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First record of cuckoo wasp *Trichrysis imperiosa* (Smith) (Hymenoptera, Chrysididae) from the nest of *Sceliphron coromandelicum* (Lepeletier) (Hymenoptera, Sphecidae) in India

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ABSTRACT: The present study could document, *Sceliphron coromandelicum* (Lepeletier) (Hymenoptera: Sphecidae) as the host of the cuckoo wasp, *Trichrysis imperiosa* (Smith) (Hymenoptera: Chrysididae) from Kerala, India. This is the first host record of *T. imperiosa*. Interesting observations and notes on their natural history are also reported. © 2022 Association for Advancement of Entomology

KEYWORDS: Host association, notes, natural history, Kerala, kleptoparasite

The Chrysididae popularly called "gold wasps" or "jewel wasps" are brightly coloured and shiny Hymenoptera, mostly brilliant metallic green, violet, gold and/or red (Rosa *et al*., 2021a). They are also termed cuckoo wasps, since they use the nest of another species for laying eggs and rearing their own young. Evolutionarily they are specialized to defend themselves during oviposition; they curl into a defensive ball through conglobulation. Their strongly chitinized and sculptured body serve to defend the attack of their hosts (Houston, 2011). The natural history of chrysidid wasps remains poorly known, though they are widespread and are important natural enemies of several groups of Hymenoptera like Sphecidae, Eumeninae and Pompilidae (Kimsey and Bohart, 1991; Bank *et al*., 2017; Sann *et al.*, 2018). Genus *Trichrysis* Lichtenstein, 1876 of subfamily Chrysidinae are parasitoids of sphecid or crabronid wasps (Rosa *et al.,* 2016) and also pompilids (Pärn *et al.,* 2015). The genus is distributed in Palaearctic, Afrotropical, Oriental and Australian Regions (Rosa *et al.,* 2016). A total of 121 species of Chrysididae under 20 genera and four subfamilies are known from India (Rosa *et al*., 2021a; Rosa *et al*., 2021b; Rosa and Halada, 2021; Aswathi and Bijoy, 2021).

The mud dauber wasp nest was collected from Pilassery, Kozhikode, Kerala (11.324°N; 75.9076°E) on 24-06-2021. The nest was initially kept for emergence; however, it was opened later for further studies. The fully developed individuals of both the sphecids and chrysidids were pinned and the rest were preserved in alcohol (70%). The mounted specimens were studied and photographed using Leica DFC 500 digital camera attached to Leica M205 A stereomicroscope (1X objective), and processed with LAS version 3.6, extended focus

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software. The voucher specimens are deposited in the National Zoological Collections of Zoological Survey of India, Kolkata.

The cuckoo wasp was identified as *T. imperiosa* (Fig. 1.a), with the help of taxonomic keys (Rosa *et al.,* 2021a). With five teeth on the apex of the 3rd metasomal tergite, it belongs to *T. lusca* species group. *T. imperiosa* is similar to *T. lusca* (Fabricius, 1804), however, differs in the colour of dorsal mesosoma, in the nature of frontal carina, and also the sculpture of second and third metasomal tergites. The body is metallic greenish-blue to blue and has golden reflections on face. The species is widely distributed in India and are documented from the states of Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, West Bengal and Arunachal Pradesh (Rosa *et al*., 2021a). Elsewhere the species is known from China (Tsuneki, 1970); Australia, Myanmar, Sri Lanka (Bingham, 1903); Vietnam (Kimsey and Bohart, 1991); Indonesia, Nepal, Papua New Guinea and Thailand (Rosa *et al.*, 2016).

Morphological identification of *S. coromandelicum* (Fig. 1. b), was made using the key to species (Anagha *et al*., 2021). It can be easily recognized by the pronotal collar with yellowish-brown band, black metasoma with fine setae and the yellow or yellowish-brown petiole. The species is distributed in Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Ukraine (Pulawski, 2021; Anagha *et al*., 2021). In India, the species is documented from Andaman Islands, Assam, Bihar, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Pondicherry, Punjab, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal (Anagha *et al*., 2021).

Natural history of *T. imperiosa* and *S. coromandelicum:* The female sphecids build their mud nests in a variety of sheltered and dry sites. They are also common in human habitations (Camillo, 2002). In the present study, the mud nests of *S. coromandelicum* were found on an unplastered, illuminated wall of a building, well protected from rain and sunlight, at a height of about 1.5 m from ground level. The nest had 10 subcylindrical cells, arranged in tiers (Fig. 1c), including an unopened cell. On breaking the single unopened cell, it was seen that the cells were provisioned with a host larva and 15 spiders, belonging to the families Clubionidae and Salticidae. Both juveniles and subadults (Fig. 1 d) could be seen. The host association of *T. imperiosa* could be ascertained since all the cells of the nest were not parasitized and three host sphecids too emerged from the same nest. In total, three *T. imperiosa* and two *S. coromandelicum* were found inside the sphecid nest (Table 1). It could be confirmed that similar to the host sphecid, only a single individual of chrysidid wasp developed from each cell. *T. imperiosa* individuals had constructed a mirror-like diaphragm across the center of the host cocoon which separated it from the host remains (Fig. 1. c).

Table 1. Details of the nest contents in each cell

No.	Cell content	Remarks
1	Vacant cell	Opened
2	Vacant cell	Opened
3	Vacant cell	Opened
4	*T. imperiosa*	Unopened
5	*T. imperiosa*	Unopened
6	*T. imperiosa*	Unopened
7	*T. imperiosa*	Unopened
8	*S. coromandelicum*	Unopened
9	*S. coromandelicum*	Unopened
10	15 spiders, *S. coromandelicum* larva	Unopened

All cuckoo wasps are parasitoids or kleptoparasites of Hymenoptera. They lay their eggs inside the host nest. In some species the hatched larva of the cuckoo wasp will consume the host larva when it is fully developed or in others it will start feeding the host egg or larvae as well as the provisioned food immediately after hatching (Szczepko *et al.,* 2003).

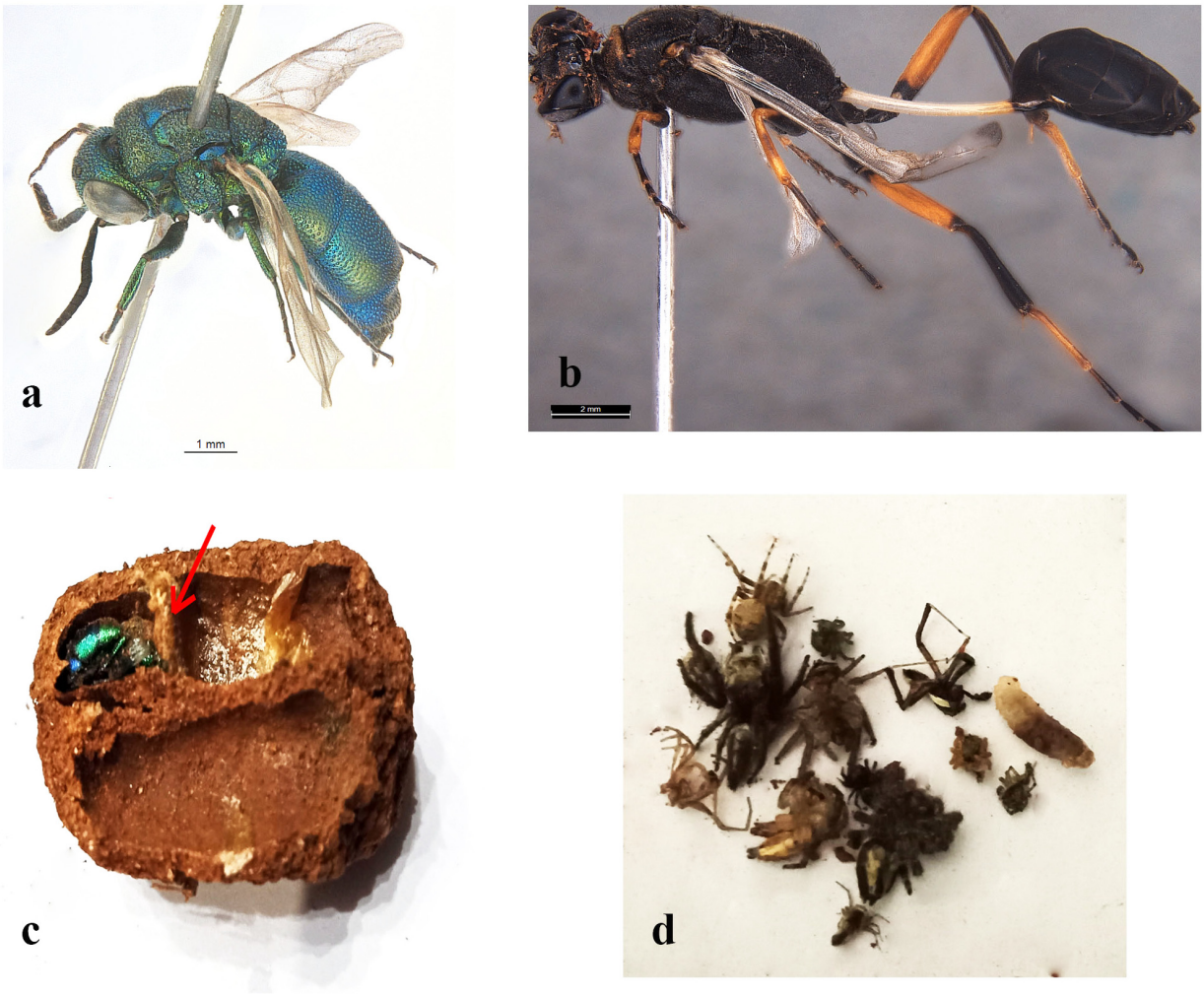

Fig. 1. a) *Trichrysis imperiosa*, b) *Sceliphron coromandelicum*, c) Cuckoo wasp inside *Sceliphron* nest with mirror like diaphram, d) Spider prey and larvae

Host-parasite associations of *Trichrysis* wasps have been documented by several authors (Dufour and Perris, 1840; García Mercet, 1911; Alfken, 1915; Enslin, 1921; Trautmann, 1927; Grandi, 1931, 1936; Danks, 1971; Groot, 1971; Lomholdt, 1975; Morgan, 1984; Kimsey and Bohart, 1991; Asís *et al.,* 1994; Kunz, 1994; Strumia, 1997; Rosa, 2006). Recently Pärn *et al.,* (2015) included some Pompilidae species as potential hosts for *Trichrysis*.

T. lusca is reported as a parasitoid of two species of *Sceliphron* - *S. fabricator* Smith (Mocsáry, 1889, 1912; Linsenmaier, 1959) and *S. inflexus* Sickmann (Tsuneki, 1955). A few unidentified species of Eumenidae were also documented as hosts of this species (Kimsey and Bohart, 1991). The cuckoo wasps with pollen-collecting species as hosts as in the case of bees may act as parasitoids rather than kleptoparasites (Pauli *et al.,* 2019). Accordingly, in the present study since the host species *S. coromandelicum* is not a pollen collector, it can be assumed that *T. imperiosa* is in the role of a kleptoparasite rather than a parasitoid. This is the first ever host record of *T. imperiosa* globally.

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