

New host and distribution records of *Hemiptarsenus orizae* Narendran (Hymenoptera, Eulophidae) from Kerala, India

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ABSTRACT: Rice leaf folder, *Helcystogramma arotreaum* (Meyrick, 1894) a major defoliator in Kerala was found parasitoid by a solitary endoparasitoid, *Hemiptarsenus orizae* Narendran (Hymenoptera, Eulophidae). New host-parasitoid association with distribution records of *H. orizae* is reported.

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KEY WORDS: Rice leaf folder, Chalcidoidea, endoparasitoid, *Helcystogramma arotreaum*

Hemiptarsenus Westwood, 1833, a moderate-sized parasitic wasp in Eulophinae, was erected for *Hemiptarsenus fulvicollis* Westwood, 1833. Majority of the parasitoids in the genus *Hemiptarsenus* attack larval or nymphal stages of various species of *Agromyza*, *Butornornyza*, *Cerodontha*, *Chromatornyia*, *Lirionyza*, *Ophiomyia*, *Phytolirionyza*, *Phytornyza*, and *Pseudonafirnyza* (*Agromyzidae*); *Merornyza* (*Chloropidae*, Diptera); *Eriopeltis* (*Coccidae*); *Bucculatrix* (*Bucculatricidae*); *Stugnatophora* (*Cosmopterigidae*); *Elachista* (*Elachistidae*); *Hydrellia* (*Ephydriidae*); *Phyllonorycter* (*Gracillariidae*); *Leucoptera* (*Lyonetiidae*); *Mornpha* (*Mmphiidae*); *Ectoedernia*, *Parafororia*, *Stigmella*, *Trifurcula* (*Nepticulidae*, Homoptera); *Gortynu* (*Noctuidae*); *Ostrinia* (*Pyralidae*); *Prays* (*Yponomeutidae*, Lepidoptera);

Blastophagus, *Ceutorhynchus*, *Hypurus*, *Rharnphus* (*Curculionidae*, Coleoptera); and *Hpteralhrus* (*Tenthredinidae*, Hymenoptera) (Chac-dong *et al.*, 2000). *Hemiptarsenus orizae* was discovered in the rice ecosystem and is reported only from Tamil Nadu and West Bengal (Narendran, 2011).

Parasitoids are the essential components of agroecosystems, particularly those from the Hymenoptera (Godfray, 1994). The primary foundational research on insect pest management for subsequent applicative investigations is based on faunistic parasitoid surveys (Tomanoviæ *et al.*, 2014; Petroviæ *et al.*, 2019). If a favourable environment causes considerable stress in agriculture, several pest species, particularly lepidopterans, are likely to become more prevalent (Elkinton and Liebhold, 1990; Devetak *et al.*, 2014).

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The abundance of hosts affects the population dynamics of parasitoids since many of them may prey on many host species or specialise in one. As a result, parasitoids play a crucial role in pest management (Hassell, 1980; Hassell and May, 1986; Barbosa, 1998; Gagiæ *et al.*, 2016).

Rice defoliator, *Helcystogramma arotraeum* Meyrick 1894 (Lepidoptera, Gelechiidae) is a pest of rice in Japan, Taiwan, China (Hainan, Jiangxi, and Yunnan), Myanmar, Thailand, India, Sri Lanka, Malaysia, and Indonesia (Ueda, 1995; Ponomarenko, 1997). *H. arotraeum* (= *Brachmia arotrae* Meyr.) larvae were seen folding and feeding on rice leaves. The caterpillars of this pest folds the leaves and feed with in and is wide spread in late-planted rice, (30–40% of the population of leaf-folders during the first week of December), and was seen parasitized by *Apanteles* sp. and *Brachymeria* sp. Little focus has been given to this rice pest despite its startling resemblance to *Cnaphalocrocis medinalis* Guenée (Natarajan *et al.*, 1978). *Oryza sativa* L. and *Zizania latifolia* Turcz (Poaceae) were the known hosts of this pest (Ponomarenko, 1997). The study aimed to shed light on the new host association of *H. orizae* in the rice fields of North Kerala.

Caterpillars of *H. arotraeum* were collected from the rice fields of Muiyyorath (11°52'30.8"N; 75°38'32.3"E), Kannur, Kerala, India, in the wet season (June–September). and brought to the laboratory for the emergence of parasitoids (at 28 ± 2°C and 70–80% relative humidity). Parasitoids preserved (in 70% ethanol) were processed using hexamethyldisilazane (HMDS) and later card-mounted. The parasitoids were identified using the available taxonomic keys (Narendran, 2011). Images of parasitoids were taken with a Leica DFC 295 camera attached to a Leica S8 APO stereozoom trinocular microscope with an 8x objective. Figures were produced from stacked images and combined automatically into a single image using Leica Automontage Software® V4.2. All the specimens were deposited at the Department of Zoology, Malabar Christian College, Kozhikode, Kerala, India. Moreover, the developmental stages of the rice insect pest, *H.*

arotraeum, were photographed using a Canon EOS 1500D 24.1-megapixel digital SLR camera.

The parasitoid *H. orizae* was found attacking the larvae of *H. arotraeum* in the rice fields, similar to the rice leaf folder *C. medinalis*. Larvae of *H. arotraeum* fold the leaves by sticking leaf margins, scrape the green tissues of leaves, leaving the blade with long, transparent white streaks (Fig. 1A–F). In mid-July, *Hemiptarsenus orizae* parasitized 3.6 per cent of *H. arotraeum* larvae, emerging from 2 of the 55 collected during the booting stage of paddy.

***Hemiptarsenus* Westwood, 1833**

Hemiptarsenus Westwood, 1833: 122–123. Type species: *H. fulvicollis* Westwood, designated by Westwood, 1839.

Notanisomorpha Ashmead, 1904: 356. Type species: *N. collaris* Ashmead. by original designation (synonymized by Schauff and La Salle, 1993: 494).

Eriglyptoideus Girault, 1913: [167]: 154. Type species: *E. varicornis* Girault. by original designation (synonymized by Bouček, 1988: 626).

Hemiptarsenoideus Girault, 1916: [274]: 220. Type species: *H. semialbiclava* Girault, designated by Gahan and Fagan, 1923 (Synonymized by Girault 1924: 376).

Neodimmockia Dodd, 1917: 361–362. Type species: *N. agromyzae* Dodd, by monotypy (Synonymized by Girault, 1924: 376).

Cleolophus Mercet, 1924: [24]: 461. Type species: *C. autonomus* Mercet, original designation and monotypy (Synonymized by Burks, 2012: 28–31).

Parpholema Szelenyi, 1981: [1]: 276. Type species: *P. collaris* Szelenyi, original designation and monotypy (Synonymized by Burks, 2012: 28–31).

Diagnosis: Scape exceeding level of vertex; funicle 4 segmented in female and with 3 branches in male; notauli incomplete; axillae usually not angulately advanced; scutellum without sublateral grooves; propodeum with median carina and plicae indistinct or absent in majority of species; forewing

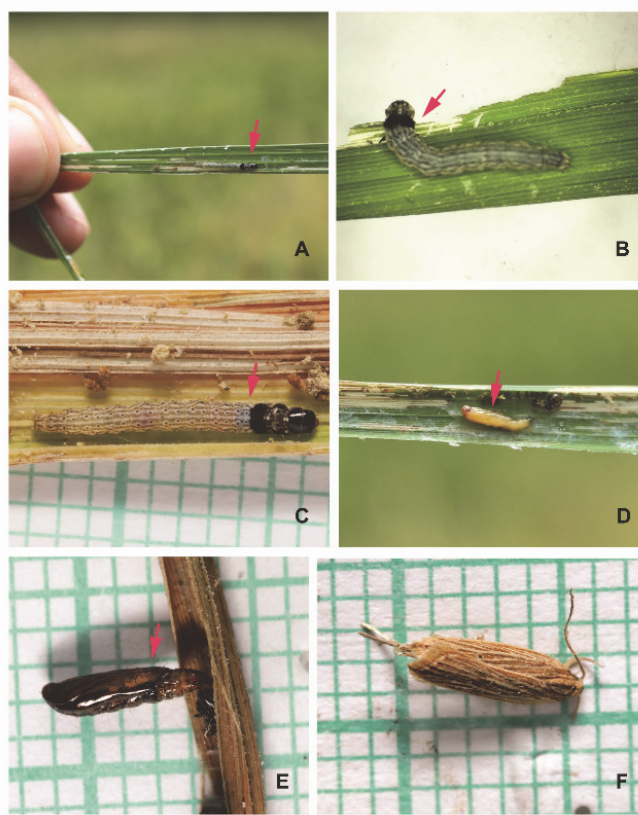


Fig. 1 Biology of *Helcystogramma arotraeum* (Meyrick): A-B. Larva feeding the rice leaf; C. Late instar larva; D-E. Pupal stage; F. Adult

and costal cell long and narrow; forewing at least 2.6x as long as wide and costal cell 10- 15x as long as wide.

Hemiptarsenus orizae (Narendran, 2011)

Type material: **Paratypes Examined**

Material examined: 1 ♀, INDIA: Kerala, Kannur, Muyyorath, 16.vii.2019, coll. S.K. Sreejina.

Diagnosis: Female: Length 2.31 mm. Head dark metallic green with bronze refringence; eye gray; ocelli pale brownish yellow; antenna brown with pedicel and scape pale yellowish brown (Fig. 2); pronotum orange yellow with a transverse area adjacent to posterior border medially metallic green; mesoscutum, scapula, axilla, scutellum and meso and metapleuron slightly dark with metallic green and bronze refringence; petiole pale brown; gaster with yellow and black patches; legs completely pale yellow except fourth tarsal segment and pretarsus

of forelegs also brown; wings hyaline with veins brown.

Variation: As reported by Narendran (2011), the paratypes from West Bengal are more brightly metallic green without bronze refringence and antenna pale brownish; length of female varies from 2.4-2.5mm.

Distribution: India: Tamil Nadu, West Bengal (Narendran, 2011) and Kerala.

Host: *Helcystogramma arotraeum* (Meyrick) (Lepidoptera, Gelechiidae) is the only known host. According to Chac-dong *et al.* (2000), two lepidopteran families, Noctuidae and Pyralidae, are hosts to the genus *Hemiptarsenus*.

Biology: *H. orizae* (Fig. 2) was reared from the larvae of *H. arotraeum*, inhabiting the foliage of *O. sativa* (Fig. 1B). Females of *H. orizae* probably oviposit into the early larval instars of *H.*

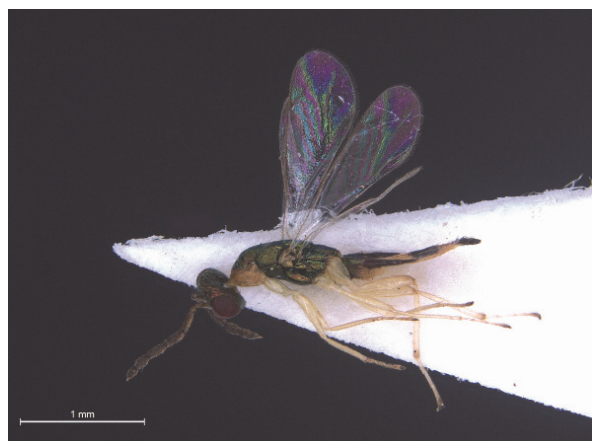


Fig. 2 Adult *Hemiptarsenus orizae* (Narendran)

arotraeum (Fig. 1A) as the parasitoids were reared from the late larvae (Fig. 1C) of the host. Hence, it is a larval parasitoid and exhibits solitary endoparasitism through koinobiosis. The parasitoid *H. orizae* was reported from the rice fields by Narendran (2011). However, no hosts have been reported for the parasitic wasp, and this study reports the first host-parasitoid association and distribution record of *H. orizae*.

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