

Redescription of the blister beetle *Meloe semicoriaceus* fairmaire, 1891 (Coleoptera: Meloidae: Meloinae) with notes on courtship behavior

Abstract

The species of the blister beetle genus *Meloe* subgenera *Eurymeloe* from the Kashmir Himalayas are discussed. The genus is represented by eight species from India; *Meloe arunachalae* Saha, 1979; *M. proscarabaeus* Linnaeus, 1758; *M. semicoriaceus* Fairmaire, 1891; *M. transversicollis* Fairmaire, 1891; *M. rufiventris himalayicus* Kaszab, 1978; *M. servulus* Bates, 1879; *M. variegatus* Donovan, 1793 and *M. violaceus* Marsham, 1802 and possible occurrence of *M. punjabensis* Kaszab, 1958. Five species are reported from the Kashmir Himalayas (*M. semicoriaceus*, *M. rufiventris himalayicus*, *M. servulus*, *M. variegatus* and *M. transversicollis*). *M. semicoriaceus* is redescribed with taxonomic detailing and few elements of courtship behavior also provided.

Keywords: blister beetle, meloe, kashmir himalayas, meloidae

Volume 1 Issue 2 - 2017

 Akbar SA,¹ Dar MA,¹ Wachkoo AA²
¹Department of Plant Protection and Fruit Sciences, Division of Entomology, Central Institute of Temperate Horticulture, India

²Department of Zoology, University of Kashmir, India

Correspondence: SA Akbar, Department of Plant Protection and Fruit Sciences, Division of Entomology, Central Institute of Temperate Horticulture, Srinagar, Jammu and Kashmir, 191132, India, Email kingakbarali@gmail.com

Received: August 08, 2017 | Published: September 07, 2017

Introduction

The blister beetles of the family Meloidae are globally represented by more than 2500 species in 120 genera belonging to 3 subfamilies.^{1,2} The genus *Meloe* Linnaeus³ is one of the largest genera in the family Meloidae and is currently represented by 146 described species.⁴ The type genus of *Meloe* is *Meloe proscarabaeus* by subsequent designation (Latreille, 1810). The genus is primarily Holarctic and more richly developed in the Old World.¹ The Middle Asia *Meloe* species are poorly studied and often known only from their original descriptions and mentions in various catalogs.⁵ The descriptions in old publications are usually incomplete, which troubles diagnostics of the species.⁶ The most important taxonomic works on the genus had been done by Leach,^{7,8} LeConte,^{9,10} Champion,¹¹ Péringuey,¹² Van Dyke,¹³ Pinto & Selander,⁴ Kaszab,¹⁴ Bologna & Pinto.¹⁵⁻¹⁷ The genus displays diverse characteristics and has been divided into fourteen subgenera.¹⁸

In India, Meloidae is represented by 16 genera and 107 species and the genus *Meloe* is represented by 8 species from India. There are some taxonomic problems about the known Indian species of the genus, in particular to relationships and diagnostic characters of *M. arunachalae* and *M. transversicollis*, placed in an Indian Museum. *M. transversicollis* was described by Fairmaire¹⁹ based on a single female specimen collected from Kashmir. The Syntype of the species is located by Muséum national d'Histoire naturelle, Paris (France). Another specimen of the species is hosted by Zoological Survey of India, Kolkata (ZSI). The specimen was collected by M.S. Mani (Santokh Singh) from Rhala region of Western Himalayas (3200m; 27.5.1955) and details were provided by Saha²⁰ in his revision of the Indian blister. There are also present few records based on doubtful data.²¹ However due to inaccessibility of the types of the Indian species discussion about the known Indian species is beyond the scope of this paper. Moreover, the Kashmir' fauna shows great affinities with that of Afghanistan and Central Asia, but no comparison or discussion on this aspect is also possible based on above cited reasons.

Material and methods

The specimens were collected by hand from apple orchards of Central Institute of temperate horticulture, Srinagar. Taxonomic analysis was conducted using Olympus SZX16 stereo zoom microscope. For digital images, Prog Res0 Capture Pro v.2.8.0. evolution digital camera was used on the same microscope with Combine ZP-Montage software. Images were cleaned with Adobe Photoshop CS6. Description and morphological terminology for measurements (given in millimeters) follows Shapovalov.⁵

Results and discussion

M. semicoriaceus Fairmaire¹⁹ (Figures 1-16). *Meloe semicoriaceus* Fairmaire.¹⁹ Compt. rend. Soc. ent. Belg.: CII: Borchmann,²² Junk's Col. Cat., 17 (69): 132.

Material examined

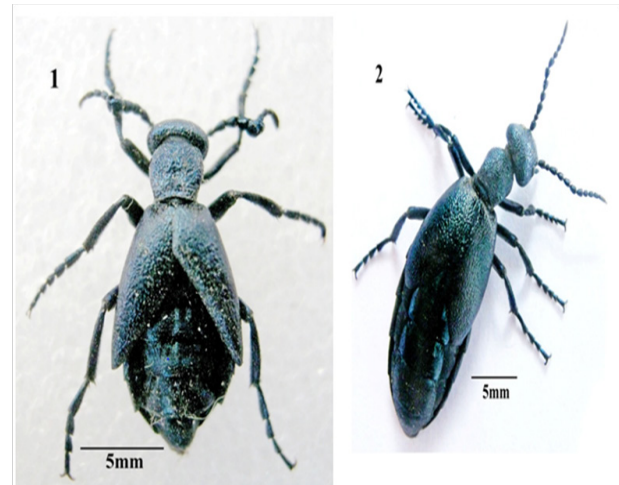
3 specimens (2 females and 1 male), India: Kashmir Himalayas: Srinagar, CITH (33°58'01.00" N 74°48'01.00" E), 1640m, 17.II.2016, (Coll. Shabir, R.A. & Bashir, A.D.).

Male

Body length from outer margin of closed mandibles to apex of abdomen 15mm, to elytral apex 11mm; width of head 2.5mm, length of head 3mm, width of pronotum 2mm and length of hind leg 10mm. Body black with metallic dark blue tint; mandibles black in apical part, reddish brown in basal part; apical part of clypeus yellowish brown. Elytra subglabrous; pilosity reduced; legs, antennae, apex of clypeus and last abdominal segment with thick short brownish black setae. Head triangular, longer than wide (2.5mm width; 3mm length); posterior margin of head strongly concave; posterior angles rounded. Clypeus bean shaped with raised lateral borders and transverse apical margin. Apical margin of clypeus fringed with stout setae. Labrum medially incised with concave apical margin, slightly raised, strongly punctate with little pubescence; mandibles strongly, obtuse at apex,

with acute curved teeth projecting laterally. Eyes twice as long as wide, oval, with shallow emargination along inner edge; maxillary palpi well defined with last segment elongate, two times as long as wide and bell shaped. Antenna 11-segmented. Segment V expanded forming a well developed and highly sclerotised platform at the apex. Segment VI and VII form cup shaped plates or 'kinks' curved outwards; length ratio of antennal segments (in relation to apical segment) 1.00 : 0.45 : 0.35 : 0.35 : 0.20 : 0.20 : 0.45 : 0.37 : 0.37 : 0.20 : 0.35; their width ratio 1.00 : 1.00 : 1.00 : 1.30 : 2.54 : 2.50 : 1.70 : 1.60 : 1.60 : 1.40 : 1.60. Pronotum broader than long (3.25mm width; 2mm length), sides sinuate with widely rounded anterior angles and much narrower posterior ends; dorsal surface flat with a prominent depression in the middle. Prosternum and mesoventrite transverse. Legs slender with weakly curved outer margins. Length ratio of segments of fore tarsus 1.00 : 0.50 : 0.70 : 0.70 : 0.80; their width ratio 1.00 : 1.20 : 1.50 : 1.50 : 1.50. Fore tarsi 1.30 times as long as corresponding tibiae; while mid tarsus 1.50 times and hind tarsus 1.90 times as long to their respective tibia. Tibiae with two spurs at apex; hind leg long (10mm) with outer spur having apical portion produced anteriorly, spoon shaped. Undersides of tarsal segments of each leg with wide tarsal pads, hairy marginate with short setiform hairs. Each leg with two acute tarsal claws and a smaller ventral blade. Head and pronotum coarsely and

densely punctate; elytra convex having small fine punctures forming delicate wrinkles. Abdominal tergites with sparse ill-defined wrinkles and few loosely spaced punctures; ventrites smooth and shining.



Figures 1 & 2 *Meloe semicoriaceus* 1. Male 2. Female.



Figures 3–16 Body parts of male and female (*M. semicoriaceus*): 3. Head of male; 4. Head of female; 5. Antennae of male; 6. Antennae of female; 7. Maxillary palpi of female; 8. Clypeus of female; 9. Hind leg, ventral view of tarsal segments in female; 10. Hind leg, lateral view of tarsal segments in female; 11. Hind leg, spoon shaped tibial spur in male; 12. Hind leg, truncated tibial spur in female; 13. First segment of hind tarsus- lateral view in female; 14. First segment of hind tarsus- ventral view in female; 15. Body sculpture in female with confluent punctures. 16. Male and female mounting posture.

Female

Similar to male but larger, oblong with body length from outer margin of closed mandibles to apex of abdomen 22mm, to elytral apex 16mm; width of head 4mm, length of head 5mm, width of pronotum 4mm and length of hind leg 12mm. Body darker than male with blue metallic tint; mandibles black in apical part, reddish brown in basal part; apical part of clypeus yellowish brown. Elytra narrowed apically, subglabrous with more pronounced pilosity and pubescence; legs, apex of clypeus and last abdominal segment with thick short setae. Head triangular, longer than wide (4mm width; 5mm length); posterior margin of head concave in middle with lateral lobes rounded. Clypeus rectangular, large distinct, raised in middle and fringed with stout setae anteriorly. Labrum transverse; mandible strongly, obtuse at apex, with acute curved teeth projecting laterally. Eyes twice as long as wide, oval, with shallow emargination along inner edge; maxillary palpi well defined with last segment elongate, 2 times as long as wide, apical segment bell-shaped. Antenna 11-segmented; length ratio of antennal segments 1.00 : 0.50 : 0.50 : 0.50 : 0.60 : 0.60 : 0.65 : 0.50 : 0.65 : 0.20 : 0.50; their width ratio 1.00 : 1.00 : 1.00 : 1.00 : 1.40 : 1.40 : 1.30 : 1.40 : 1.30 : 0.90 : 1.20. Pronotum almost as broad as long (4.75mm width; 4.22mm length), sides sinuate posteriorly and evenly convergent to base; dorsal surface of the pronotum flat. Prosternum and mesoventrite transverse. Legs slender with weakly and regularly curved outer margins. Length ratio of segments of fore tarsus 1.00 : 0.50 : 0.55 : 0.60 : 1.00; their width ratio 1.00 : 1.00 : 1.30 : 1.40 : 1.40. Fore and mid tarsi 1.20 times as long as corresponding tibiae; while hind tarsus 1.50 times as long as tibia. Tibiae with two spurs at apex; hind leg long (12mm) with outer spur obliquely truncate. Undersides of tarsal segments of each leg with wide tarsal pads, hairy marginate with short setiform hairs. Each leg with two acute tarsal claws and a smaller ventral blade. Head and pronotum with coarse confluent punctures; elytra also with coarse ill-defined wrinkles, more prominent than in male specimen; ventrites smooth and shining.

Remarks

The specimens of *M. semicoriaceus* were collected and later maintained in laboratory on *Taraxacum officinale* plants (commonly known as Hand). The male and female specimens were reared for 32 days before they died. The male displayed and assumed active role in mating and always aimed to force copulation while the female overtly devoted most of her time towards feeding and reacted negatively towards mating attempts by decamping and avoiding direct confrontation with the male. With male persistence few bouts of courtship eventually culminated in copulation. Copulation was observed to proceed with series of tactile and previously reported stereotype sexual acts. Male touches the female with antennae and mounts on her back facing in the same direction as that of female, positioning with fore legs placed in between the fore and mid legs of female. Male antennation was not concurred to comment upon. Several mating attempts were observed, lasting for 5-25 minutes. The male was observed to touch the thorax and head of female with palpi. Soon male extrude the genitalia and slides backwards towards the dorsum of the female abdomen and makes contact. Female mostly remained passive throughout the process but occasionally was seen to tilt abdomen towards the approaching male genitalia to receive and assist in copulation. The male after inserting genitalia inside female, dismount from back and the two attain linear position facing against each other (position lasting for 10-35 minutes). After two days of mating, male died. After mating female showed least interest towards feeding and made several attempts to escape from the jar by cutting

the net covering. Inside the jar larval specimens of few *Scolytus* spp. were introduced for oviposition. The aim was to facilitate oviposition and thereby promote their possible use in biocontrol problems. The results obtained were of mixed nature and require further confirmation before their deliberation. The female eventually died.

Meloe transversicollis Fairmaire¹⁹ (Figures 17-18). *Meloe transversicollis* Fairmaire.¹⁹ Compt. rend. Soc. ent. Belg.: CII: Borchmann. 1917, Junk's Col. Cat., 17 (69): 133. Not examined. *Meloe transversicollis* was described by Fairmaire¹⁹ based on a single female specimen collected from Kashmir. The species is distinct with intermediate antennal segments not flattened, a rectangular clypeus, and elytra feebly rugose. The syntypes (MNHN-EC-4217/No available date of collection/Indian Kashmir/det. David Kral 2013) of the species is placed by Muséum national d'Histoire naturelle, Paris (France) and Zoological Survey of India, Kolkata (ZSI).



Figures 17 & 18 *Meloe transversicollis* syntype specimen and data label

Conclusion

The manuscript discusses the regional *Meloe* fauna. Since the Cantharid in secreted by these beetles has potential medical use, understanding and study of these insects is important. Nothing substantial has been published about these beetles from the region. The study aims to provide baseline data about previously described species. Diagnosis, images and taxonomic information on regional species will facilitate in their prompt identification.

Acknowledgements

The authors are thankful to Professor Marco Alberto Bologna (Università Degli Studi Roma-Italy) for his help with the identification and suggestions. Sincere thanks to the Director Central Institute of Temperate Horticulture CITH (Dr. Desh Beer Singh) for facilities made available. Project and financial assistance rendered by Department of Science and Technology (DST), Govt. of India, for research encouragement via; NPDF Fellowship program: File No: PDF/2015/ 000866 is also gratefully acknowledged.

Conflict of interest

The authors have no conflict of interest to declare.

References

- Bologna MA, Pinto JD. Phylogenetic studies of Meloidae (Coleoptera), with emphasis on the evolution of phorsey. *Systematic Entomology*. 2001;26(1):33–72.
- Slipinski SA, Leschen RAB, Lawrence JF. In Order Coleoptera Linnaeus, 1758. In: Zhang ZQ, editor. Animal biodiversity: An outline of higher-level classification. *Zootaxa*. 2011;3148:203–208.
- Linnaeus C. *Systema Naturae*, 10th edn. Stockholm, Sweden; 1758.
- Pinto JD, Selander RB. The bionomics of blister beetles of the genus *Meloe* and a classification of the New World species. *Illinois Biological Monographs*. 1970;42:1–222.
- Bologna MA. Family Meloidae Gyllenhal, 1810. In: Löbl I, Smetana A, editors. *Catalogue of Palaearctic Coleoptera, Tenebrionoidea*. Volume 5, Apollo Books. 2008. p. 670.
- Shapovalov MA. A New Species of the Blister-Beetle Genus *Meloe* L. (Coleoptera, Meloidae) from Tajikistan. *Entomologicheskoe Obozrenie*. 2014;93(9):1337–1341.
- Leach WE. An essay on the British species of the genus *Meloe*, with description of two exotic species. *Trans Linn Soc*. 1810;11(1):35–49.
- Leach WE. Further observations on the genus *Meloe*, with descriptions of six exotic species. *Trans Linn Soc*. 1813;11(2):242–251.
- Leconte JL. Synopsis of the Meloides of the United States. *Proc Acad Nat Sci Phila*. 1853;6:328–350.
- Leconte JL. Classification of the Coleoptera of North America. *Smith Misc Coll*. 1862;3:209–278.
- Champion GC. Family Meloidae. In: *Insecta, Coleoptera, Biologia Centrali-Americana*. 1891-1893;4(2):364–464.
- Peringuey L. Descriptive Catalogue of the Coleoptera of South Africa. *Family Meloidae Trans R Soc South Afr*. 1909;1:165–292.
- Van Dyke EC. A reclassification of the genera of North American Meloidae (Coleoptera) and a revision of the genera and species formerly placed in the tribe Meloini, found in America, North of Mexico, together with description of new species. *Univ Calif Publ Ent*. 1928;4:395–474.
- Kaszab Z. Die Meloiden Afghanistan (Coleoptera). *Acta zoologica Academiae scientiarum Hungaricae*. 1958;3:245–312.
- Bologna MA, Pinto JD. A review of *Meloe* (*Taphromeloe*), including a description of the first-instar larva of *M. (T.) erythrocnemus* and comments on the classification of the tribe Meloini (Coleoptera: Meloidae). *Proceedings of the Entomological Society of Washington*. 1992;94:299–308.
- Bologna MA, Pinto JD. The triungulin of two Palaearctic *Meloe* subgenera: *Lasiomeloe* Reitter and *Micromeloe* Reitter (Coleoptera, Meloidae), with bionomic and taxonomic notes. *Bolletino di Zoologia*. 1995;62(4):383–393.
- Bologna MA, Pinto JD. A review of the Afrotropical species of *Meloe* Linnaeus, 1758 (Coleoptera Meloidae) with descriptions of first instar larvae, a key to species and an annotated catalogue. *Tropical Zoology*. 1998;11(1):19–59.
- Selander RB. On the nomenclature and classification of the Meloidae (Coleoptera). *Insecta Mundi*. 1991;5(2):65–94.
- Fairmaire L. Description de coleopteres de l'interieur de la Chine. *Compt rend Soc Ent*. 1891;35:279–307.
- Saha GN. Revision of Indian blister beetles (Coleoptera: Meloidae; Meloinae). *Records of the Zoological Survey of India*. 1979;74:1–146.
- Anand RK. First record of *Meloe proscarbeus* Lin. and *M. violaceus* Marshall (Coleoptera: Meloidae) from India along with further description and a key to Indian species. *Journal Entomological Research*. 1978;2:40–42.
- Borchmann F. Pars 69. Meloidae, Cephaloidae. In: Schenkling E, editor. *Coleopterorum Catalog usauspiciisetauxilio*. W Junk Junk Berlin; 1917. p. 208.