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Research Article

First report of *Bulaea lividula bocandei* Mulsant (Coleoptera: Coccinellidae) from India with notes on its diagnosis, host plants and distribution

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ABSTRACT: *Bulaea lividula bocandei* Mulsant (Coleoptera: Coccinellidae), hitherto known from North Africa, the Middle East, and Pakistan, is recorded for the first time from India (Tamil Nadu). *Suaeda maritima* (L.) Dumort. (Chenopodiaceae), a common halophytic plant in mangroves, is recorded as a new host plant of *B. lividula bocandei.* A brief diagnostic account of the species with illustrations is given along with details on its host plants and distribution.

KEY WORDS: *Bulaea,* Coccinelloidea, Indian subcontinent, range expansion

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INTRODUCTION

True lady beetles (Coleoptera: Coccinellidae) belonging to the tribe Coccinellini are readily recognized by their bright and pretty appearance with striking spots and patterns. The family was recently placed in a newly erected superfamily Coccinelloidea (Robertson *et al*. 2015). Though most of the Coccinellini are considered as primarily aphidophagous, their feeding habits are extremely diverse and include psyllids, whiteflies, immatures of plataspids and chrysomelids, lepidopterans, fungal spores and pollen, etc. The genus *Bulaea* Mulsant is known to have a mixed diet that includes partial phytophagy and aphidophagy. It is known to eat leaves (Savoiskaya, 1970), as well as pollen (Capra, 1947; Savoiskaya, 1983), but the adults are known to feed on aphids under laboratory and field conditions (Giorgi *et al*., 2009; Escalona *et al*., 2014; Ali *et al*., 2014). Giorgi *et al.* (2009) opined that the ancestral state in the transition to phytophagy seen in *Bulaea* was likely to be aphidophagy, pollinivory, or both.

Bulaea lichatschovii (Hummel) is the lone species of this genus hitherto known from India, with a wide distribution in Africa, Europe and Asia (Fürsch, 2005; Kovář, 2007). Ali (2014) reported this species from Pakistan. *Bulaea lichatschovii* was reported for the first time from India from Rajasthan by Kapur and Bhaumik (1966) and later from Uttar Pradesh by Poorani (2004). It is also known from Haryana (label data, unpublished). In this paper, we record *Bulaea lividula bocandei* Mulsant, a species known mainly from the Middle East and North Africa, for the first time from India (from Pichavaram, Tamil Nadu), which represents a significant range extension for this species. It was found in association with *Suaeda maritima* (L.) Dumort. (Chenopodiaceae), which is confined to mangrove habitat. Here, a brief diagnostic description of the species is given with illustrations and notes on its host plants and distribution.

MATERIALS AND METHODS

The specimens studied were collected from the mangroves of Pichavaram, Tamil Nadu, during 2016-17. Pichavaram is located on the Southeastern coast of Tamil Nadu and lies between latitude 11°20’00” N to 11°30’00” N and longitude 79°45’00” E to 79°51’00” E. It comprises both mangrove and wetland ecosystems and supports a rich diversity of flora and fauna. In all, 23 beetles were collected by active searching and net sweeping in the mangroves of Pichavaram. The specimens were identified by following Fürsch (2005). The specimens are deposited in the collections of Parasitoid Taxonomy and Biocontrol laboratory,

Department of Entomology, Faculty of Agriculture, Annamalai University, Chidambaram.

***Bulaea lividula bocandei* Mulsant, 1850 (Fig.1)**

Bulaea lividula Mulsant, 1850: 1016.

Bulaea bocandei Mulsant, 1850: 71.

Bulaea lividula bocandei: Kovář, 2007: 600; Abdel-Dayem *et al.,* 2017: 46.

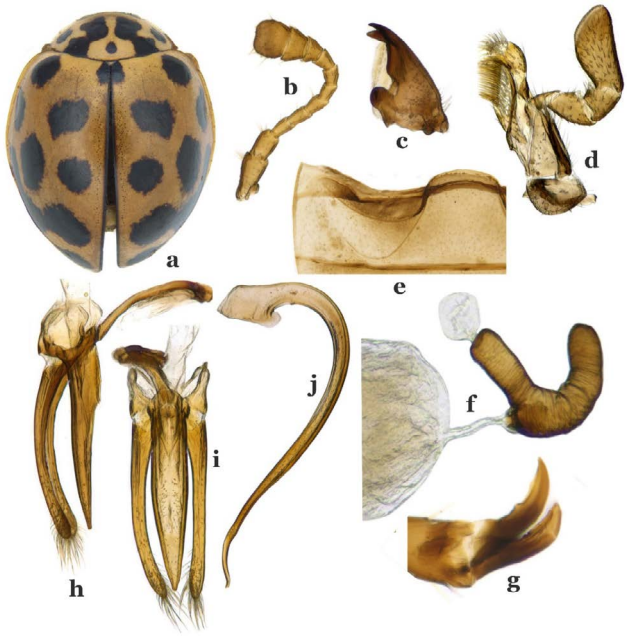

Fig. 1. Diagnostic characters of *Bulaea lividula bocandei*: a. adult, dorsal habitus; b. antenna, c. mandible; d. maxilla; e. abdominal postcoxal line; f. female genitalia: spermatheca; g. tarsal claws; h–j. male genitalia: h. tegmen, lateral view; i. tegmen, ventral view; j. penis.

DIAGNOSIS: Body outline (Fig. 1a) elongate oval, broadest around shoulders of elytra; dorsum convex and glabrous. Head creamy yellow, posteriorly black. Pronotum creamy yellow with black maculae as follows: two lateral, circular spots, a pair of oblique spots around middle and a smaller, circular median spot above scutellum. Scutellum anteriorly yellow, borders and apex blackish. Elytra bright yellow with 19 black spots arranged as follows: a common sutural spot on scutellum and nine spots on each elytron arranged in a 1-2-3-2-1 pattern, first two rows of spots on anterior half, third row of spots around middle and the last two rows in posterior half, penultimate pair of spots coalesced to form a large transverse macula. Antenna (Fig. 1b) with 11 antennomeres, antennomeres 9, 10 and 11 distinctly transverse and forming a prominent club, terminal antennomere flattened and expanded. Maxilla with terminal palpomere (Fig. 1d) elongate securiform. Abdominal postcoxal lines (Fig. 1e) arcuately recurved, apically incomplete. Tarsal claws (Fig. 1g) simple with a very small median projection not amounting to appendiculate type. Male genitalia (Fig. 1h–j) with penis guide of tegmen in ventral view (Fig. 1i) lanceolate in outline, parallel sided in anterior half, posterior half triangular and progressively narrowed towards apex; penis guide in lateral view (Fig. 1h) broad in anterior third, thereafter distinctly narrowed towards apex; penis (Fig. 1j) with a broad capsule, gradually narrowed to a tubular apex. Female genitalia with spermatheca (Fig. 1f) having a slightly produced nodulus, a prominent, elongate cylindrical ramus and a tubular, curved cornu, infundibulum lacking.

NOTES: *Bulaea lividula bocandei* is closely related to *B. lichatschovii,* the most common species of the genus. Both *B. bocandei* Mulsant and *B. lividula* Mulsant were described as separate species by Mulsant (1850), but treated as mere variants of *B. lichatschovii* by Korschefsky (1932). The elytral pattern in *B. lichatschovii* is similar to that of *B. lividula bocandei,* but in the latter, the body outline appears to be more convex and the elytral spots are often smaller or obliterated or completely absent. Fürsch (2005) gave an account of *B. bocandei* and illustrated the male and female genitalia, which did not include the illustration of the tegmen in ventral view. The male genitalia are diagnostic for this species and are illustrated here to facilitate its identification. Fürsch (1979) included this species [as *B. lichatschovi* ssp. *albiventris* (Fürsch)] in his key to the Coccinellidae of Saudi Arabia. The male genitalia of the specimens examined by us differ from the illustrations provided by Ren *et al.* (2009) for *B. lichatschovii,* its closest relative, in many ways. The illustrations by Ren *et al.* (2009) show a narrower penis guide in lateral view and the penis guide in ventral view is apically distinctly more elongate, narrow and tubular. In the examples studied here, the penis guide in ventral view is lanceolate in outline with basally subparallel sides and is apically progressively narrowed and triangular and in lateral view distinctly broader in the anterior third and posteriorly narrowed.

The tribal position of *Bulaea* remains to be settled. Originally *Bulaea* used to be a part of the tribe Tytthaspidini (=Bulaeini) which was subsumed into a broader, composite Coccinellini by Seago *et al.* (2011) based on a phylogenetic analysis of morphological and molecular characters. In their molecular phylogenetic analysis of Coccinellini, Escalona *et al.* (2017) found that most of the genera of the former Tytthaspidini, including *Bulaea,* form a strongly supported monophyletic group and opined that this should be recognized as a formal taxonomic unit. Here it is treated as part of the larger tribe, Coccinellini s.l.

HOST PLANTS / BIOLOGY: The species of *Bulaea* are known to be at least partially phytophagous. The specimens of *B. lividula bocandei* studied here were collected in association with a halophytic plant, *Suaeda maritima* (L.) Dumort. (Chenopodiaceae), known to be common in mangroves. All the life stages of the beetle were observed on this plant and gut content analysis of the dissected specimens clearly indicated pollen feeding (Fig. 2). Abdel-Dayem *et al.* (2017) recorded it on *Ziziphus nummularia* (Burm.f) Wight & Arn. (Rhamnaceae). The mandibles of *B. lividula bocandei* are apically bifid (Fig. 1c) as in typically aphidophagous coccinellids, but have relatively stiff and comb like prostheca used to scoop pollen and spores.

Bulaea lichatschovii is commonly known to feed on a mixed diet of leaves, pollen and aphids (Savoiskaya, 1970, 1983). Fürsch (1967) reported that it feeds on the pollen of Chenopodiaceae. Ozbek and Cetin (1991) reported sugar beet, lentil and alfafa as its host plants. Ali *et al*. (2014) recorded it as feeding on different species of aphids and pollen in the deserts of Sindh Province of Pakistan, but rarely from agricultural fields. The label data of specimens of *B. lichatschovii* examined from Rajasthan by JP also show *Chenopodium* sp. as the host plant. It confirms that this species has a definite association with host plants in the family Chenopodiaceae.

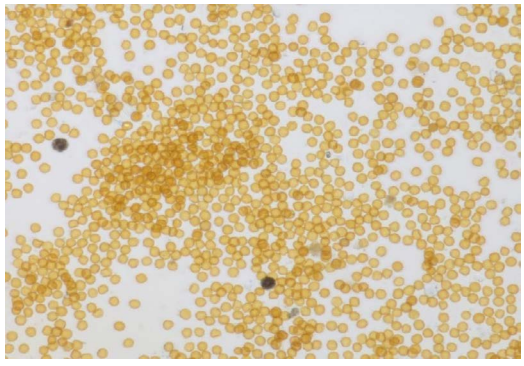

Fig. 2. Pollen in gut contents of *Bulaea lividula bocandei.*

DISTRIBUTION: The known distribution range of *B. lividula bocandei* includes: **Africa**: Eritrea; **Asia**: United Arab Emirates, Israel, Iraq, Iran, Jordon, Pakistan, Saudi Arabia, Syria and Yemen; **North Africa**: Algeria, Egypt and Mauritania (Fürsch, 2005; Kovář, 2007; Abdel-Dayem *et al*., 2017). This species has been recorded only from Pakistan in South Asia so far and this constitutes the first instance of its occurrence in India.

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REFERENCES

Abdel-Dayem MS, Fad HH, El-Torkey AM, Elgharbawy AA, Aldryhim YN, Kondratieff BC, Al Ansi AN, Aldhafer HM. 2017. The beetle fauna (Insecta, Coleoptera) of the Rawdhat Khorim National Park, Central Saudi Arabia. *ZooKeys* **653**: 1–78. Crossref.

Ali M, Naqui AN, Perveen R, Ahmad K, Hussain I. 2014. First record of tribe Bulaeini (Coleoptera: Coccinellidae) with generic and species descriptions from Pakistan. *Pak J Zool.* **46**(5): 1475–1478.

Capra F. 1947. Note sui coccinellidi (Col.). III. La larva ed il regime pollinivoro di *Bulaea lichatschovi* Hummel. *Memorie della Società Entomologica Italiana* **26**: 80–86.

Escalona HE, Zwick A, Li HS, Li J, Wang X, Pang H, Hartley D, Jermiin LS, Nedved O, Misof B, Niehuis O, Slipinski A, Tomaszewska W. 2017. Molecular phylogeny reveals food plasticity in evolution of true ladybird beetles (Coleoptera: Coccinellidae: Coccinellini). *BMC Evol Biol.* **17**(1): 151. Crossref.

Fürsch H. 1967. Familie: Coccinellidae (Marienkäfer), pp. 227–278. In: Freude H, Harde KW, Lohse GA (Eds.) *Die Käfer Mitteleuropas*, Band 7. Clavicornia. Goecke und Evers, Krefeld 310 pp.

Fürsch H. 1979. Insects of Saudi Arabia, Coleoptera: Fam. Coccinellidae. Fauna of Saudi Arabia 1: 235–248.

Fürsch H. 2005. *Bulaea* Mulsant, 1850 and *Isora* Mulsant, 1950 [sic!] (Coleoptera: Coccinellidae) sind synonym. *Dtsch Entomol Z.* **115**(5): 227–232.

Giorgi JA, Vandenberg NJ, McHugh JV, Forrester JA, Slipinski SA, Miller, KD, Shapiro, LR, Whiting, MF. 2009. The evolution of food preferences in Coccinellidae. *Biol Control* **51**(2): 215–231. Crossref.

Kapur AP, Bhaumik AR. 1966. A note on ladybird beetles (Coleoptera: Coccinellidae) from Rajasthan, with first record of *Bulaea lichatschovi* (Hummel) from India. *Rec Indian Museum* **59**(4): 445–448.

Korschefsky R. 1932. Pars 120: Coccinellidae. II. In: Junk W, Schenkling S (Eds.) *Coleopterorum Catalogus*. Berlin 435 pp.

Kovář I. 2007. Coccinellidae. In: Lobl I, Smetana (Eds.). *Catalogue of Palaearctic Coleoptera. Volume 4. Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea, and Cucujoidea.* Apollo Books, Stenstrup. pp. 71–74, 568–630.

Mulsant E. 1850. *Species des Coléoptères Trimères Sécuripalpes.* Annales des Sciencies Physiques et Naturelles, d'Agriculture et d'Industrie, publiées par la Société nationale d'Agriculture, etc., de Lyon, Deuxième Série 1104 pp.

Ozbek H, Cetin G. 1991. Contribution to the fauna of Coccinellidae (Coleoptera) from eastern Anatolia along with some new records from Turkey. *Turk J Entomol.* **15**(4): 193–202.

Poorani J. 2004. Notes on the Coccinellidae (Coleoptera) of the Indian subcontinent, including new synonymies. *J Biol Control* **18**(2): 185–187.

Robertson JA, Slipinski A, Moulton M, Shockley FW, Giorgi A, Lord NP, McKenna DD, Tomaszewska W, Forrester J, Miller KB, Whiting MF, McHugh JV. 2015. Phylogeny and classification of Cucujoidea and the recognition of a new superfamily Coccinelloidea (Coleoptera: Cucujiformia). *Syst Entomol*. **40**(4): 745–778. Crossref.

Ren SX, Wang XM, Pang H, Peng ZQ, Zeng T. 2009. *Colored Pictorial Handbook of Ladybird Beetles in China.* Science Press, Beijing, 336 pp. [in Chinese]

Savoiskaya GI. 1970. Coccinellids of the Alma-Ata reserve. *Trudy altaisk gos Zapov Fasc.* **9**: 163–187.

Savoiskaya GI. 1983. *Larvae of coccinellids (Coleoptera, Coccinellidae) of the fauna of the USSR.* Zoologicheski Institut, Leningrad.

Seago AE, Giorgi JA, Li J, Slipinski A. 2011. Phylogeny, classification and evolution of ladybird beetles (Coleoptera: Coccinellidae) based on simultaneous analysis of molecular and morphological data. *Mol Phylogenet Evol*. **60**: 137–151. Crossref. PMid:21426943