





The genus *Carinostigmus* having 44 species worldwide, of which 5 species are reported from India (Tessy Rajan et al 2020; Pulawski, 2023). Green (1903), Arnold (1924), Yasumatsu & Watanabe (1964), Iwata (1964) and Tsuneki (1970) studied the biology of some species belonging to the genus *Carinostigmus*. *Carinostigmus* generally hunts aphids to feed their larvae, while the adults feed on nectar from flowering plants (Gacy et al. 2019). Females usually make their nest in stems, dried twigs, and wooden logs by making burrows inside them. They construct cells inside these burrows for storing paralyzed aphids (Bohart & Menke, 1976).

## 2. Methodology

Samples of predatory wasps of tea pests were collected by using yellow pan trap and sweep net during the recent survey conducted at tea gardens of Idukki district, Kerala for studying the natural enemies of tea

pests. The collected wasp specimens were studied and photographed with a Leica Stereo zoom microscope model LEICA M 205A with LEICA DFC 450 Camera. Multifocal stacking images were prepared with Auto montage software LAS Version 3.8.0 (Build: 878). All the studied wasp specimens

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= R R O R J L F D O & R O O H F W L R Q V .

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Abbreviations used for the depositories in the text: NHMUK : Natural History Museum, London, England, U.K; USNM : U. S. National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.; ZSIK : National Zoological Collections, Zoological Survey of India, Western Ghat Regional Centre, Kozhikode, Kerala, India.

### 3. Results & Discussion

#### *Carinostigmus costatus* Krombein, 1984 (Figs 1-2)

*Carinostigmus costatus* Krombein, 1984: 15, female, male. Holotype: female, Sri Lanka: Western Province, Colombo District, Gampaha Botanical Garden (USNM).

**Diagnostic characters:** Underside of head with strong longitudinal costae except median area with delicate longitudinal lineations narrowly (Fig. 2); mandible with narrow ivory streak near base; propodeal enclosure except basal section rugoso-reticulate; apex of clypeus slightly emarginated; petiole stouter, about 5-6.5 × as long as its median width; face with median carina stronger and armed with erect projection near middle; groove along inner eye margin strongly crenulate; mandibles tridentate in female.

**Material examined.** INDIA: Kerala, Idukki district, Kuttikanam, Stagbrook tea plantation (9.599250 N and 76.963637 E), 1♀, 24.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.23217; Vagamon, Kothapara tea plantation (9.724068 N and 76.981615 E), 1♀, 29.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.23218; Kuttikanam, Ashley tea plantation (9.590327 N and 76.963517 E), 2♀, 30.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV.23219-23220.

**Distribution.** India: Goa, Karnataka, Kerala, Uttarakhand. *Elsewhere:* Sri Lanka; China (Tessy Rajan *et al.*, 2020; Pulawski, 2023).

#### *Carinostigmus aterrimus* (Turner, 1917) (Figs 3-4)

*Stigmus aterrimus* Turner, 1917:174, female. Holotype: female, India: Tamil Nadu, Nilgiri Hills, Coonoor (NHMUK).

**Diagnostic characters:** Underside of head moderately densely punctate especially towards middle and usually with few parallel carinae laterally (Fig. 4); mandible with no ivory markings; propodeal enclosure except basal section rugoso-reticulate; apex of clypeus slightly emarginated; petiole stouter, about 5-6.5 × as long as its median width; face with median carina stronger and armed with erect projection near middle; groove along inner eye margin strongly crenulate; mandibles tridentate in female.

**Material examined.** INDIA: Kerala, Idukki district, Kuttikanam, Stagbrook tea plantation (9.599250 N and 76.963637 E), 1♀, 24.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.23204; Valakode, Rhythmbara tea plantation (9.716500 N and 76.973642 E), 1♀, 26.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.23205; Vagamon, Panchalimedu tea plantation (9.5357 N and 76.9785 E), 1♀, 28.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.23206; Valakode, J.C. Hills tea plantation (9.706623 N and 76.963503 E), 2♀, 29.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV.23207-23208; Kuttikanam, Ashley tea plantation (9.590327 N and 76.963517 E), 2♀ & 2♂, 30.i.2023, Coll. P. Girish Kumar & Party, ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV.23209-23212; Kuttikanam, Teyla tea plantation (9.581908 N and 76.969120 E), 4♀, 31.i.2023, Coll. P. Girish Kumar



&Party, ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV.23213-23216.

**Distribution.** India: Kerala (new record), Karnataka, Tamil Nadu (Tessy Rajan *et al.*, 2020; Pulawski, 2023).

**Major differences between *Carinostigmus costatus* Krombein and *C. aterrimus* (Turner)**

	<i>C. costatus</i> Krombein, 1984	<i>C. aterrimus</i> (Turner, 1917)
1.	Underside of head with strong longitudinal costae except median area with delicate longitudinal lineolations narrowly.	Underside of head moderately densely punctate especially towards middle and usually with few parallel carinae laterally.
2.	Mandible with narrow ivory streak near base.	Mandible with no ivory markings.

**4. Conclusion**

It is the first report of two predatory wasps, namely, *Carinostigmus costatus* Krombein, 1984 and *C. aterrimus* (Turner, 1917) as natural enemies of tea aphids.

**5. Acknowledgements**

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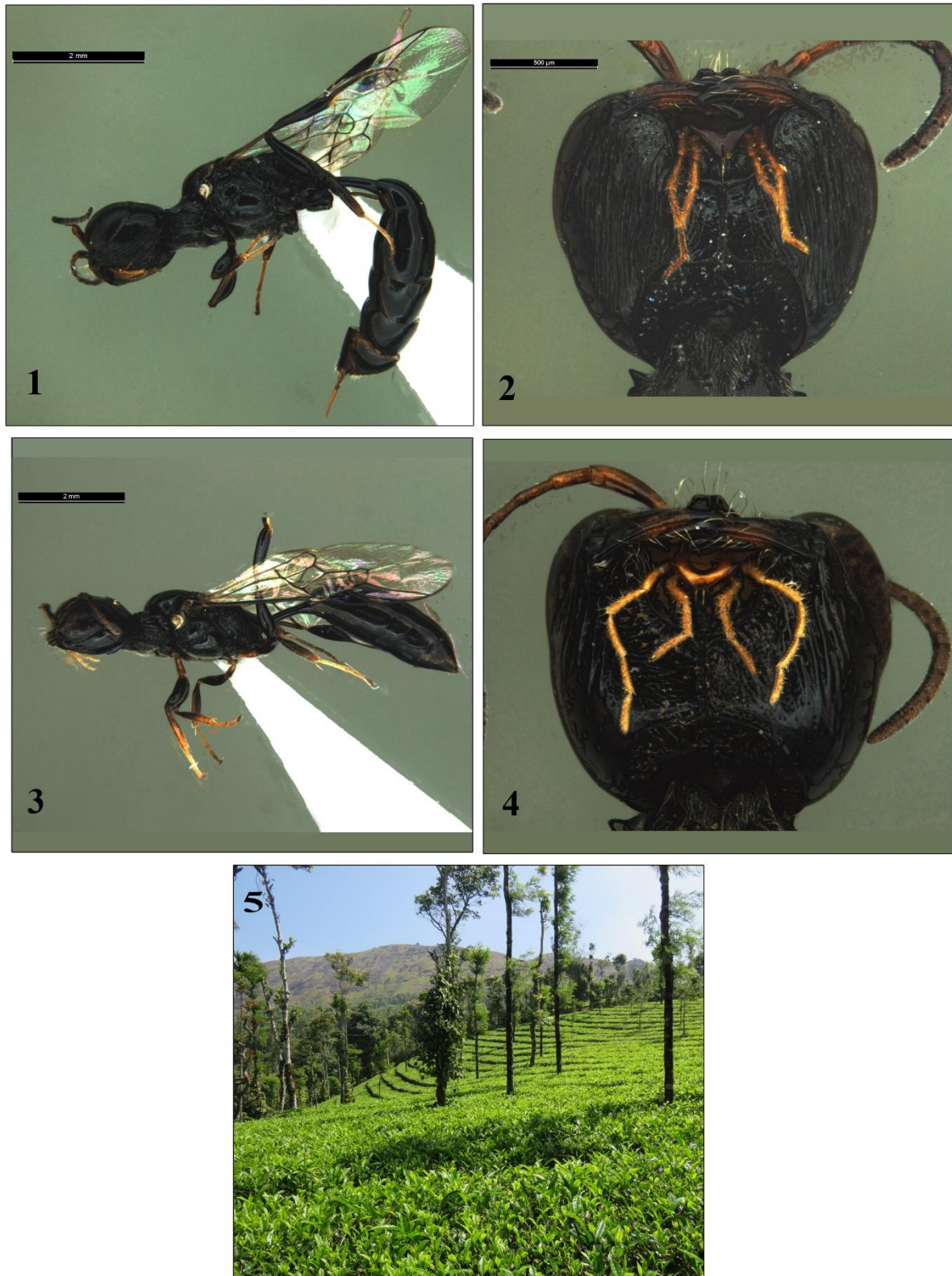
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FIGURES 1–2. *Carinostigmus costatus* Krombein female. 1. Habitus, lateral view; 2. Under side of head. FIGURES 3–4. *Carinostigmus aterrimus* (Turner) female. 3. Habitus, lateral view; 4. Underside of head. FIGURE 5. Rhythmbara tea plantation, Valakode, Vagamon.