



## MORPHOLOGY AND PREY-PREDATOR CATALOGUE OF GENUS *OENOPIA* MULSANT 1850 (COLEOPTERA: COCCINELLIDAE) FROM UTTARAKHAND

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### ABSTRACT

Intensive field survey was undertaken to report the distribution and prey-predator relationships of Genus *Oenopia* (Coleoptera: Coccinellidae) from the Garhwal region of Uttarakhand focusing on five species of coccinellid beetles: *Oenopia sexreata*, *Oenopia mimica*, *Oenopia sauzeti*, *Oenopia kirbyi*, and *Oenopia luteopustulata*, which are found on various host plants preying on aphids. All species are classified under the subfamily Coccinellinae and the tribe Coccinellini. Various homopterans like whiteflies, psyllids, planthoppers, as well as Sternorrhyncha and Chrysomelidae, have been identified as prey for *Oenopia* species.

**Key words:** Coccinellidae, *Oenopia*, ladybirds, aphids, Uttarakhand.

### INTRODUCTION

Several *Oenopia* species from the Indian subcontinent are linked to aphids found in agricultural systems and orchards, as well as to adelgids on silver fir and other coniferous plants in northern and northeastern India. *Oenopia* species are primarily aphidophagous. In addition, various homopterans like whiteflies, psyllids, planthoppers, as well as Sternorrhyncha and Chrysomelidae, have been identified as prey for *Oenopia* species (Poorani 2002). Ladybird beetles (Coleoptera: Coccinellidae) are primarily predators, feeding on plant-eating insects found in agriculture, horticulture, and forestry, such as scale insects, mealybugs, whiteflies, thrips, aphids, and mites (Evans 2009). Nevertheless, these prey species vary in suitability for the growth, development, and reproduction of ladybirds, influenced by factors such as habitat, the predator's nutritional needs, and the biochemical makeup of the prey (Sharma and Joshi, 2020). Coccinellid beetles that feed on plants and fungi, known as phytophagous and mycophagous beetles, are important and noteworthy (Sutherland and Parrella 2009). Globally, over 6,000 species of coccinellids have been documented, with more than 400 species identified in India (Omkar and Pervez 2004; Sharma et al. 2015). These beetles are important agents for the biological control of insect pests. Coccinellid beetles are currently employed to manage insect pests

affecting agricultural crops, cash crops, vegetables, flowers, orchards, and even forest tree species (Mishra and Yousuf 2019). Poorani (2002) detailed the distribution and classification of 400 species of coccinellids found in the Indian subregion. The Coccinellidae family is divided into six primary subfamilies: Sticholotidinae, Chilocorinae, Scymninae, Coccidulinae, Coccinellinae, and Epilachninae. Nonetheless, recent phylogenetic research has indicated the potential identification of a seventh subfamily, Ortaliinae (Kundoo and Khan 2017). All subfamilies are predatory except the Epilachninae subfamily, which feeds on plants (Karki et al. 2024). Ladybird beetles (Coleoptera: Coccinellidae) are a diverse and ecologically significant group with many species that play an important role in various terrestrial ecosystems, including agriculture (Ajaz and Akhtar 2017). Most species of coccinellids are advantageous predators (while some are plant or fungus feeders), which has made them important in the advancement of biological control methods. The predation behavior of adults and larvae of coccinellid beetles can significantly affect the populations of the immature stages of their prey. In addition to their preferred prey, many predatory coccinellids also consume various non-prey items, such as honeydew, pollen, sap, nectar, and different types of fungi (Ajaz and Akhtar 2017). A few studies exist on the

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distribution and prey-predator dynamics on the predaceous coccinellids from North India (Omkar and Pervez 1999, 2000, 2002a, 2002b), including Uttarakhand (Pervez et al. 2020; Karki et al. 2024). Overall, the genus *Oenopia* represents a diverse group of lady beetles with significant ecological roles as predators of aphids and other small insects, making them beneficial for natural pest control in various ecosystems.

**Morphological characters** - Adult beetles have a body size ranging from approximately 5.5 to 6.5 mm in length and 5.0 to 5.5 mm in width. Their body is oval and moderately convex in shape. The coloration of the adult beetles is yellowish-red and black, featuring six cells on the elytra. These cells are split into two sections, with the upper half containing two cells and the lower half having one cell on each elytron, which are key identifying traits of the species.

### 1. *Oenopia sexaraeta*

**SubFamily** Coccinellinae  
**Tribe** Coccinellini

**Distribution:** Found in India (Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal); also present in Nepal, Bhutan, Myanmar, China, and Vietnam.



a. Adult



b. Tegmen



c. Male Genitalia

### 2. *Oenopia mimica*

**Subfamily** Coccinellinae  
**Tribe** Coccinellini

**Morphological characters** - Size: 3.00–4.30 mm in length and 2.95–3.10 mm in width. The shape is a short oval with a convex, hairless back. The female has a black head, while the male's head is yellow. The base color of the pronotum and elytra ranges from bright lemon yellow to creamy yellow; the pronotum features a black, hat-shaped spot on the rear edge, with its outer sides extending backward to touch the posterior corners of the pronotum. The elytral pattern is depicted in illustrations, showing a distinct median sutural mark that is elongated

and widens to an oval shape in the center, tapering at both ends. The antenna consists of 11 segments, with segments 9 and 10 being only slightly wider than long, forming an elongated club. The punctation on the elytra is notable, with clear microsculpture present in the spaces between the punctures. The abdominal postcoxal line is incomplete and has a short diagonal line associated with it.

**Distribution:** India (specifically Arunachal Pradesh, Assam, Himachal Pradesh, Sikkim, Uttarakhand, Uttar Pradesh, and West Bengal); Bhutan; Nepal; Myanmar; and Laos.



a. Adult



b. Tegmen



c. Male Genitalia



3. *Oenopia sauzeti*

SubFamily Coccinellinae

Tribe Coccinellini

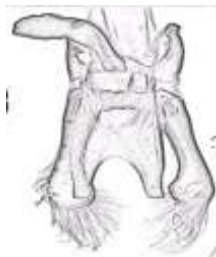
**Morphological characters** - Size: 3.40–4.60 mm in length and 2.76–3.60 mm in width. It has a short oval with a convex, smooth dorsal surface. The female's head is black, while the male's is yellow. The pronotum and elytra are creamy yellow to bright lemon yellow, adorned with black markings. The pronotum features a hat-shaped black mark at the back, with its posterolateral ends not reaching the corners. The elytral pattern includes a broad, distinctly transverse-quadrate median sutural spot that is sometimes rectangular, rarely rounded at the edges. The antenna has antennomeres 9

and 10 that are noticeably transverse, and the antennal club is short and compact. Elytral punctures are prominent, with the spaces between them being mostly smooth to finely textured, lacking any microsculpture.

**Distribution:** This species is commonly found across the northern and northeastern parts of India, including states such as Assam, Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Mizoram, Punjab, Sikkim, Tripura, West Bengal, Uttar Pradesh, and Uttarakhand. Its range also extends through the Eastern Himalayas, Bhutan, Pakistan, Nepal, Myanmar, Thailand, China, Laos, Vietnam, and Taiwan.



a. Adult



b. Tegmen



c. Male Genitalia

4. *Oenopia kirbyi*

SubFamily Coccinellinae

Tribe Coccinellini

**Morphological characters** - Dimensions: 3.70–3.90 mm in length and 3.00–3.20 mm in width. The shape is oval, with a moderately convex and smooth dorsum. The head is black, and the pronotum is also black, featuring yellow anterolateral corners. The basic color of the elytra

is a bright lemon yellow, adorned with four black spots; the edges are black, and there is a broad black stripe along the suture that is wider in the middle. The underside is black, except for the yellowish elytral epipleura.

**Distribution:** India (including Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, West Bengal); Eastern Himalayas; Bhutan; Nepal; Myanmar; Thailand; and Laos.



a. Adult



b. Tegmen



c. Male Genitalia

5. *Oenopia luteopustulata* Mulsant

= *Propylea luteopustulata* (Mulsant)

SubFamily Coccinellinae  
Tribe Coccinellini

**Morphological characters** - Size: 4.20–5.16 mm in length and 3.54–4.35 mm in width. The shape is broadly oval to slightly elongated oval, with a moderately convex and smooth dorsum. The base color ranges from red to orange-yellow, featuring black markings on the head, pronotum, and elytra. The head is yellow, marked with a transverse black stripe in the posterior half. The pronotum displays a transverse black band along the back edge, sometimes with four black spots. The elytral

pattern is highly variable, showing an anchor-shaped black marking resembling that of *P. dissecta*, which can appear in various forms such as reduced states, broken lines, 10–11 spots on the elytra, or completely unmarked elytra.

**Distribution:** India: Found extensively throughout the northern and northeastern areas, as well as the Himalayas, including the Andaman Islands, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal. Additionally, present in Nepal, Bhutan, Pakistan, Myanmar, China, Thailand, Tibet, Taiwan, and Vietnam.

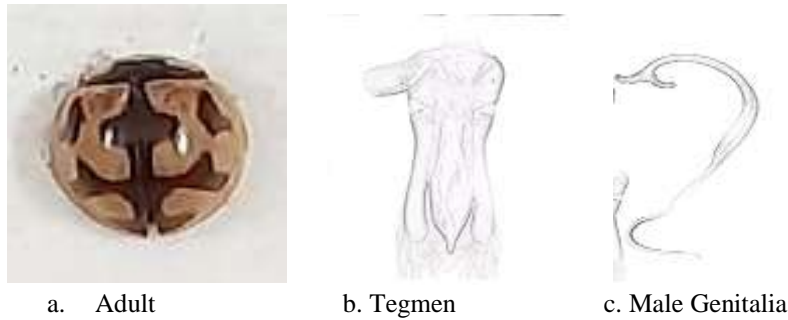


Table-1: *Oenopia* species and their aphid prey.

Ladybird species	Prey	References
<i>Oenopia sexaraeta</i>	<i>Adelges</i> sp., <i>Brachycaudus helichrysi</i> <i>Brevicoryne brassicae</i> <i>Eutrichosiphum</i> <i>raychaudhurii</i> <i>Indoidiopterus geranii</i> <i>Macrosiphum rosae</i> <i>Mollitrichosiphum alni</i> <i>Myzus persicae</i> <i>Rhopalosiphum maidis</i> <i>Shinjia orientalis</i> <i>Sitobion miscanthi</i> <i>Sitobion rosaeiformis</i> <i>Taoia indica</i>	Joshi et al. (2016) Das et al. (2020) Hafez et al. (2020) Mishra and Yousuf (2018) Mishra and Yousuf (2019) Poorani (2023) Siddique et al. (2023) Singh (2024) Tiwari (2024) Poorani (2002)
<i>Oenopia mimica</i>	<i>Adelges</i> sp. <i>Taoia indica</i>	Joshi et al. (2016) Das et al. (2020), Poorani (2023) Poorani et al. (2015), Poorani (2002) Hafez et al. (2020)
<i>Oenopia sauzeti</i>	<i>Myzus persicae</i> , <i>Rhopalosiphum maidis</i> <i>Sitobion avenae</i> . <i>Aleurolobus barodensis</i> <i>Aphis gossypii</i> Glover <i>Aphis fabae</i> Scopoli	Ali et al. (2023) Das et al. (2020) Joshi et al. (2016) Karki et al. (2024)



	<p><i>Aphis kurosawai</i> Takahashi <i>Aphis longisetosa</i> Basu, <i>Aphis spiraecola</i> Patch  <i>Brachycaudus helichrysi</i> <i>Brevicoryne brassicae</i> <i>Capitophorus formosartemisiae</i>  <i>Cavariella aegopodii</i> <i>Clethrobium dryobius</i>  <i>Coloradoa artemisicola</i> <i>Eriosoma lanigerum</i> Lambers,  <i>Macrosiphoniella pseudoartemisiae</i>  <i>Macrosiphum rosae</i> <i>Melanaphis donacis</i>  <i>Myzus obtusirostris</i> <i>Phorodon cannabidis</i>  <i>Sipha maydis</i> Passerini, <i>Schizaphis graminum</i>  <i>Sitobion rosaeiformis</i> <i>Evacanthus repexus</i>  <i>Tinocallis kahawaluokalan</i></p>	<p>Khanduri and Sharma (2023)  Chauhan et al. (2024)  Pervez et al. (2020)  Poorani (2023)  Poorani et al. (2015)  Sharma and Joshi (2010)  Sharma and Joshi (2020)  Singh (2024)  Poorani (2002)  Wei and Dai (2021)  Hafez et al. (2020)  Aziz et al. (2019)</p>
<i>Oenopia kirbyi</i>	<p><i>Aphis fabae</i> Scopoli  <i>Aphis fabae solanella</i>  <i>Aphis gossypii</i>  <i>Aphis paraverbasci</i>  <i>Brevicoryne brassicae</i>, <i>Capitophorus formosartemisiae</i>  <i>Cervaphis rappardi indica</i>, <i>Coloradoa rufomaculata</i>, <i>Eriosoma lanigerum</i>, <i>Eulachnus thunbergii</i>, <i>Hyalopterus pruni</i>, <i>Macrosiphum rosae</i>  <i>Myzus persicae</i>  <i>Sitobion rosaeiformis</i> <i>Tuberculatus indicus</i></p>	<p>Gaikwad et al. (2022)  Das et al. (2020)  Goswami et al. (2023)  Poorani (2002)  Joshi et al. (2016)  Poorani (2023)  Sharma and Joshi (2020)  Singh (2024)  Hafez et al. (2020)  Tiwari (2024)</p>
<i>Oenopia luteopustulata</i> = <i>Propylea luteopustulata</i>	<p><i>Aphis craccivora</i>  <i>Aphis gossypii</i>, <i>Brachycaudus helichrysi</i>  <i>Brevicoryne brassicae</i>, <i>Capitophorus formosartemisiae</i>  <i>Eriosoma lanigerum</i>, <i>Hyalopterus pruni</i>  <i>Lipaphis pseudobrassicae</i>, <i>Macrosiphoniella sanborni</i>, <i>Macrosiphum rosae</i>  <i>Myzus persicae</i>  <i>Rhopalosiphum maidis</i>  <i>Sitobion rosaeiformis</i> <i>Tuberculatus indicus</i></p>	<p>Joshi et al. (2016)  Karki et al. (2024)  Pervez et al. (2020)  Phaloura (2016)  Poorani (2023)  Tiwari (2024)  Das et al. (2020)  Hafez et al. (2020)</p>

## CONCLUSION

The results establish a foundation for upcoming research on the *Oenopia* genus, its ecological relationships, and its potential roles in integrated pest management (IPM) initiatives. Further investigation into their behavior, life cycles, and reactions to environmental changes could improve their effectiveness as biocontrol agents while promoting biodiversity preservation in Uttarakhand. The *Oenopia* genus is found in a wide range of habitats

throughout Uttarakhand, such as agricultural lands, forests, and grasslands. *Oenopia* species have been identified as effective natural predators of various agricultural pests, particularly aphids and scale insects, making them crucial for biological pest control and ecological balance in agroecosystems. The variety of *Oenopia* species in the region reflects Uttarakhand's rich faunal heritage. However, habitat degradation and agricultural practices pose threats to their populations,

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highlighting the need for conservation strategies to maintain their ecological contributions.

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