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Research article

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Preliminary revision of the Indian cuckoo wasp genera *Trichrysis* Lichtenstein, 1876 and *Chrysidea* Bischoff, 1910, with description of a new species (Hymenoptera, Chrysididae)

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Abstract. The genera *Trichrysis* Lichtenstein, 1876 and *Chrysidea* Bischoff, 1910 from India are reviewed. A new species, *Trichrysis poseidonia* sp. nov. from India and Nepal is described. *Trichrysis bengalensis* (Mocsáry, 1889) is revalidated from the previous synonymy with *T. lusca* (Fabricius, 1804). *Trichrysis inops* (Gribodo, 1884) is recorded from India for the first time. The lectotype of *Chrysis spectrum* Wickwar, 1908 is designated. *Chrysis mendicalis* Cameron, 1897 is transferred from the genus *Trichrysis* to the genus *Chrysidea*. Keys and illustrations are provided for the identification of the eleven species of *Trichrysis* and the four species of *Chrysidea* so far known in the country, including a Sri Lankan species.

Keywords. Chrysidinae, cuckoo wasps, lectotype designation, Nepal, Sri Lanka.

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Introduction

Trichrysis Lichtenstein, 1876 and *Chrysidea* Bischoff, 1910 are two small genera of cuckoo wasps widely distributed in the Old World, whose members are often confused with each other for similar

habitus, colouration, and some morphological features. Several new species of *Trichrysis* and a new species of *Chrysidea* were recently described from China and Vietnam (Rosa & Xu 2015; Rosa *et al.* 2016; Wiśniowski *et al.* 2020; Nguyen *et al.* 2022) due to a new interest in the Oriental fauna of cuckoo wasps, and other taxa are currently under revision.

Bingham (1903), in a monograph of the Indian Chrysididae, listed and keyed five species currently included in *Trichrysis* and still considered valid: *T. imperiosa* (Smith, 1874), *T. lanka* (Bingham, 1903), *T. lusca* (Fabricius, 1804), *T. scioensis* (Gribodo, 1879) and *T. triacantha* (Mocsáry, 1889). Other taxa listed by Bingham (1903) were later differently evaluated: *T. nugatrix* (Bingham, 1903) has been listed as accidentally introduced by Kimsey & Bohart (1991) and synonymised with *Caenochrysis tridens* (Lepelletier, 1825), an American species; *T. singalensis* (Mocsáry, 1889) was synonymised with *T. triacantha* by Kimsey & Bohart (1991), although the types were no longer found in the depository collections listed by Mocsáry (Rosa *et al.* 2016); *T. bengalensis* (Mocsáry, 1889) was synonymised with *T. lusca* (Fabricius, 1804) by Kimsey & Bohart (1991).

Another two species, *T. excisifrons* (Mocsáry, 1912) and *T. tonkinensis* (Mocsáry, 1914), were described and added to the Indian fauna afterwards by Mocsáry (1912) and Rosa *et al.* (2016). Lastly, Bohart (1988) described *T. hexapholis* Bohart, 1988 from Sri Lanka, not yet recorded from India, but included in the present article to provide a more comprehensive key to the known species of the genus in the biogeographic area.

Trichrysis scioensis (Gribodo, 1879) was considered a doubtful regional record by Rosa *et al.* (2021a), and probably referable to another species subsequently described in this genus. However, in light of new distribution data recently published (Rosa & Halada 2021) and here presented for *T. inops* Gribodo, 1884, it is possible that more African species have been introduced to India or that their biogeographical distribution is actually wider than previously hypothesized, and for this reason *T. scioensis* is listed and keyed here for the Indian fauna.

Bingham (1903), in the genus *Chrysis* Linnaeus, 1761, listed and keyed three species of *Chrysidea* which are still considered valid species, namely: *Chrysidea furiosa* (Cameron, 1897), *C. mendicalis* (Cameron, 1897), and *C. pumila* (Klug, 1845). Recently Aswathi & Bijoy (2021) added *Chrysidea falsa* Rosa & Xu, 2015 to species recorded from India.

The objective of this paper is to revise the Indian species included in the genera *Trichrysis* and *Chrysidea* summarizing new data obtained from museum specimens, type material, and recently collected specimens. We record another two Indian species: *T. poseidonia* sp. nov. and *T. inops* (Gribodo, 1884), and revalidate *T. bengalensis* (Mocsáry, 1889) stat. rev. We also transfer *Chrysis mendicalis* Cameron, 1897 (original combination), from the genus *Trichrysis* to *Chrysidea* and provide a key to these two genera to facilitate the identification of the species currently known, being aware that in the near future other species could be found and described from the country.

Material and methods

The present contribution is based on specimens recently collected in India by the second author and on historical material either studied (at the Natural History Museum, London, UK and the Hungarian Natural History Museum, Budapest Hungary) or received on loan for study from European museums, such as the Erfurt Museum (Germany) and the Naturalis Biodiversity Center (The Netherlands).

Morphological terminology follows Kimsey & Bohart (1991) and Rosa *et al.* (2021a). All specimens were examined and described under a Tegal SCZ stereo microscope. The images of the new species

were taken with a Camera Olympus E-M1 Mark II with the Olympus 60 mm objective and Zuiko MC ver. 2.0; images were stacked with the Helicon software and then enhanced with Adobe Photoshop.

Institutional abbreviations

ETHZ	= Eidgenössische Technische Hochschule, Zürich, Switzerland
HNHM	= Magyar Természettudományi Múzeum, Budapest, Hungary
MHC	= Marek Halada collection, České Budějovice, Czech Republic
MSNG	= Museo Civico di Storia Naturale, Genova, Italy
NHME	= Naturkundemuseum Erfurt, Germany
NHMUK	= Natural History Museum, London, UK
NHMW	= Naturhistorisches Museum, Vienna, Austria
NMLU	= Natur-Museum, Luzern, Switzerland
OUMNH	= Oxford University Museum of Natural History, Oxford, UK
PRC	= Paolo Rosa Private Collection, Bernareggio, Italy
RMNH	= Naturalis Biodiversity Center, Leiden, The Netherlands
SCAU	= South China Agricultural University, Guangzhou, China
SERL	= Shadpada Entomology Research Lab, Irinjalakuda, Kerala, India
ZMUC	= Zoologisk Museum, Copenhagen, Denmark

Abbreviations for morphological terms

BOL	= brow-ocellar line, the shortest distance between mid-ocellus and transverse frontal carina
F1–F3	= flagellomeres 1–3
l/w	= relative length compared to width
MOD	= anterior ocellar diameter
MS	= malar space, the shortest distance between base of mandible and margin of compound eye
OD	= ocular distance, the shortest distance between compound eyes
OOL	= oculo-ocellar line, the shortest distance between lateral ocellus and compound eye
P	= pedicel
PD	= puncture diameter
POL	= the shortest distance between posterior ocelli
S2	= metasomal sternum 2
T1–T3	= metasomal terga 1 to 3
TFC	= transverse frontal carina
vs	= versus

Results

Taxonomy

Class Insecta Linnaeus, 1758
 Order Hymenoptera Linnaeus, 1758
 Superfamily Chrysidoidea Latreille, 1802
 Family Chrysididae Latreille, 1802
 Subfamily Chrysidinae Latreille, 1802

 Genus *Trichrysis* Lichtenstein, 1876

Trichrysis Lichtenstein, 1876: 27.

Type species

Sphex cyanea Linnaeus, 1758: 572 [= *Trichrysis cyanea* (Linnaeus, 1758)].

Diagnosis

Head broader than high; scapal basin concave, striate, or punctate; TFC various, usually single and medially raised, sometimes double, down curved along eye margin, or with branches upward extended to ocellar area; MS usually about 1 MOD; pronotum with distinct and complete sublateral carina, sometimes incomplete or weak, faint in the *inops* species group; mesopleuron with broad episternal and scrobal sulcus; metasoma with geminate punctures; T2 usually with median carina; T3 with three or five teeth; lateral teeth in some species can be merely angle-shaped; S2 with black spots usually fused medially, rarely separated by a narrow line, or largely separated in the *inops* group, however, never connected to anterior or lateral margins.

Members of this genus are usually completely blue or green in colour, but a few Indian and African species have red markings, in particular on the metasoma; small males can often be blackish dorsally.

The genus *Trichrysis* is currently subdivided into three heterogeneous species groups: the *cyanea*, *inops* and *lusca* groups (Rosa *et al.* 2016).

Indian members are subdivided in the following groups:

- *lusca* group: *Trichrysis bengalensis* (Mocsáry, 1889) *T. imperiosa* (Smith, 1874), *T. lusca* (Fabricius, 1804)
- *cyanea* group: *Trichrysis excisifrons* (Mocsáry, 1912), *T. lanka* (Bingham, 1903), *T. poseidonia* sp. nov., *T. tonkinensis* (Mocsáry, 1914), *T. triacantha* (Mocsáry, 1889)
- *inops* group: *Trichrysis inops* (Gribodo, 1884), *T. scioensis* (Gribodo, 1879)

Hosts

Hosts are cavity-nesting crabronid and pompilid wasps (Pärn *et al.* 2014; Paukkunen *et al.* 2015; Pauli *et al.* 2019). Additionally, cavity-nesting solitary bee species have been reported in the old literature as hosts (e.g., Trautmann 1927), but these records should be considered unreliable due to the very different biology of bees compared to crabronid and pompilid hosts.

Distribution

The genus includes more than 40 species distributed in the Palaearctic, Afrotropical, Australian, and Oriental Regions (Bohart 1988; Rosa *et al.* 2016, 2021a; Wiśniowski *et al.* 2020).

Differential diagnosis

In the Old World, some members of *Trichrysis* can easily be confused with members of the genus *Chrysidea*. Linsenmaier (1987) synonymised *Chrysidea* with *Trichrysis* (as a subgenus of *Chrysis*), but the genus *Chrysidea* was later considered as valid and separate by Bohart (1988) and Kimsey & Bohart (1991). The recent phylogeny by Pauli *et al.* (2019) shows a close affinity between these two genera, which are well identified in a subordinated clade. However, considering the position of these two genera within the *Chrysis* lineage, the authors suggested combining both genera with *Chrysis* Linnaeus, 1761. We support the point of view of Pauli *et al.* (2019); however, waiting for a revision of the Chrysidini classification, we still consider the two genera separately.

A combination of morphological characteristics allows the separation of *Trichrysis* and *Chrysidea* (Table 1): sublateral carina (present in *Trichrysis* vs faint or rarely present in *Chrysidea* and in some

Table 1. Table summarising the main diagnostic differences between the species groups of *Chrysidea* Bischoff, 1910 and *Trichrysis* Lichtenstein, 1876.

	<i>Chrysidea</i> Bischoff, 1910	<i>T. inops</i> group	<i>T. cyanea</i> group	<i>T. lusca</i> group
sublateral carina	absent (faint, rarely present)	absent (faint, rarely present)	present	present
black spots on S2	medially separated by 1–2 × MOD	medially separated by 1–2 × MOD	medially fused or nearly so	medially fused or nearly so
apical teeth	2 (rarely 3)	5	3	5
TFC	topping scapal basin	variable, not topping scapal basin	variable, not topping scapal basin	variable, not topping scapal basin
medial cell	incomplete (rarely complete)	complete	complete	complete
genital capsule	gonocoxa fully developed to gonostylus	inner upper margin of gonocoxa short	inner upper margin of gonocoxa short	inner upper margin of gonocoxa short
body colouration	green and blue, without golden to red markings	green and blue, with or without golden to red markings	green and blue, occasionally with golden to red markings or with olive colour	T2 laterally with red markings ormesosoma with coppery reflection

species of the *inops* group); black spots on the second sternum (medially fused or nearly so in *Trichrysis* vs distinctly separated by 1–2 × MOD in *Chrysidea* and the *inops* group); number of teeth on the apical margin of the third tergum (three or five in *Trichrysis*, sometimes lateral ones barely visible like angles vs two lateral teeth, medially straight, weakly undulate, or rarely with a median tooth in *Chrysidea*); transverse frontal carina (variable in *Trichrysis*, anyway not topping the scapal basin, vs topping the scapal basin in *Chrysidea*); medial cell [= discoidal cell in Kimsey & Bohart 1991] (complete in *Trichrysis*, *Chrysidea falsa* and *C. mendicalis* vs incomplete in the other members of *Chrysidea*, with its outer veins either not or only partly sclerotised); genital capsule (gonocoxa shortened with distinct, elongate gonostylus vs gonocoxa fully developed without distinct gonostylus); body colours (green and blue in both genera, yet some species of *Trichrysis* have red, golden or bronze spots, stripes, or highlights which are not recorded in *Chrysidea*).

Rosa *et al.* (2021a) recently published a checklist of Indian cuckoo wasps, with a key for the identification of known and expected genera for the country.

List of the Indian species

Trichrysis bengalensis (Mocsáry, 1889) stat. rev.

Fig. 1

Chrysis (*Trichrysis*) *bengalensis* Mocsáry, 1889: 527.

Chrysis bengalensis: – Dalla Torre 1892: 47. — Bingham 1903: 439 (in key), 482–483; 1908: 349.

Chrysis (*Pentachrysis*) *bengalensis*: – Bischoff 1913: 62.

Praestochrysis lusca: – Kimsey & Bohart 1991: 533.

Material examined

Holotype

INDIA • ♀; Bombay, Maharastra; “Bombay, [leg.] Stockinger”; 755–1; “*Bengalensis* Mocs. typ. det. Mocsáry”; “*Chrysis lusca* F. Linsenmaier det. 62”; “Holotypus *Chrysis bengalensis* ♀ Mocs. RMB”; “id nr. 135510 HNHM Hym.coll.”; HNHM.

Distribution

India (Maharashtra; possibly Tamil Nadu: Chennai [= Madras] (Bingham 1903)).

Remarks

The holotype of *Chrysis bengalensis* Mocsáry, 1889 (Fig. 1) is different from the examined specimens of *Trichrysis lusca* (Fig. 3), as described by Mocsáry (1889) and Bingham (1903). In addition to the uniform dark blue colouration (vs more extensively green to light blue in *T. lusca*) and the dark brown wings (vs light fusco-hyaline in *T. lusca*), it is coarsely punctured with large and deeper punctures, compared to *T. lusca*; the TFC is close to the upper margin of the scapal basin and without the vertical

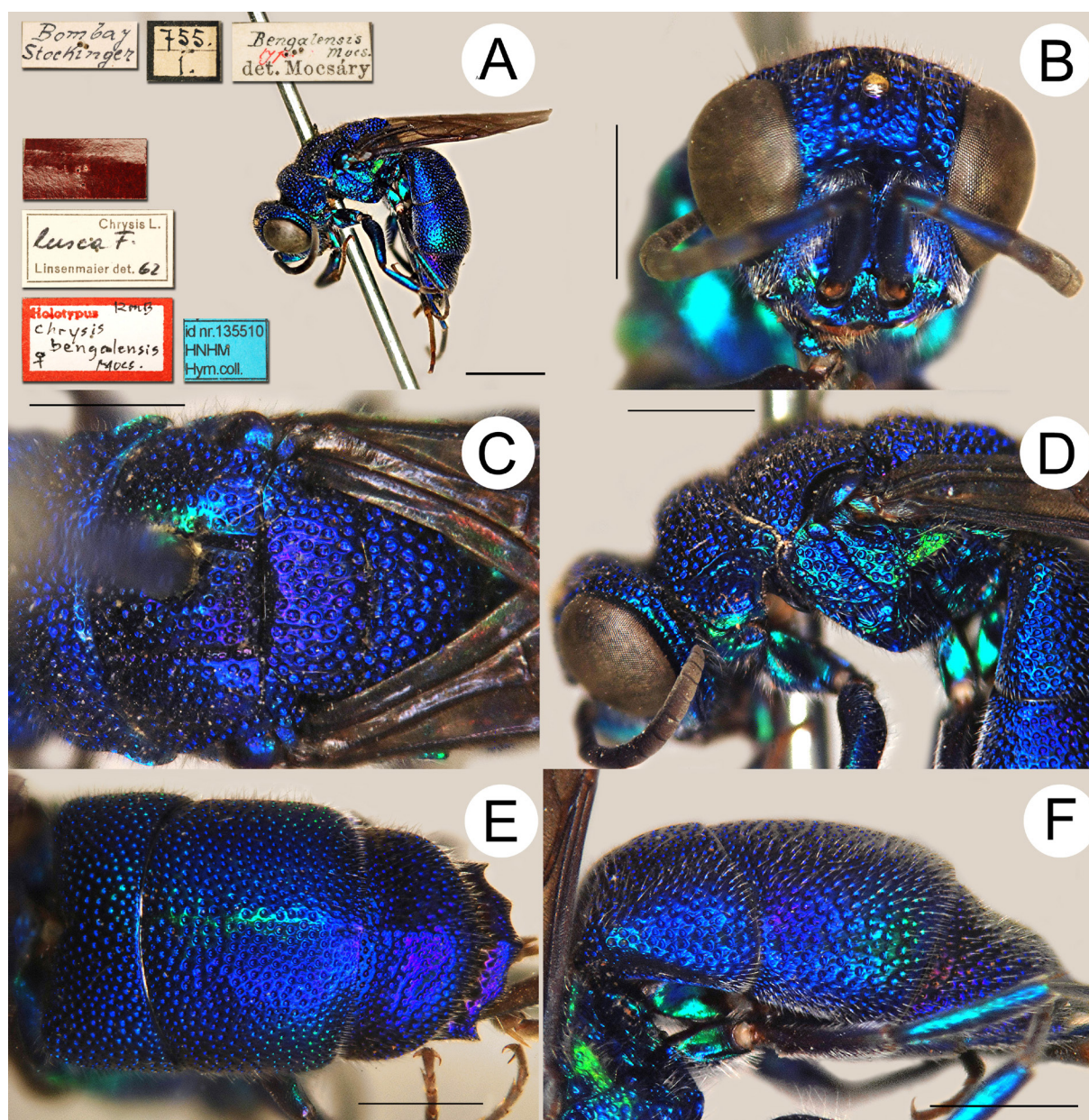


Fig. 1. *Trichrysis bengalensis* (Mocsáry, 1889), ♀, holotype (HNHM). **A.** Habitus, lateral view. **B.** Head, frontal view. **C.** Mesosoma, dorsal view. **D.** Head and mesosoma, lateral view. **E.** Metasoma, dorsal view. **F.** Metasoma, lateral view. Scale bars: 1.0 mm.

frontal carina that originated from the mid TFC and bisecting the upper frons, as in *T. lusca* (compare Rosa *et al.* 2016: fig. 40); the two lateral, upward branches of the TFC are raised (vs irregular); the pit row has large and deep pits (vs small); the apical margin bears three pointed teeth with an angle between the median and the lateral tooth instead of five distinct, short teeth; intervals between teeth are wider than in *T. lusca*.

Based on the type examination, and the characters listed above, we consider *T. bengalensis* as a valid species, and we here resurrect it from the previous synonymy with *Praestochrysis lusca* proposed by Kimsey & Bohart (1991). The placement of the *lusca* species group in the genus *Trichrysis* rather than in the genus *Praestochrysis* was already discussed by Linsenmaier (1997) and Rosa *et al.* (2016). Other specimens examined from the Oriental region show differences from the type of *Trichrysis lusca* (Fig. 3) and are very likely members of a species complex, which is worthy of further investigation.

Trichrysis excisifrons (Mocsáry, 1912)

Fig. 7J

Chrysis (Trichrysis) excisifrons Mocsáry, 1912: 379. — Bischoff 1913: 45.

Trichrysis excisifrons: – Kimsey & Bohart 1991: 572. — Rosa *et al.* 2021a: 79, fig. 79.

Material examined

Holotype

INDIA • ♀; “Sikkim; *excisifrons* Mocs. Typ. Det. Mocsáry”; “Holotypus *Chrysis excisifrons* Mocs. ♀ RM Bohart” [red label]; “id nr. 13551 HNHM Hym.Coll.”; HNHM.

Distribution

India (Sikkim); Nepal (Kimsey & Bohart 1991).

Trichrysis imperiosa (Smith, 1874)

Fig. 7B

Chrysis imperiosus Smith, 1874: 460.

Chrysis imperiosa – du Buysson 1898a: 142. — Bingham 1903: 438 (in key), 479–480, fig. 159, pl. I fig. 13.

Chrysis (Pentachrysis) imperiosa – Bischoff 1910: 486.

Chrysis (Trichrysis) imperiosa – Roy & Kundu 1985: 227.

Praestochrysis lusca – Kimsey & Bohart 1991: 533.

Praestochrysis imperiosa – Strumia 1996: 62, fig. 3.

Trichrysis imperiosa – Rosa *et al.* 2021a: 79, fig. 80.

Material examined

Lectotype

AUSTRALIA • ♀; “50, 70”; “*Chrysis, imperiosus*, Type Smith”; “B.M. TYPE HYM 13.146”; “Lectotype *Chrysis imperiosus* ♀, F. Smith, R.M. Bohart”; “Lectotype”; “BMNH(E) #970896”; BMNH.

Other material

INDIA • 3 ♀♀; Meghalaya, Khasia Hills; ETHZ • 1 ♀, Kerala, Travancore; May 1935; NMLU • 1 ♀; Kerala, Quilon (= Kollam), Thenmala; leg. Nathan; PRC.

Distribution

India (Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, West Bengal, Arunachal Pradesh); China (Taiwan, Hunan, Guangdong, Hainan) (Rosa *et al.* 2016); Australia, Myanmar, Sri Lanka (Bingham 1903); Vietnam (Kimsey & Bohart 1991); Indonesia, Nepal, Papua New Guinea, Thailand (Rosa *et al.* 2016).

Remarks

Although further revision is required, multiple species are to be included under the name of *Trichrysis imperiosa*. The Indian species could belong to *Trichrysis cupreidorsus* (Tsuneki, 1963) (Rosa *et al.* 2021a), described from Thailand and synonymised by Kimsey & Bohart (1991) with *Praestochrysis lusca* (Fabricius, 1804), without type examination. For the moment, we maintain the assessment given by Rosa *et al.* (2021a).

Trichrysis inops (Gribodo, 1884) Figs 2, 7A

Chrysis inops Gribodo, 1884: 318.

Diagnosis

The *inops* group includes relatively small species (5.0–6.0 mm) with body largely covered by golden to red markings and stripes; TFC and lateral pronotal carina faint; apical margin of T3 with five pointed teeth; black spots on S2 small, oblique and largely separated medially. The following redescription is based on the Indian specimens.

Redescription

Female

MEASUREMENTS. Body length (5.0–6.0 mm).

HEAD. Vertex with double punctation, with small punctures on ocelli area; brow with contiguous punctures (Fig. 2C). Scapal basin deep and transversally ridged, micropunctate between ridges, covered with silvery, short, decumbent setae; TFC faint; malar space finely punctulate, about $1.0 \times \text{MOD}$; genal carina strong and complete, from temple to mandible insertion (Fig. 2B); anterior margin of clypeus slightly arched medially, with narrow brownish rim. Relative length of P:F1:F2:F3 = 1.0:1.5:0.9:0.7; $F1 \text{ l/w} = 3.7$ (width taken basally); OOL = $1.6 \times \text{MOD}$; POL = $2.0 \times \text{MOD}$; MS = $1.0 \times \text{MOD}$.

MESOSOMA. Pronotal groove relatively shallow, triangular, almost extending to posterior margin of pronotum; sublateral carina faint (Fig. 2A–B); lateral pronotal margins, seen in dorsal view, distinctly concave medially; punctures on pronotum large and deep on anterior margin, sparser medially and posteriorly with shallow dots on interspaces; mesoscutum with large and denser punctures at base of median lobe, antero-medially with larger, micropunctate interspaces; notauli basally with deep fovea, followed by aligned and round foveate punctures, distinctly decreasing in diameter towards anterior margin; parapsidal lines barely visible; scutellum with spaced punctures, anteriorly shallow, with antero-median area widely impunctate; scutellar-metanotal suture wide, with deep median fovea on metanotal anterior margin; metanotum micropunctate anteriorly, with large, deep punctures; posterior propodeal projections acute, slightly divergent; mesopleuron with deep, dense punctures; episternal sulcus partially visible; scrobal sulcus large and polished; wings unmodified, hyaline with brownish nervures.

METASOMA. Metasoma with large, round punctures and polished interspaces (Fig. 2E); punctures not distinctly geminate as in other species of the genus; T2 without median carina (Fig. 2D); T3 pre-pit bulge slightly convex; medially with longitudinal keel extending to median tooth; pit row distinct, with

large, deep pits, partially confluent; post pit row densely micropunctate (Fig. 2D). Apex of T3 with five sharp teeth (Fig. 2E); interval between lateral teeth wider than interval between median tooth and first pair of lateral teeth; S2 black spots small, elliptic, distinctly separated medially (Fig. 2F).

COLOURATION. Body metallic green to blue (Fig. 2A–B), with golden to red stripes and markings on head, median lobe of mesoscutum, mesoscutellum laterally, metanotum and propodeum; with two golden to red posterolateral stripes on T1 and T2; greenish to golden ventrally. Scape, pedicel and base of F1 metallic green, rest of flagellum black. Tegula fully metallic blue. Legs metallic green; meso- and meta-basitarsus light brown to yellowish; other tarsi light brown.

Male

Not available for this study.

Material examined

Holotype

ETHIOPIA • ♀; “Scioa IX-XI, Let Marfià, Antinori 1879”; “*Chrysis Marefiensis* ♀ Grib.” [handwritten by Gribodo]; “Typus; *inops* Gribodo; Museo Civico di Genova”; “Lectotypus *Chrysis inops* ♀ Gribodo RM Bohart det.”; “Holotypus ♀ *Chrysis inops* Gribodo, 1884”; MSNG.

Lectotype: Lectotype of *Chrysis natalica* Mocsáry, 1913

SOUTH AFRICA • 1 ♀; Natal, Howic; “*natalica* Mocs. typ. det. Mocsáry”; “Lectotypus *Chrysis natalica* Mocsáry R.M. Bohart”; “id nr. 135515 HNHM Hym.coll.”; HNHM.

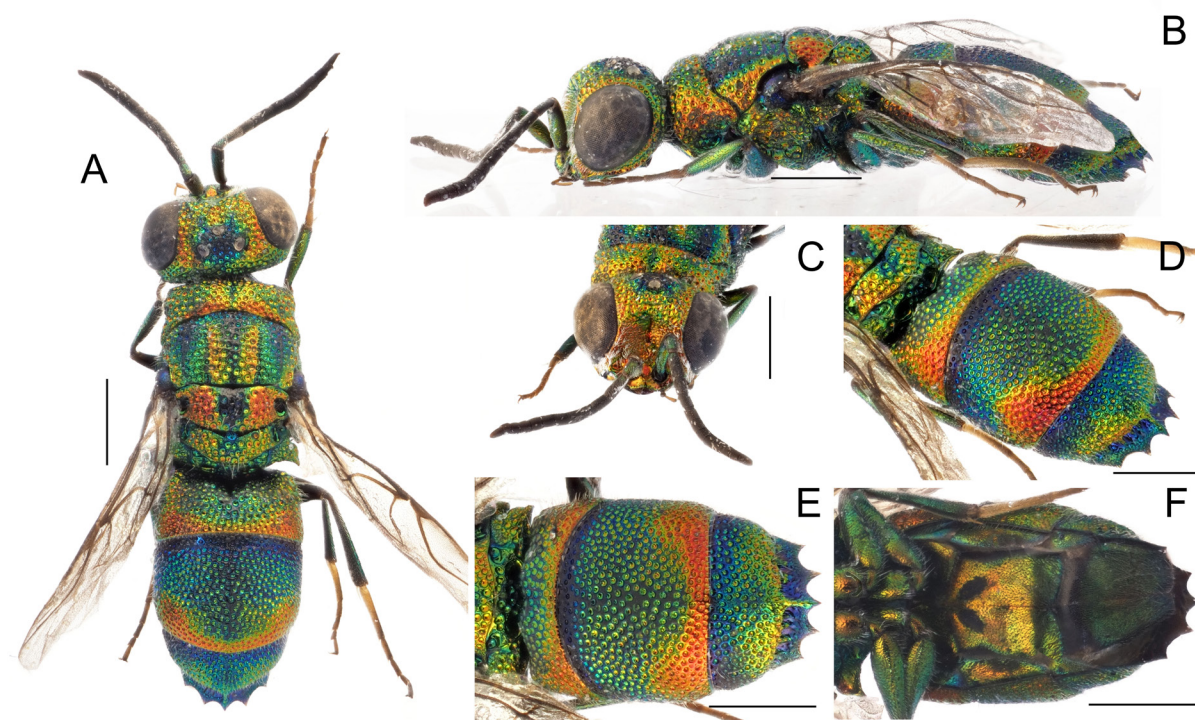


Fig. 2. *Trichrysis inops* (Gribodo, 1884), ♀, (NHME), Tamil Nadu. **A.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** Head, frontal view. **D.** Metasoma, postero-lateral view. **E.** Metasoma, dorsal view. **F.** Metasoma, ventral view. Scale bars: 1.0 mm.

Other material

INDIA • 1 ♀; Tamil Nadu, Vilupparam, Auroville, Discipline village; 12°0.7' N, 79°47.97' E; 1 Sep.–31 Oct. 2019; local collector leg.; NHME • 1 ♀; same locality data as for preceding; 1 Jan.–26 Feb. 2020 • 1 ♀; Tamil Nadu, Tiruvannamalai, Mt Arunalchal; 11–19 Jul. 2019; NHME • 1 ♀; Tamil Nadu, Tiruvannamalai town; 11–18 Aug. 2019; NHME • 1 ♀; Tamil Nadu, Tiruvannamalai, Mt Arunalchal; 12°14' N, 79°03' E; alt. 760 m; 1–3 Jun. 2018; NHME • 2 ♀♀; same locality data as for preceding; 30 Nov.–2 Dec. 2018; NHME • 1 ♀; Tamil Nadu, Tiruvannamalai, Mt Arunalchal; 12°14' N, 79°03' E; alt. 500 m; 2 Oct.–8 Nov. 2019; NHME • 1 ♀; same locality data as for preceding; 20–26 Jan. 2020; NHME.

Distribution

India (Tamil Nadu); Benin, Ghana, Guinea, Ivory Coast, Kenya, Nigeria, Togo (Madl & Rosa 2012).

Differential diagnosis

The specimens recorded are very similar to *Trichrysis natalica* (Mocsáry, 1913). This taxon, together with all the other species included in the *inops* group, was synonymised with *T. inops* by Kimsey & Bohart (1991) in the genus *Praestochrysis* Linsenmaier, 1959. Linsenmaier (1997) and Rosa *et al.* (2016) have already discussed the affinities of the members of this species group with *Trichrysis* rather than *Praestochrysis*.

After examination of almost all the types included in this species group and copious material, we consider the *inops* species group to be a rich group of species, mostly distributed in the Afrotropical region. Together with other experienced colleagues (e.g., Marek Halada (Czech Republic) and Maurizio Pavesi (Italy)) we think that several taxa placed in synonymy with *inops* by Kimsey & Bohart (1991) are valid species (pers. comm.). However, the revalidation of these taxa will be performed in a future article focused on African *Trichrysis*. In the present article, we maintain the classification proposed by Kimsey & Bohart (1991) and identify this Indian species as *T. inops*. Another two species, *T. scioensis* (Gribodo, 1879) and *T. baratzensis* Strumia, 2009, may be included in this group, although they show some differences having only three teeth and two distinct angulate convexities in the intervals between the median and lateral teeth, instead of five pointed teeth, and the shape of the S2 black spots clearly larger and rounded. *Trichrysis inops* is separated from the other pentadentate Indian species, *T. imperiosa* and *T. lusca*, by faint TFC and lateral pronotal carina, and by small dimensions (5.0 to 6.0 mm instead of 6.5 to 10 mm) and slender body (vs stocky). It is separated from other Indian *Trichrysis* by faint TFC (vs TFC raised), small and separate black spots on S2 (vs larger and medially united); five distinct apical teeth on the margin of T3 (vs three distinct teeth or three teeth with two angulate convexities in the intervals between median and lateral teeth).

The occurrence of *T. inops* in India may be the result of an accidental introduction through commerce, because all known records are so far limited to Sub-Saharan Africa. The species could have adapted to the Indian climate and to a native host, but more research is needed looking for its hosts and nests.

Trichrysis lanka (Bingham, 1903)

Figs 3, 7E

Chrysis lanka Bingham, 1903: 451.

Chrysis spectrum Wickwar, 1908: 121.

Trichrysis lanka – Bohart 1988: 348, fig. 5. — Kimsey & Bohart 1991: 572. — Rosa *et al.* 2021a: 81, fig. 81.

Material examined**Lectotype: Lectotype of *Chrysis spectrum* Wickwar, 1908**

SRI LANKA • ♀; Colombo, Ceylon, O.S.W.; “Ceylon O.S.Wickwar 1912–189”; “*Chrysis spectrum*”; “Type O.S. Wickwar; B.M. Type Hym. 13.52”; “Lectotype”; NHMUK.

Paralectotype

SRI LANKA • 1 ♀; “Colombo 10.04”; “*Chrysis spectrum*; (Wickwar)”; “Ceylon O.S. Wickwar 1910 – 103”; “Paralectotype”; NHMUK.

Other material

INDIA • 1 ♀; Tamil Nadu, Coimbatore; Oct. 1958; NMLU • 3 ♀♀; Kerala, Nedungadu; 30 May–1 Jun. 1938; P.S. Nathan leg.; RMNH.

Distribution

India (Kerala, Tamil Nadu). Sri Lanka (Bingham 1903).

Remarks

Chrysis spectrum (Fig. 3) was described five years after Bingham’s description of *Chrysis lanka*. In the paper, Wickwar (1908) listed four specimens, but only two are still preserved in the collection at NHMUK, both in rather poor condition, mainly due to mould. Both are specimens of *Trichrysis lanka*. Bohart in Kimsey & Bohart (1991) designated the lectotype of *T. spectrum* and synonymised it with *T. lanka*. Unfortunately, no specimen examined at NHMUK bears a lectotype label, and no information has been provided by Kimsey & Bohart (1991) to recognise the selected lectotype in the collection, thus making the designation invalid. To prevent further misunderstandings, we (BW) here designate the lectotype based on the female (Fig. 3) bearing the labels: Colombo, Ceylon, O.S.W.; Ceylon O.S.Wickwar 1912-189; *Chrysis spectrum*; Type O.S. Wickwar; B.M. Type Hym. 13.52 [13G Chrysididae, drawer 71]. The type of *Chrysis lanka* was not found at NHMUK (Kimsey & Bohart 1991, pers. comm.) and could possibly be deposited in the Mocsáry collection (HNHM), who bought part of the Bingham collection (Rosa *et al.* 2017).

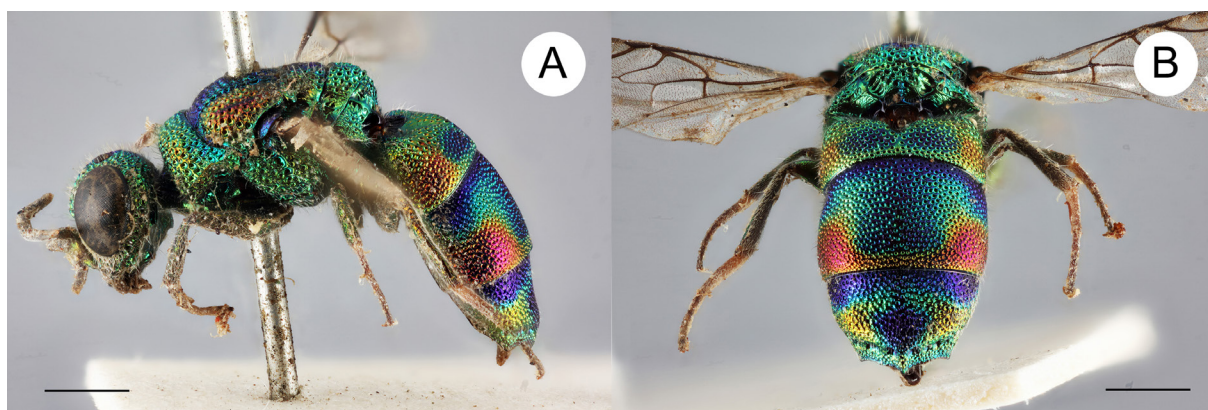


Fig. 3. *Chrysis spectrum* Wickar, 1908, ♀, lectotype (NHMUK). **A.** Habitus, lateral view. **B.** Habitus, posterior view. Scale bars: 1.0 mm.

Trichrysis lusca (Fabricius, 1804)

Figs 4, 7C

Chrysis lusca Fabricius, 1804: 171.

Chrysis lusca – du Buysson 1896: 475 (in key), 476. — Dalla Torre 1892: 76. — du Buysson 1898b: 76. — du Buysson 1900: 153. — Bingham 1903: 439 (in key), 484; 1908: 349. — Jonathan *et al.* 1977: 87. — Thakkar & Parikh 2018: 22.

Chrysis (Pentachrysis) lusca – Mocsáry 1889: 527–528. — Bischoff 1913: 62.

Praestochrysis lusca – Kimsey & Bohart 1991: 533.

Trichrysis lusca – Suresh *et al.* 1999: 2. — Mathew 2004: 219. — Rosa *et al.* 2021a: 81, fig. 82.

Material examined

Holotype

ITALY [given in the original description] • ♀ [square green label]; “TYPE”; “Schlanbusch, Mus: T. Lund, *Chrysis, lusca*, Fabr.”; “*Chrysis lusca* F., Syst. Piez. 1804.171.7”; “ZMUC 00241218”; ZMUC.

Other material

INDIA • 2 ♀♀; Karikal, Malabar; without further data; NHMW • 1 ♀; Kerala, Kannur, Ulikkal; 12°01' N, 75°40' E; 5 Feb. 2021; A.S. Prakash leg.; CCSERLC118; SERL • 1 ♀; Kerala, Ernakulam, Moothakunnam; 10°11' N, 76°12' E; 27 Jul. 2020, N.A. Kashmeera leg.; CCSERLC87; SERL • 1 ♀; Kerala, Kozhikode, Malaparamba; 11°17' N, 75°48' E; 3 Feb. 2021; P.G. Aswathi leg.; CCSERLC112; SERL • 1 ♀; Kerala, Kasargod, Periyanganam; 12°18' N, 75°15' E; 28 Feb. 2020; sweep net; CCSERLC13; SERL • 3 ♀♀; Kerala, Idukki, Marakkanam; 9°57' N, 77°02' E; 19 Apr. 2020; T.D.

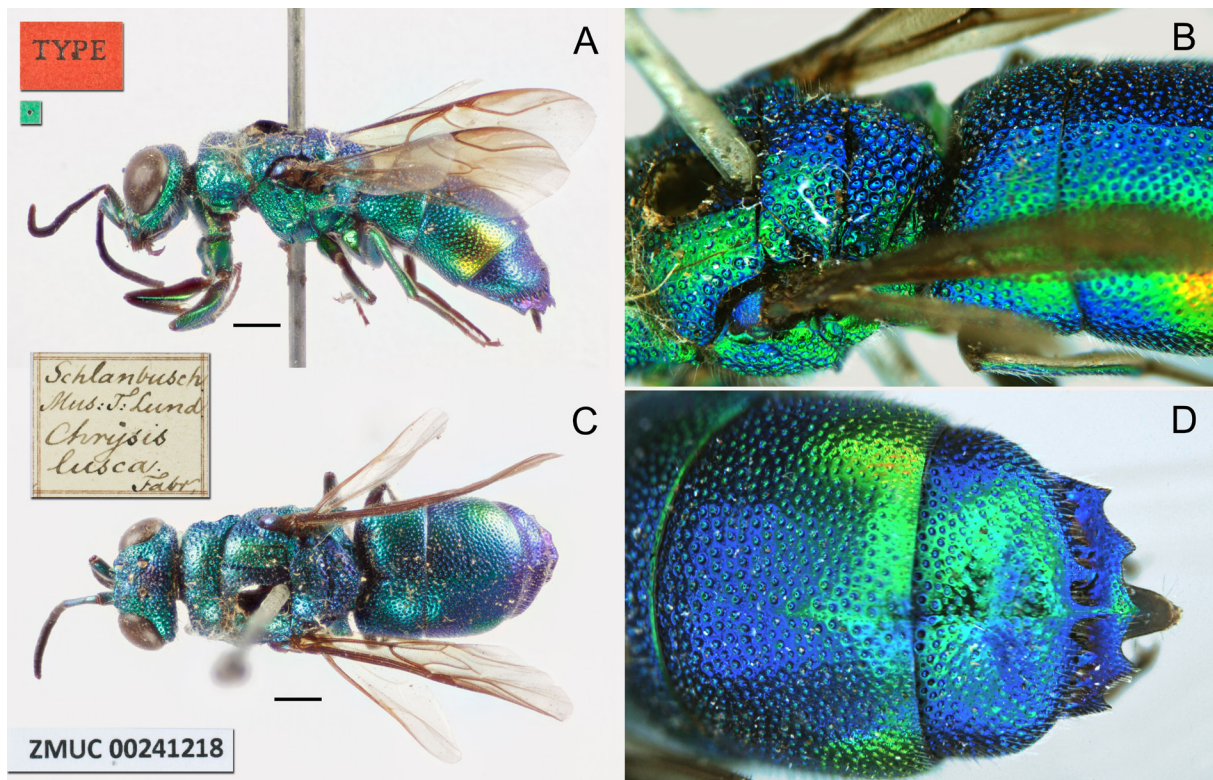


Fig. 4. *Trichrysis lusca* (Fabricius, 1804), ♀, holotype (HNHM). **A.** Habitus, lateral view. **B.** Mesosoma and T1, dorso lateral view. **C.** Habitus, dorsal view. **D.** Metasoma, posterior view. Scale bars: 1.0 mm.

Dhanoop leg.; CCSERLC182 to 184; SERL • 1 ♀; Kerala, Thenmala; May 1985; Nathan leg.; PRC • 1 ♀; Kerala, Wayanad, Kambalakkad; 11°40' N, 76°05' E; 19 Mar. 2020; CCSERLC24; SERL • 1 ♀; Kerala, Wayanad, Kallur; 11°39' N, 76°19' E; 20 Nov. 2020; sweep net; P.G. Aswathi leg.; CCSERLC93; SERL • 1 ♀; Kerala, Wayanad, Mananthavady; 11°46' N, 75°59' E; 20 Jan. 2021; P.G. Aswathi leg.; CCSERLC99; SERL • 1 ♀; Kerala, Wayanad, Vakery; 11°41' N, 76°12' E; 5 May 2020; P.G. Aswathi leg.; CCSERLC79; SERL • 12 ♀♀; Tamil Nadu, Coimbatore; without further data; NHMW • 1 ♀; Tamil Nadu, Coimbatore; Aug. 1932; Nathan leg.; NMLU • 1 ♀; Tamil Nadu, Kurumbagaram; 22 Sep. 1951; S. Nathan leg.; NMLU • 3 ♀♀; Tamil Nadu, Kurumbagaram; Sep. 1951; MNLU • 1 ♀; Tamil Nadu, Settipatti; 13 Jun. 1975; W. Perraudin leg.; NMLU • 1 ♀; same locality data as for preceding; 16 Jun. 1975; NMLU • 1 ♀; same locality data as for preceding; 3 Jul. 1976; NMLU • 3 ♀; same locality data as for preceding; Nov. 1979; MNLU • 1 ♀; Tamil Nadu, Omalur, Salem Settipatti; 14 Oct. 1975; W. Perraudin leg.; NMLU • 1 ♀; same locality data as for preceding; 5 Nov. 1975; NMLU • 1 ♀; same locality data as for preceding; 29 Nov. 1975; NMLU • 4 ♀♀; same locality data as for preceding; Mar. 1978; NMLU.

Distribution

India (Bihar, Chhattisgarh, Karnataka, Kerala, Maharashtra, Odisha, Puducherry, Tamil Nadu, West Bengal, Rajarampore, Nilgiris); China (Hubei, Hunan, Taiwan, Fujian, Guangdong, Macao, Hainan, Guizhou, Yunnan) (Rosa *et al.* 2016); Australia, Japan, Korea, Madagascar, Myanmar, Philippines, Thailand (Kimsey & Bohart 1991); Bangladesh, Cambodia, Indonesia, Malaysia, Myanmar (Jonathan *et al.* 1977), Sri Lanka, Vietnam (Rosa *et al.* 2016). Afrotropical: Mauritius and Réunion (Azevedo *et al.* 2010).

Trichrysis poseidonia sp. nov.

[urn:lsid:zoobank.org:act:19970448-9945-46AB-BB89-F530D7016840](https://zoobank.org/urn:lsid:zoobank.org:act:19970448-9945-46AB-BB89-F530D7016840)

Figs 5–6, 7D

Diagnosis

Large species (8.0–8.5 mm) with green body, largely covered by dark blue areas, and with red spots apico-laterally on T2; TFC single, medially raised; sublateral carina partially developed anteriorly; teeth on the apical margin of T3 elongate and thickened; black spots on S2 large, subtrapezoidal, and largely fused medially. Species easily recognisable by its colour pattern and elongated and thickened teeth on the apical margin of T3.

Etymology

The specific name derives from ‘Poseidon’, the Greek god of the sea, for the sharp and elongate apical teeth, recalling Poseidon’s trident; it also follows the tradition of naming species with deity names (see, e.g., *Trichrysis neptunia* (Semenov-Tian-Shanskij, 1967) and *Chrysis kartikeya* Rosa & Halada, 2021).

Material examined

Holotype

INDIA • ♀; Tamil Nadu, Vilupparam, Auroville, Discipline village; 12°0.7' N, 79°47.97' E; 1 May–31 Jul. 2017; local collector leg.; NHME.

Paratypes

INDIA • 1 ♀; Kerala, Kannur, Madayipara; 12°01' N, 75°15' E; 8 Oct. 2021; P.G. Aswathi leg.; CCSERLC155; SERL.

NEPAL • 1 ♀; Rapati Province, Rihar; 27°54' N, 82°20' E; alt. 210 m; 1. Jun 2007; J. Weipert leg.; NHME.

Description

Female (holotype)

MEASUREMENTS. Body length 8.1 mm.

HEAD. Frons with short and strong TFC, raised only medially and feebly angulate, without branches, with lateral ending 1.0 MOD far from eye (Fig. 5C); vertex and frons evenly deeply punctate-reticulate, with contiguous punctures and small punctures irregularly intermixed; area below TFC shallowly punctate; scapal basin medially largely impunctate, laterally with small, transversally aligned puncture; lateral punctures bearing long, whitish setae; clypeus irregularly punctulate, with small, shallow punctures; hardly convex apico-medially, short (subantennal distance $0.75 \times \text{MOD}$), with straight margin bordered by narrow, brown rim; malar space densely reticulate-punctulate, about $1.0 \times \text{MOD}$ long; genal fovea present between eye and mandible insertion (Fig. 5B); genal carina strong and complete; mandible simple. Relative length of P:F1:F2:F3 = 1.0:1.2:0.7:0.7; F1 l/w = 3.7 (width taken basally); OOL = $1.4 \times \text{MOD}$; POL = $2.2 \times \text{MOD}$; MS = $1.0 \times \text{MOD}$.

MESOSOMA. Pronotal groove large and relatively shallow, extending to $\frac{3}{4}$ of pronotal length (Fig. 5A); fully developed sublateral carina; lateral pronotal margins, seen in dorsal view, distinctly concave medially; punctures on pronotum larger and denser medially, sparser laterally with shallow dots on interspaces; mesoscutum with large and denser punctures at base of median lobe, antero-medially with

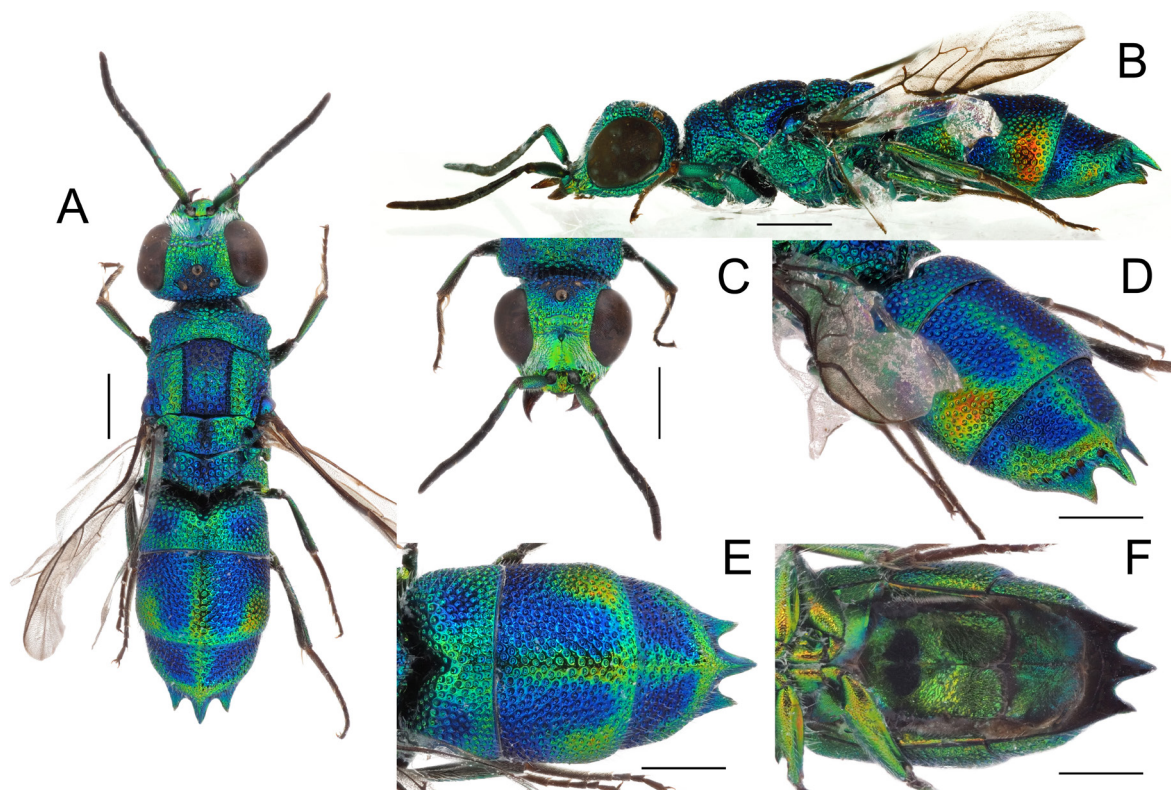


Fig. 5. *Trichrysis poseidonia* sp. nov., ♀, holotype (NHME). **A.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** Head, frontal view. **D.** Metasoma, postero-lateral view. **E.** Metasoma, dorsal view. **F.** Metasoma, ventral view. Scale bars: 1.0 mm.

larger interspaces; interspaces with shallow dots; notauli formed deep, even and aligned punctures, slightly decreasing in diameter toward anterior margin; parapsidal line well visible; scutellum with spaced punctures, with shallow punctures and dots on interspaces; scutellar-metanotal suture deep and wide; metanotum shallowly micropunctate anteriorly, with large, deep, contiguous and foveate-reticulate punctures; posterior propodeal projections acute, divergent; mesopleuron (Fig. 5B) reticulate-punctate, episternal sulcus formed by large, irregular foveae, scrobal sulcus with larger foveae; wings unmodified, hyaline with brownish nervures.

METASOMA. Metasoma with large, even, round punctures, with small punctures in interspaces (Fig. 5E); punctures not distinctly geminate; T2 without median carina (Fig. 5D); T3 with median carina extending to tip of median tooth; T3 pre-pit bulge slightly convex; pit row distinct, with small, deep pits; post pit row densely micropunctate (Fig. 5D); apex of T3 with three elongate teeth (Fig. 5E–F), median tooth distinctly thickened in lateral view (Fig. 5B); intervals between median and lateral tooth deep and rounded; S2 black spots large, subtrapezoidal and medially fused (Fig. 5F, 7D).

COLOURATION. Body metallic green (Fig. 5), with distinct blue patches in ocelli area, median lobe of mesoscutum, medially on scutellum and metanotum and laterally on T1, T2 and T3; with golden to red spots apico-laterally on T2; with a green-golden reflection on pre-pit bulge; greenish ventrally. Scape, pedicel and basal half of F1 metallic green, the rest of flagellum black. Tegula fully metallic. Legs metallic green, tarsi dark brown.

Male

Unknown.

Distribution

India (Kerala, Tamil Nadu), Nepal.

Remarks

The paratype was collected from Madayipara, Kannur, Kerala. Madayipara is a laterite plateau that spreads over 700 acres of land. The specimen was collected on a warm sunny day from crevices in a dry wall (Fig. 6).

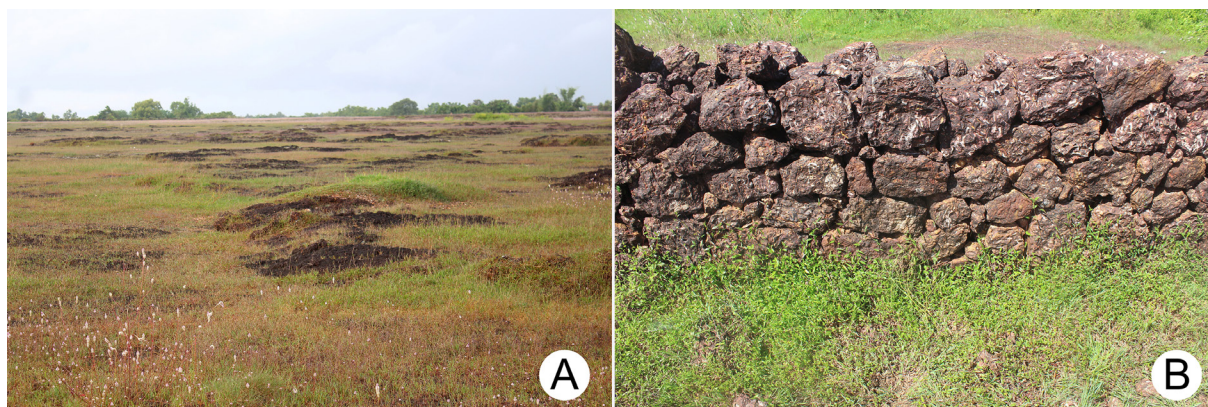


Fig. 6. Madayipara, Kannur, Kerala, type locality of *Trichrysis poseidonia* sp. nov. **A.** Madayipara, laterite plateau. **B.** Collecting place on dry wall.

Differential diagnosis

Trichrysis poseidonia sp. nov. is immediately recognised by the unique shape of the elongated and thick teeth on the apical margin of T3 (Fig. 5D–E); the colour of the body is also diagnostic (Fig. 5), as well as the shape of the black spots on S2 (Figs 5F, 7D).

Trichrysis scioensis (Gribodo, 1879)
Fig. 7G

Chrysis scioensis Gribodo, 1879: 344.

Chrysis scioensis – Bingham 1903: 436 (in key), 454–455.

Chrysis (Trichrysis) scioensis – Bischoff 1913: 46.

Trichrysis scioensis – Rosa *et al.* 2021a: 88.

Material examined

Holotype

ETHIOPIA • ♀; “Scioa, Mahal-Uonz, VI.1877, [O.] Antinori”; “*Chrysis, scioensis*, Tipo. Grib.” [handwritten by Gribodo]; “Typus”; “Holotypus *Chrysis scioensis* Gribodo” [handwritten by R.M. Bohart]; MSNG.

Remarks

Trichrysis scioensis was collected by Bingham (1903) in Delhi. This record was considered questionable by Rosa *et al.* (2021a) and possibly referred to another species later described in this genus. However, the discovery of *T. inops* in India and the occurrence of other species or even genera in India and Africa in recent years, i.e. the genus *Odontochrydium* Brauns, 1928 (Rosa 2018), the species *C. principalis* Smith (Rosa *et al.* 2015), species of the *mandibularis* group (Rosa & Halada 2021), *T. inops* (this paper), suggest a wider correlation between the two faunas, not yet carefully studied. For this reason, in the present article we list and key this African species.

Trichrysis tonkinensis (Mocsáry, 1914)
Fig. 7H

Chrysis (Trichrysis) tonkinensis Mocsáry, 1914: 25.

Trichrysis tonkinensis – Rosa *et al.* 2016: 126, figs. 61–66, 127; 2021a: 83, fig. 84.

Material examined

Holotype

VIETNAM • ♀; Tonkin, China; “*tonkinensis* Mocs. typ. det. Mocsáry” [red label]; Holotypus *Chrysis tonkinensis* Mocs. ♀ RM Bohart; id nr. 135549 HNHM Hym.coll.”; HNHM.

Other material

INDIA • 1 ♀; Puducherry, Nedungadu; Oct. 1932; P.S. Nathan leg.; NMLU.

Distribution

India (Puducherry). China (Fujian, Yunnan); Vietnam; Philippines; Indonesia, Malaysia (Rosa *et al.* 2016).

Trichrysis triacantha (Mocsáry, 1889)

Fig. 7I

Chrysis (*Trichrysis*) *triacantha* Mocsáry, 1889: 325.

Chrysis (*Trichrysis*) *triacantha* – du Buysson 1893: 247. — Bischoff 1913: 46.

Chrysis triacantha Mocsáry – du Buysson 1896: 471 (in key). — Bingham 1903: 436 (in key), 453, fig. 154; 1908: 348. — Jonathan *et al.* 1977: 86.

Trichrysis triacantha – Rosa *et al.* 2021a: 83, fig. 85. — Rosa & Halada 2021: 210.

Material examined

Syntypes

INDONESIA • 1 ♀; “Plason, Sumatra 877-2; *triacantha* det. Mocsáry Type”; NHMW • 1 ♀; Sumatra; “*triacantha* det. Mocsáry” • 1 ♀; Plason, Java; “1878 II; *triacantha* type det. Mocsáry”.

Other material

INDIA • 4 ♀♀; Kerala, E of Kothamangalam; 10°05.1' N, 76°39.1' E; alt. 150 m; 1 May 2005; M. Halada leg.; MHC, PRC; • 1 ♀, Kerala, Thenmala; 8°58.0' N, 77°03.5' E; 5 May 2005; M. Halada leg.; MHC • 1 ♀; Kerala, Thrissur, Mulankunnathukavu; 10°35' N, 76°12' E; 1 Feb. 2021; T.B. Suryanarayanan leg.; CCSERLC162; SERL • 1 ♀; Kerala, Wayanad, Kambalakkad; 11°40' N, 76°05' E; 29 Mar. 2020; P.G. Aswathi leg.; CCSERLC42; SERL.

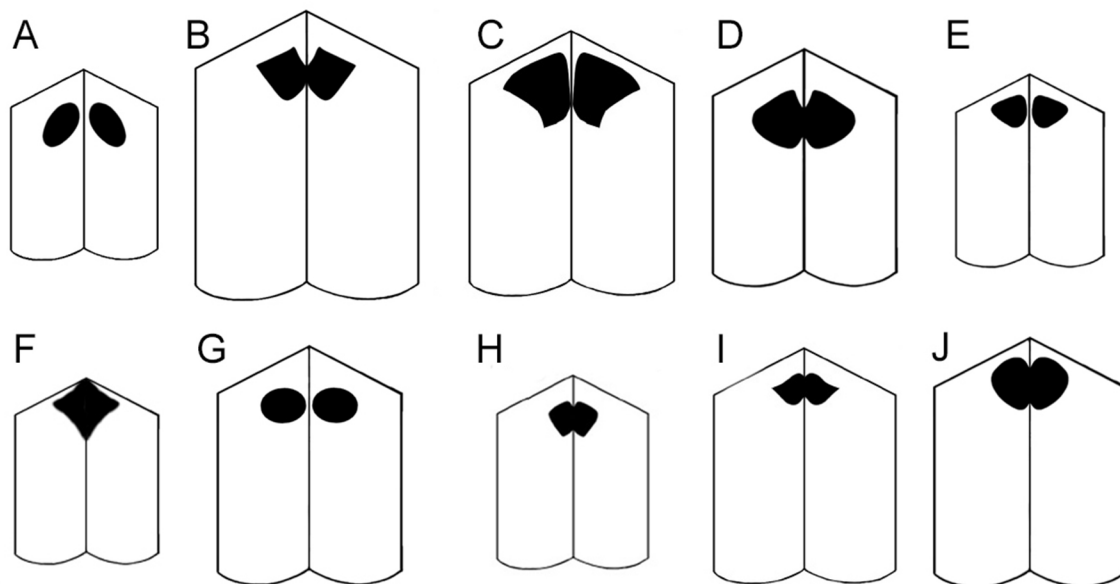


Fig. 7. Species of *Trichrysis* Lichtenstein, 1876, shape of black spots on S2. **A.** *T. inops* (Gribodo, 1884). **B.** *T. imperiosa* (Smith, 1874). **C.** *T. lusca* (Fabricius, 1804). **D.** *T. poseidonia* sp. nov. **E.** *T. lanka* (Bingham, 1903). **F.** *T. hexapholis* Bohart, 1988 (modified from Bohart 1988). **G.** *T. scioensis* (Gribodo, 1879). **H.** *T. tonkinensis* (Mocsáry, 1914). **I.** *T. triacantha* (Mocsáry, 1889). **J.** *T. excisifrons* (Mocsáry, 1912).

Distribution

India (Bihar, Kerala, West Bengal); China (Fujian, Taiwan, Guangdong, Hong Kong, Hainan, Yunnan) (Rosa *et al.* 2016). Widely distributed in the Oriental Region (Kimsey & Bohart 1991).

Remarks

Rosa *et al.* (2016) considered *Trichrysis triacantha* as a possible synonym of *T. vestigator* (Smith, 1858) based on illustrations of the apical margin of T3 provided by Bohart (1988: fig. 6) and Kimsey & Bohart (1991: fig. 150c). Thanks to the kind help of James Hogan (OUMNH), we examined pictures of the type of *T. vestigator* and can state that the two taxa are closely related. Actually, the intervals between the median tooth and the lateral teeth of the type specimen are straight and not convex, as shown in the illustrations of Bohart (1988) and Kimsey & Bohart (1991). Taking into account the high variability of this species, as recorded by Rosa *et al.* (2016), based on specimens collected in the same locality in China, we agree that the two species could be conspecific; however, examination of more material is needed prior to proceeding with this synonymy.

Key to the currently known species of Indian *Trichrysis*

The key is mainly based on females. Males are usually recognizable by the subtruncate apex of T3, shorter apical teeth, and darker colouration dorsally; the shape of the black spots on S2 may slightly vary, but the shape is normally similar, although they may be slightly smaller or narrower.

1. Apex of T3 with five teeth 2
– Apex of T3 with three teeth 5
2. TFC faint or barely visible; lateral pronotal carina faint; black spots on S2 small, elliptic, medially largely separated as in Fig. 3F; small species (5–6 mm) *T. inops* (Gribodo, 1884)
– TFC sharp; lateral pronotal carina fully developed; black spots on S2 large, medially fused; large and stocky species (6.5–11 mm) 3
3. Apical margin of T3 with three pointed teeth and two blunted ones between the median and lateral teeth; wings dark brown; female without median transverse carina below TFC; body punctures overall deep and dense; pits of the pit row deep, large to partially confluent; body colour dark blue with green or light blue spots laterally on T2 *T. bengalensis* (Mocsáry, 1889)
– Apical margin of T3 with five pointed teeth; wings light with brown nervures; female with median transverse carina below TFC; body punctures sparse and shallower; pits of the pit row small and separated; body colour green with lateral golden spots on T2 4
4. Vertex, pronotum, mesoscutum, mesoscutellum, metanotum, mesopleuron, T1 and T2 laterally metallic coppery, in contrast with metallic blue colouration of the remaining part of the body; F1 only partially metallic green to blue; black spots on S2 fused medially as in Fig. 7B; pit row of T3 with deep and mostly fused pits *T. imperiosa* (Smith, 1874)
– Body metallic green to blue; T2 with greenish to golden or golden-red spot laterally; F1 fully metallic green to blue; black spots on S2 fused medially or separated by narrow metallic line as in Fig. 7C; pit row of T3 with smaller and well-defined pits *T. lusca* (Fabricius, 1804)
5. Teeth on apical margin of T3 exceptionally elongate and thick *T. poseidonia* sp. nov.
– Teeth on apical margin of T3 not exceptionally developed 6
6. Metasoma with large, red, golden and purple lateral or apico-lateral markings contrasting with the green body colour; head and mesosoma with red and golden colours in nature, which are usually lost in the prepared specimens in collections 7

- Metasoma blue with greenish stripes and markings, not distinctly red or highly contrasting with the rest of the green-blue body colour 8
- 7. Black spots on S2 small, oval, and medially separated by a thin line as in Fig. 7E; tegulae metallic blue; T3 with an apico-median darker bluish to purplish spot before median tooth; T3 intervals between median and lateral tooth convex *T. lanka* (Bingham, 1903)
- Black spots on S2 large, triangular and medially fused, as in Fig 7F; tegulae brown, non-metallic; T3 with two separated, lateral bluish to purplish spots, and golden stripe before pit row; T3 intervals between median and lateral tooth concave *T. hexapholis* Bohart, 1988
- 8. Black spots on S2 rounded and separated by a thin line, as in Fig. 7G *T. scioensis* (Gribodo, 1879)
- Black spots on S2 medially fused, differently shaped as in Fig. 7H–J 9
- 9. Tegula brown, at most with a weak metallic reflection basally; body colour usually metallic green or light greenish-blue, with characteristic olive green to blackish matt areas on interspaces between punctures on mesonotum; S2 as in Fig. 7H *T. tonkinensis* (Mocsáry, 1914)
- Tegula entirely with metallic reflection; body metallic blue or blue and green; S2 as in Fig. 7I–J ...
..... 10
- 10. Black spots on S2 as in Fig. 7I; TFC medially as an angle *T. triacantha* (Mocsáry, 1889)
- Black spots on S2 as in Fig. 7J; TFC continuous *T. excisifrons* (Mocsáry, 1912)

Genus *Chrysidea* Bischoff, 1913

Chrysidea Bischoff, 1913: 34.

Chrysis (*Chrysidea*) – Linsenmaier 1959: 170.

Trichrysis (*Chrysidea*) – Kimsey & Bohart 1981: 77.

Chrysis (*Trichrysis*) – Linsenmaier 1984: 196.

Chrysidea – Bohart 1988: 129. — Kimsey & Bohart 1991: 310.

Diagnosis

Head broader than high; scapal basin hollowed, striate or micro-ridged, topped by convex TFC, sometimes with a second upper TFC; F1 longer than F2 or F3, usually less than twice; MS subequal or shorter than 1 MOD; pronotum with weak median groove and mostly without sublateral carina; mesopleuron with episternal and scrobal sulci, omaulus and verticaulus; metanotum rounded, rarely projected posteriorly; fore wing medial cell usually with outer veins faint; T3 usually with only two lateral teeth, sometimes with one median tooth; S2 black spots oval or round, usually separated by 1–2 MOD. Genital capsule with large gonocoxa slightly notched apically, thus appearing bilobate.

Hosts

The known hosts of *Chrysidea* are crabronid wasps (Zimmermann 1961; Kimsey & Bohart 1991).

Distribution

The genus includes 26 species distributed in the Palearctic, Afrotropical, and Oriental Regions. *Chrysidea pumila* (Klug, 1845) is widespread in the Afrotropical and Palearctic Regions; 16 species are endemic to the Afrotropical Malagasy Subregion (Mita & Rosa 2019).

Differential diagnosis

See the differential diagnosis of *Trichrysis* and Table 1.

List of the Indian species

***Chrysidea falsa* Rosa & Xu, 2015**

Fig. 7C

Chrysidea falsa Rosa & Xu, 2015: 466.

Chrysidea falsa – Aswathi & Bijoy 2021: 124.

Material examined

Holotype

CHINA: • 1 ♀; Yunnan, Jingdong, Wenjing Town, 24°18'9" N, 100°55'53" E; 29.IV.2005, Hs. Wang leg.; “Holotype *Chrysidea falsa* Rosa & Xu”; SCAU.

Other material

INDIA • 1 ♀; Kerala, Kasargod, Koyithatta Sreedharmashastha Kavu; 12°17' N, 75°15' E; 29 Feb. 2020; Aswathi P.G. leg.; CCSERLC11; SERL • 4 ♀♀; Kerala, Kasargod, Edayilakkad Kavu; 12°08' N, 75°09' E; 28 Feb. 2020; Aswathi P.G. leg.; CCSERLC14 to 17; SERL • 1 ♀; Kerala, Calicut, Vadakara; 11°38' N, 75°34' E; 4.2021; Aswathi P.G. leg.; CCSERLC11; SERL • 2 ♀♀; Kerala, Kollam, Shendurney Wildlife Sanctuary; 8°55' N, 77°02' E; 19 Feb. 2022; Aswathi P.G. leg.; CCSERLC198 and 199; SERL.

Distribution

India (Kerala), China (Yunnan), Malaysia, Philippines (Rosa & Xu 2015).

***Chrysidea furiosa* (Cameron, 1897)**

Fig. 9A

Chrysis furiosa Cameron, 1897: 3.

Chrysis (Dichrysis) furiosa – Bischoff 1913: 44.

Chrysidea furiosa – Kimsey & Bohart 1991: 314. — Rosa *et al.* 2021a: 22.

Material examined

INDIA • 1 ♀; Kerala, Periyar A. Sanc.; 5–15 Oct. 1979; J.S. Noyes leg.; B.M. 1979–518; NHMUK.

Distribution

India (Kerala, West Bengal).

***Chrysidea mendicalis* (Cameron, 1897) stat. nov.**

Figs 8–9

Chrysis mendicalis Cameron, 1897: 4.

Chrysis mendicalis – Bingham 1903: 436 (in key), 451; 1908: 347.

Chrysis (Trichrysis) mendicalis – Bischoff 1913: 45.

Chrysis (Pentachrysis) mendicalis – Bischoff 1913: 63.

Trichrysis mendicalis – Kimsey & Bohart 1991: 573. — nec Rosa *et al.* 2021a: 83 (fig. 83).

Material examined

Holotype

INDIA • 1 ♀; “*Chrysis mendicalis* Cam. Type; 1053”; “TYPE HYME 2002 *Chrysis medicalis* [!] Cameron, 1897 HOLOTYPE ♀ HOPE ENT COLL., OUMNH” [Barrakpore is the type locality given in the description]; OUMNH.

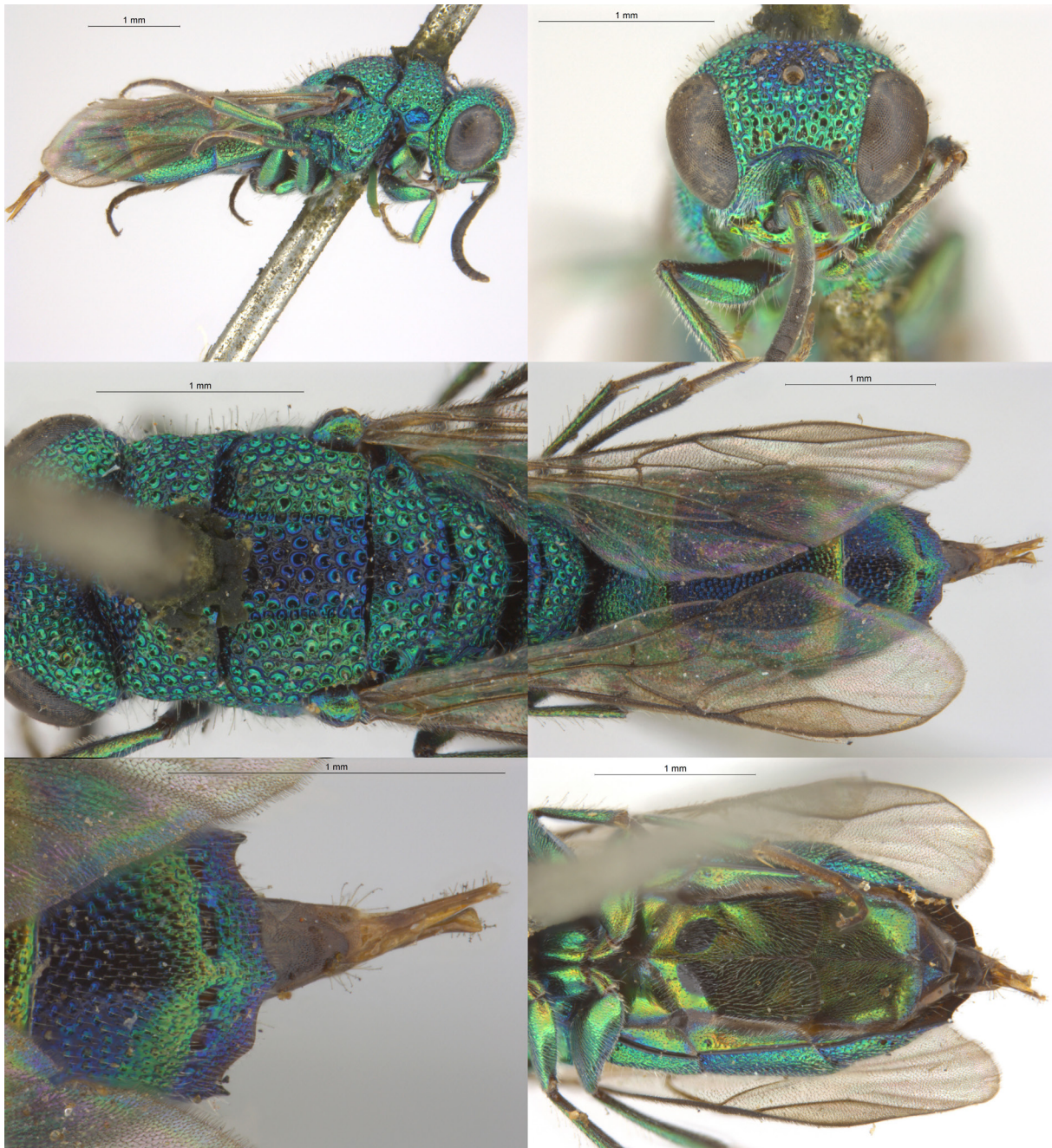


Fig. 8. *Chrysidea mendicalis* (Cameron, 1897), ♀, holotype (OUMNH). **A.** Habitus, lateral view. **B.** Head, frontal view. **C.** Mesosoma, dorsal view. **D.** Metasoma, dorsal view. **E.** T3, posterior view. **F.** Metasoma, ventral view.

Other material

INDIA • 1 ♀; Kerala, Kollam, Shendurney Wildlife Sanctuary; 8°55' N, 77°02' E; 19 Feb. 2022; P.R. Rinto; CCSERLC195; SERL.

Remarks

Chrysidea mendicalis (Cameron) has traditionally been included in the genus (or subgenus) *Trichrysis*. The specimen of *Trichrysis mendicalis* illustrated in the Indian species checklist (Rosa *et al.* 2021a) is a misidentified one from the Mocsáry collection (HNHM). In fact, Mocsáry acquired the chrysidid collection of C.T. Bingham (Mocsáry 1911, 1912; Rosa *et al.* 2017), including types of species described by Bingham and Nurse. The illustrated specimen was originally from the Bingham collection. Since Bingham studied Cameron's collection, this identification has been considered reliable.

A recent examination of the holotype of *Trichrysis mendicalis* (Fig. 8) deposited at OUMNH revealed that this is a species of *Chrysidea*, closely related to *Chrysidea falsa* in particular. The main difference between these two species is found in the metasomal punctation (smaller and denser dorsally in *C. falsa*, Fig. 9C) and in the shape of the apical margin of the T3; in *Chrysidea mendicalis* the post-pit area is more extended and the intervals between the median and the lateral tooth are more concave to angulate (Fig. 9B). The Sri Lankan specimen illustrated in Rosa *et al.* (2021a) may be temporarily identified as *Trichrysis triacantha*.

Chrysidea pumila (Klug, 1845)

Chrysis pumila Klug, 1845: fig. 13.

Chrysogona assimilis Dahlbom, 1854.

Chrysogona assimilis – du Buysson 1896: 467.

Chrysogona pumila – Bingham 1903: 431.

Chrysidea pumila – Rosa *et al.* 2021: 22.

Material examined

INDIA • 2 ♀♀; Kerala, Kannur, Madayipara; 12°01' N, 75°15' E; 8 Oct. 2021; P.G. Aswathi leg.; CCSERLC156 and 157; SERL.

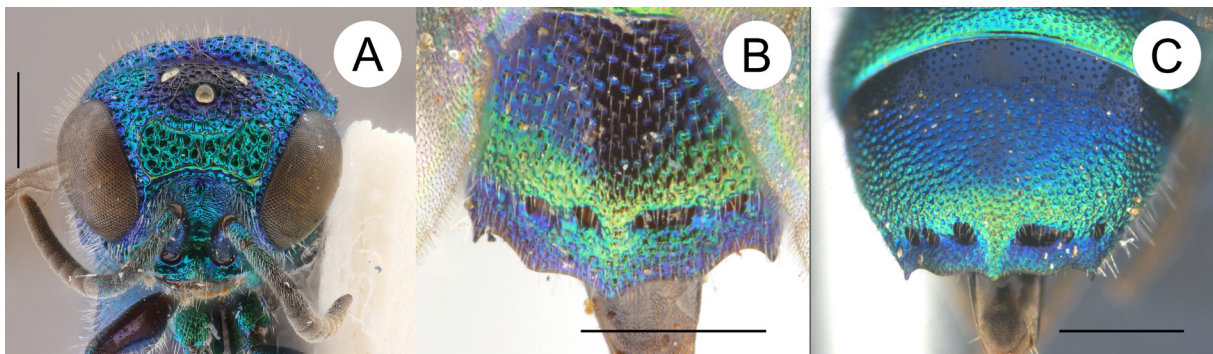


Fig. 9. **A.** *Chrysidea furiosa*, ♀, (RMNH), head in frontal view. **B.** *Chrysidea mendicalis*, ♀, holotype (OUMNH), apex of T3 in dorsal view. **C.** *Chrysidea falsa*, ♀, holotype (SCAU), apex of T3 in dorsal view. Scale bars: 0.5 mm.

Distribution

India (Kerala, Maharashtra). Subcosmopolitan species, distributed in the Afrotropical, Palearctic and Oriental Regions (Kimsey & Bohart 1991).

Key to the currently known species of Indian *Chrysidea* Bischoff, 1913

1. Apex of T3 with two teeth 2
 - Apex of T3 with three teeth 3
2. TFC raised and double, inwardly depressed below anterior ocellus, continued obliquely down the inner side of eyes, remaining distinctly separated, and continued in a carina topping the scapal basin *C. furiosa* (Cameron, 1897)
 - TFC simple, topping scapal basin *C. pumila* (Klug, 1845)
3. Apical margin of T3 with interval between median and lateral tooth angled, post pit area wide, about 2 times pit diameter long (Fig. 9B); metasoma dorsally with larger punctures and polished interspaces (Figs 8D, 9B) *C. mendicalis* (Cameron, 1897)
 - Apical margin of T3 with interval between median and lateral tooth waved, post pit area narrow, about 1 times pit diameter long (Fig. 9C); metasoma dorsally with smaller and denser punctures *C. falsa* Rosa & Xu, 2015

Discussion

The present paper is part of ongoing projects on the Oriental fauna carried out in India by two co-authors, Pokkattu Gopi Aswathi and Chenthamarakshan Bijoy, in Vietnam by Bogdan Wiśniowski, Lien Thi Phuong Nguyen and members of her lab (Vietnam Academy of Science and Technology, Hanoi), and in China by the South China Agricultural University. Other new findings in these genera are expected for the future, and the present contribution with an updated key is intended to help researchers in a better understanding of the local fauna. Further comments and descriptions of new species of *Chrysidea* are currently in preparation in another article on Vietnamese *Chrysidea* (Wiśniowski *et al.*).

The current number of known species from India for the genera *Trichrysis* and *Chrysidea* is here updated to 10 and 4 respectively (Rosa *et al.* 2021a, 2021b; Rosa & Halada 2021; Aswathi & Bijoy 2021). *Chrysidea mendicalis* is reported from the Western Ghats for the first time. Ongoing research will surely increase the number of known taxa, which is considerably underestimated because of the low collecting efforts of the past years and for the taxonomic impediment, due to the shortage of local experts able to identify the material collected in traps and during entomological surveys.

Some affinities between the Chrysidini fauna of India and Africa were found during the examination of Indian material (Rosa *et al.* 2015; Rosa & Halada 2021; present paper). These affinities, due to biogeographic reasons or accidental introductions, and their consequences on the host fauna must be evaluated with additional research.

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