



NOTES ON NATURAL HISTORY

First Report of *Geocoris (Geocoris) lituratus* (Geocoridae: Hemiptera) as Egg Predator of *Graphium agamemnon* (Papilionidae: Lepidoptera) in Urban Landscape, West Bengal

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Study Area: 24 Paragana, West Bengal, India

Coordinated: 22°43'34.3"N; 88°22'51.7"E

Key words: Wetland, First sight

Introduction:

Urban open green vegetation constitutes suitable habitat for numerous flower-visiting insects like butterflies as these areas include patches rich in flowering plants, both wild and cultivated. Factors other than anthropogenic activities which are responsible for high mortality rates of butterflies in the modern urban ecosystem are one such aspect explored less.

In this study, *G. agamemnon* was found to oviposit and complete their life cycle on *Polyalthia longifolia* Sonn. plant of the family Annonaceae. During the routine survey, *Geocoris (Geocoris) lituratus* of the family Geocoridae under the order Hemiptera were found to predate on the freshly laid eggs of the Tailed Jay butterflies.

Geocoris sp. or Big-eyed bugs are well-known predators of a variety of insects, including several economically important agricultural pests (Schuman *et al.*, 2013). But Geocorinae is the only subfamily within this group bearing a unique trophic adaptation of diet, comprising largely insects along with a supplement of plant materials particularly seeds (Sweet, 1960; Tamaki & Weeks, 1972).

In India, few studies have been conducted on Geocorids and it is limited to commonly found species like *Geocoris ochropterus* (Varshney & Ballal, 2017). Recently, Varshney & Ballal (2017) reported the biology and feeding potential of *Geocoris superbus* Montandon. So far, nine species of the genus *Geocoris* have been reported from West Bengal, of which eight species are from Kolkata and its surroundings (Mukhopadhyay, 1988).

The present communication is on the rediscovery of *G. (G.) lituratus* from Kolkata after the first report by Distant (1904). Moreover, this is the first report of this bug as a predator of eggs of Tailed Jay butterflies from India.

Our survey:

The present work was done on the campus of Ramakrishna

Mission Vivekananda Centenary College (RKMVCC), Rahara, Khardaha, West Bengal. The observations are based on a regular survey and monitoring work carried out from Jan to Dec, 2019 in the RKMVC college campus. The study was conducted in a small managed garden of False Ashoka tree, locally known as Debdaru (*P. longifolia* Sonn.).

The regular monitoring was done throughout the day from 8:00 in the morning to 18:00 in the evening at an interval of two hours. Insect net was used for collecting the hemipteran bugs in the field and were then transferred in bottles containing ethyl acetate.

The bug was identified as *Geocoris (Geocoris) lituratus* (Fieber, 1844) of the family Geocoridae under the order Hemiptera. Butterflies were primarily identified directly in the field and confirmed by the experts as *Graphium agamemnon* (Linnaeus, 1758) of the family Papilionidae.

Our observations:

Tailed Jay is predominantly a pale green and black coloured spot bearing, large-sized butterfly (0.085-0.1mt.) of the family Papilionidae. These spots initially remain fluorescent in newly emerged specimens. Both sexes are more or less alike bearing black with bright green spots and streaks on wings (Fig.-1a).

G. (G.) lituratus is small (0.003mt.), dorso-ventrally flattened, brownish to black coloured bug. The body and legs of these bugs are brownish-yellow, eyes chestnut-brown, antennae hairy and dark brown, the only base of first segment brownish-yellow; first segment of the rostrum, longer than the second (Fig.-1b)

Tailed Jay adults were often sighted visiting flowers and nectaring on *Vernoria cinerea* and *Micania micrantha* found in our study site. In general, the eggs and the early larval stages of the Tailed Jay are typically found on saplings of the host plants at low heights. They lay eggs singly on young leaves of a sapling or immature plants of *P. longifolia*.

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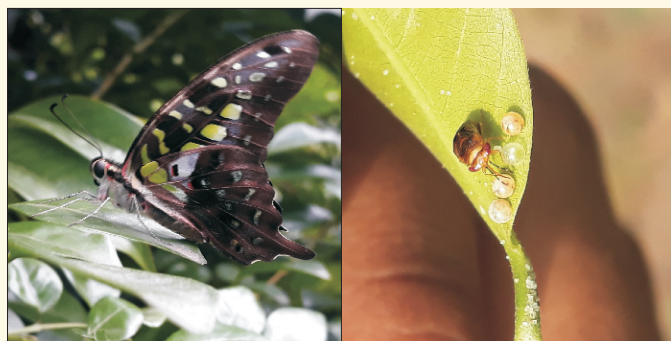


Figure-1: a) Tailed Jay Butterfly. b) *Geocoris* sp. inserting Proboscis on butterfly eggs.

The egg-laying activity of these butterflies was found to occur within 7.30 - 9.30 hrs. in the morning and they usually lay eggs on the ventral side of the leaf margin. Freshly laid eggs are spherical and white or creamy white in appearance with a diameter of about 1.1mm.

During the routine observation of eggs of the Tailed jay butterflies, *G.(G.) lituratus* were found to visit on the freshly laid eggs. The foraging activities of these bugs started between 11.00 to 12.30, soon after the eggs were laid. The eggs of the butterflies are sometimes already parasitized by wasps of the order Hymenoptera prior to the bug's visit and thus hemipteran species were seen to choose only unparasitized eggs of the butterfly. Immediately, after sitting on the top of the eggs they inserted their proboscis into the micropyle side of the soft chorion and sucked the yolk content of the egg (Fig.-1b).

In urban ecosystems, monitoring species diversity can be used as a tool to reduce human mismanagement and pollution in urbanized, industrial, rural, and managed areas (Wilson, 1997). According to Suwarno *et al.*, (2018) predators were the main factor of mortality for the larval stages of *G.agamemnon*, followed by the parasitoids. Eggs are the most vulnerable stage in the life cycle of this butterfly and the survivorship of *G.agamemnon* was measured at 2.23% (Suwarno *et al.*, 2018).

Few studies have been made on the predatory habit of *Geocoris* species. Both nymphs and adults feed on aphids, whiteflies, thrips, mites, and the eggs and larvae of tobacco budworm, bollworm and soybean loopers. In addition, they are also predators of plant bugs, especially the younger nymphs (Jesu Rajan *et al.*, 2018). But nothing has been reported on the predatory habit of this bug on the eggs of *G.agamemnon*.

Therefore, the occurrence of these hemipteran predators in this specific fragile ecosystem definitely add another serious threat to the future of the butterfly diversity of this urban area than the known anthropogenic activities.

We hope more investigations will definitely help unveil the possible measures yet to be pursued to conserve the urban specific butterfly diversity and to revamp a healthy ecosystem.

Table-1: List of species of Genus *Geocoris* from West Bengal

#	Species	Feeding habit	from
1	<i>Geocoris bengalensis</i> Mukhopadhyay & Ghosh (1982)	Small invertebrates from the litter of <i>Ficus religiosa</i> , <i>F. benghalensis</i> , <i>F. infectoria</i> ,	Howrah
2	<i>Geocoris ochropterus</i> (Fieber, 1844)	Insects and mites of the foliage habitat and also sucks plant sap.	Kolkata, Baruipur, Mirik, Kalimpong
3	<i>Geocoris pseudolituratus</i> Mukhopadhyay & Ghosh (1982)	Jassids, psyllids, other soft insects and mites from the foliage habitat of <i>Ficus hispida</i> associated vegetation. It also feeds on plant sap.	Kolkata
4	<i>Geocoris lituratus</i> (Fieber, 1844)	No information	Kolkata
5	<i>Geocoris ruffipennis</i> Distant, 1918	No information	Kolkata
6	<i>Geocoris jucundus</i> (Fieber, 1861)	No information	Kolkata
7	<i>Geocoris kalighatus</i> (Distant, 1910)	No information	Kolkata
8	<i>Geocoris ornatus</i> (Fieber, 1861)	No information	Kolkata, Howrah
9	<i>Geocoris puri</i> Distant, 1910	No information	Bengal

Source: Mukhopadhyay, 1988

Acknowledgements:

Authors acknowledge the supports of Principal Maharaj Swami Kamalasthananda and Controller of Examinations, Swami Vedanuragananda Maharaj of RKMVC College. The authors also extend their thanks to the scientists of the ZSI, Kolkata for their extreme help regarding the identification of insects for this study.

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