malachius bipustulatus, Linnaeus, 1758.

Synonym: *Cantharis bipustulata*, Linnaeus, 1758.

Description:

Body (Fig. 1a): Oval shaped – Elongated, green metallic colour with red patch at apices part of elytra. Body length ranging is 4.9–6.4 mm, width ranging 1.4–2.1 mm.

Head: Ovoid shaped, green in colour, length is 1.0-1.4 mm. Head apex rounded - greenish, finely furrowed with copious short brown hairs. Crown suture present. Its frons is green, slightly concave, and punctuated, with fine short, dense brown hairs. Clypeus is oblong, slightly concave, and finely furrowed with a scattering of black setae. The apical corners of the head are marked by a low density of long, dark brownish hairs. Compound eyes are black, prominent, and round. Length 0.1-0.2 mm small eyes absent. Labrum (Fig. 1b) nearly rounded, light brown with sparse, short brown bristles and a high density of curves. Front margin is slightly concave; 0.3–0.4 mm long.

Mandibles (Fig. 1c) are black, highly sclerotized, and almost triangle in shape, with a pair of acute teeth which have equal length. The scrobe possesses 4–6 white setae; molar area plane, length 0.5–0.8 mm long. Maxillae (Fig. 1d) are brown coloured to dirking brown; length ranges 0.6–1.0 mm. Cardo and stipes are almost triangle shape, with sparse, brown bristles. Distal region of galea ovoid in shaped and hardened;

membranes of apical region dense, with fine, yellow, short setae. Outer margin and apical region of Lacinia membranes possess dense, short, yellow setae. Maxillary palpus consist of 4 segments: first to third segments are cupped shaped, second segment is 1.2 folds longer than the segment behind it. Fourth segment is tubular and 1.2 times longer than the segment number two. Labium (Fig. 1e) is pale to brownish black. Labial palp with sparse short, fine, brown setae, length 0.4–0.7 mm. Labial palpus include three segments: first and second segments are semi cupped in shape, second segment is four times longer than the first segment. Third segment is cylindrical shape and 1.5 times longer than the second segment, Para glossa oval -like shaped and membranous with a high density of fine setae. Antennae (Fig. 1f) are brown to dark brownish and slightly serrate. Antennae consist of eleven antennomeres, its length 2.4–3.1 mm: first antennomere is globular and 1.2 folds as long as the second one. Third and fifth antennomeres are of equal length and 1.1 folds longer than the fourth segment, seventh to ninth antennomeres are slightly equal in length, eleventh antennomere is 1.2 times longer than the segment before it. Antennomeres covered with a rarity of short and brown pile.

Thorax: Green metallic Pronotum, convex moderately and semi round; 1.0–1.6 mm long, 1.0–1.4 mm width, Apical angles has fine, red-brown patches. Surface with condensed, dark black setae. Fore and hind margins of pronotum moderattely concaved; both angles of posterior and anterior are globular. Procoxal cavity opened. Prosternum black and oblong with scattered black setae. Fore edges of prosternum aligned; prosternal process bit trapezium. Scutellum is black and triangular in shape; surface with sparse fine punctate. Elytra are (Fig. 1g) bright, metallic green with a shiny red blotch at the tip; length 3.2–4.2 mm; the surface finely punctate with condensed black setae. Epipleuron of elytra is black with 5–7 short black setae. Hind wings (Fig. 1h) are oval and brown; veins colour is brown to dark brownish; length 2.8 folds as the width. Redial cell is oval and dark brown, wedge cell an extended oviform shaped. Medium spur vein is long and hardly curved, extending to the posterior edge of the wing. Veins MP3, MP4 and CuA1 are reaching to the hind margin of the wings. Forelegs (Fig. 1i) brown to dark brown. Forecoxa is elongated oval; fore trochanter is small, oval; fore femur is cylindrical, 1.1–1.5 mm length. Fore tibia is tubular and 1.1 folds as long as the femur; surface with sparse, black setae. Pretarsus comprised of five tarsomeres: first to fourth tarsomeres roughly serrate, fifth tarsomere tubular. First tarsomere is 1.8 folds longer than the second, and the second tarsomere 1.1 folds longer than third, the third tarsomere 1.2 folds longer than fourth one. Fifth tarsomere is the longest one, tubular and 1.2 times longer than first one. Foreclaw short and moderately curved. Middle legs similar to the forelegs excluding that meso-coxae are funnel shape and the trochanter is larger and extended oviform shaped. Femur ranging 1.4–1.9 mm long; meso-tibia 1.8–2.4 mm long and 1.2 folds longer than the femur; fifth meso-tarsal tarsomere is 1.1 folds longer than the first one. Hindlegs similar the forelegs excepting that the meta-coxae are conical shaped and the trochanter is an elongated oval shape. Metatibia is 1.3 folds longer than femur; fifth tarsomere longer than the first one.

Abdomen: Oviform shape and Black, surface has condensed, black setae; margins of the abdomen possess a particular structure having orange patches, consisting of six obvious segments: first to fourth abdominal sternites are rectangular. The first sternite is 1.5 times larger than the second. The second to fourth sternites of abdomen are about the same length, fifth sternite is cupped shaped and 1.2 times longer than previous one (4th sternite) with a slightly concave anterior margin, sixth abdominal sternite is oval and 1.2 folds as long as the fifth with a slightly concave anterior edge and nearly a lined posterior boarder. Eighth sternite of abdomen (Fig. 1j) is black and triangular shape; posterior margin is very extremely medially erose, while anterior margin hardly concave; the surface is having few punctate with a moderate condensed of long, brown setae. Moreover, the first to fifth abdominal tergites are transverse; sixth tergite cupped shape. However, the eighth tergite of abdomen (Fig. 1k) is black and rectangular, with a width 1.2 times the length; posterior margin is slightly medially emarginated; lateral apodemes are short; surface has a moderate density of long and brown setae.

Male genitalia:

Dorsal view: Aedoeagus (Fig. 1m) is straight, brown to dark brown in colour, cylindrical shape and strongly hardened. Basal piece oval: tegmen is cylindrical and conical shaped at apic, with a length ranged of 1.2–1.5 mm. Median lobe can be seen as a resemblance of thin stripe on mediodistal region of the tegmen. Gonopore is V-shape. Lateral view (Fig. 1n): Aedeagus is slightly bent in one-quarter of basal part. Basal piece is circular shape. Spiculum gastral (Fig.1l) is rectangle in shape, lightly concaved in the middle. Posterior margin is slightly emarginated in the middle; apical region has brown rod-shaped appendix.

Female: The female resembles the male except that the female is more robust and longer than the male, with a length of 5.8-7.3 mm.



Figure 1 *Malachius bipustulatus*: a- Habitus (6X), b- Labrum, c- Mandible, d- Maxilla, e- Labial palp, f- Antenna, g- Elytra, h- Hind wing, i- Fore leg, j- 8th abdominal sternite, k- 8th abdominal tergite, l- Spiculum gastrale, m- Aedeagus (Dorsal view), n- Aedeagus (Lateral view). Scale bar: b=0.3; c, d, e, j, k, l, m and n=0.5mm; f, g, h and i =1mm.

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Reference

1. Abdulla, A. P. B. S., Ahmmed, L. S. H., Mawlood, N. A., and Omar, A. P. Z. Z. (2021). A New Species of Histerid Beetles, *Saprinus* Erichson, 1834 (Coleoptera: Histeridae: Sapriniinae) From Iraq. *Annals of the Romanian Society for Cell Biology*, 8478-8485.
2. Anderson, R., Nash, R., and O'Connor, J. P. (1997). Irish Coleoptera: a revised and annotated list. *The Irish Naturalists' Journal*, 25.
3. Arnett, R. H. (1968). *The beetles of the United States (a manual for identification)*. The American Entomological Institute. Ann Arbor, Michigan, 11: 12.
4. Asano, M., Ikeda, H., Kamezawa, H., and Nomura, S. (2018). Revision of six species of the subtribe Ebaeina of Japan, with description of a new species

- (Coleoptera: Melyridae). Japanese Journal of Systematic Entomology, 24(1): 141-149.
5. Barnard, B. C. (2011). The Royal Entomological Society Book of British Insects. 1st ed., A John Wiley and Sons, Ltd., Publication, 383.
 6. Constantin, R. (2007). Révision des Aplocnemus de France avec description de trois nouvelles espèces. Observations taxonomiques et faunistiques sur les espèces françaises de Dasytidae et Acanthocnemidae (Coleoptera, Cleroidea). Bulletin de la Société entomologique de France, 112(2): 151-170.
 7. Crowley, L. M., of Oxford, U., Lab, W. W. G. A., of Life, W. S. I. T., and Darwin Tree of Life Consortium. (2021). The genome sequence of the common malachite beetle, *Malachius bipustulatus* (Linnaeus, 1758). Wellcome Open Research, 6.
 8. Dettner, K. (1997). Inter-and intraspecific transfer of toxic insect compound cantharidin. In Vertical Food Web Interactions: Evolutionary Patterns and Driving Forces. Berlin, Heidelberg: Springer Berlin Heidelberg, 115-145.
 9. Evers, A. M. J. (1985). Distribution of the Palearctic species of the genus complex of *Malachius* F. 54th Contribution to the knowledge of the Malachiidae. Entomologische-Blätter-für Biologie-und-Systematik-der-Kafer, 81(1/2): 1-40.
 10. Farrow, R. A. (1974). A modified light-trap for obtaining large samples of night-flying locusts and grasshoppers. Australian Journal of Entomology, 13(4): 357-360.
 11. Fiori, G. (1971). Contributi alla conoscenza morfologica ed etologica dei Coleotteri. IX. *Psilothrix viridicaeruleus*, 3-70.
 12. Gimmel, M. L., Bocakova, M., Gunter, N. L., and Leschen, R. A. (2019). Comprehensive phylogeny of the Cleroidea (Coleoptera: Cucujiformia). Systematic Entomology, 44(3): 527-558.
 13. Gradwell, G. R. (1957). Habits of larvae of *Malachius bipustulatus*. Entomologist's Monthly Magazine, 93, 104.
 14. Gutowski, J. M. (1990). Pollination of the orchid *Dactylorhiza fuchsii* by longhorn beetles in primeval forests of Northeastern Poland. Biological Conservation, 51(4): 287-297.
 15. Hatch, M. H. (1962). The beetles of the Pacific Northwest. Part III: Pselaphidae and Diversicornia I., Uni. Washn. Pub. Bio., 16: ix+ 503.
 16. Hätönen, M., Kantner, C., Losada, R. L. I., Ludwig, N., González, A. B., Riedhammer, C., ... and Alonso, S. G. (2022). European arthropods and their role in pollination: scientific report of their biodiversity, ecology and sensitivity to biocides.
 17. Hawkeswood, T. J. (1987). Notes on some Coleoptera from *Baeckea stenophylla* F. Muell. (Myrtaceae) in New South Wales, Australia. Giornale italiano di Entomologia, 3: 285-290.
 18. Kolibac, J., and Huang, D. (2019). New cleroid beetles from the Middle-Late Jurassic of China. Acta Palaeontologica Polonica, 64(1).
 19. Lawrence, J. F., and Leschen, R. A. B. (2010). Melyridae Leach, 1815. In: Handbook of zoology, Coleoptera.. Morphology and systematics (Elateroidea,

- Bostrichiformia, Cucujiformia partim) (Eds., Leschen RAB, Beutel RG, Lawrence JF). Walter de Gruyter, Berlin, 2: 273-280.
20. Leschen, R. A. B. (2010). Cleroidea, Latreille, 1902: Introduction and phylogeny. In: Leschen, R.A.B., Beutel, R.G., Lawrence, J.F. (Eds.), Handbook of Zoology, Coleoptera, Morphology and Systematics (Elateroidea, Bostrichiformia, Cucujiformia partim), Walterde Gruyter, Berlin, 2: 237-239.
 21. Majer, K. (1982). Species of the genus *Aplocnemus* of Middle Europe (Col. Melyridae). *Deutsche Entomologische Zeitschrift*, 29(4-5): 421-445.
 22. Malschi, D. (2000). Actual aspect regarding the control of cereal leaf beetles (*Oulema melanopus* L.) in Central Transylvania. *Probleme de Protecția Plantelor*, 28(1): 17-28.
 23. Mawlood, N. A., Al-Mallah, N. M., and Ahmmed, S. H. (2018). Description of click beetle, *Melanotus dichrous* (Erichson, 1841)(Coleoptera: Elateridae: Melanotinae) from Kurdistan region-Iraq. *Kirkuk University Journal For Agricultural Sciences*, 9(3): 195-199.
 24. Mayor, A. J. (2002). 74. Melyridae Leach, 1815. *American Beetles, Polyphaga: Scarabaoidea through Curculionoidea*, 2: 281-303.
 25. Nikbakhtzadeh, M. R. (2009). New records of canthariphily among beetles (Coleoptera) from Iran. *Türkiye Entomoloji Dergisi*, 33(4): 243-251.
 26. Panov, A. A. (1989). The histology of the cerebral neurosecretory system in several representatives of Cleroidea (Coleoptera, Insecta). *Journal fur Hirnforschung*, 30(1): 5-10.
 27. Ronald, G. (1998). *Checkered Beetles: Illustrated Key to the Cleridae and Thanerocleridae of the Western Palaearctic.*, Weikersheim, Germany: Margraf Verlag, 12-15.
 28. Szafraniec, S., Szafraniec, P., and Mazur, M. A. (2010). Species of Melyridae (Coleoptera: Cleroidea) from the Western Beskidy Mts. *Opole scientific society nature Journal*, 43: 95-100.
 29. Triplehorn, C. A., and Johnson, N. F. (2005). *Borror and DeLong's introduction to the study of insects.* Thomson Brooks/Cole, Belmont, CA. 864.
 30. Tshernyshev, S. E. (2015). A new species of soft-winged flower beetles of the genus *Kuatunia* Evers, 1945-48 (Coleoptera, Cleroidea, Malachiidae) from Nepal. *Zootaxa*, 3941(2): 255-260.