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Three chrysidid genera newly recorded for India, with description of new species (Hymenoptera, Chrysididae)

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A b s t r a c t : Three genera are newly recorded for India: *Cleptes* LATREILLE, 1802, *Atoposega* KROMBEIN, 1983 and *Cladobethylus* KIEFFER, 1922. Four new species are described: *Atoposega estherinae* ROSA nov.sp., *Chrysis cataka* ROSA nov.sp. (*succincta* group), *C. incisatempora* ROSA nov.sp. (*varidens* group), and *C. pandyana* ROSA nov.sp. (*wahlbergi* group). *Cleptes asianus* KIMSEY, 1987, *Cladobethylus ceylonicus* KROMBEIN, 1983, and *Chrysis ignifascia* MOCSÁRY, 1893 are recorded from India for the first time. New distributional records for India are given for twelve species. The female of *Chrysis aswathiae* ROSA, 2021 and the male of *C. travancoriana* ROSA, 2021 are described and illustrated for the first time.

Key words : cuckoo wasps, taxonomy, distribution, new species.

Introduction

The chrysidid fauna of India is one of the less studied in the Eurasian continent, considering the size of the Indian subcontinent and the variety of its ecosystems (ROSA et al. 2021a). In the last three years, a renewed interest in this family has led to the discovery of 15 new species (ROSA et al. 2021a, 2022; ROSA & HALADA 2021; ROSA 2023b), and the total number of known species has increased from 93 in 19 genera (ROSA et al. 2021a) to 122 species in 21 genera (ASWATHI & BIJOY 2021; ROSA & HALADA 2021; ROSA et al. 2021a, 2021b, 2022a), and new host associations have been discovered (ABITHA et al. 2022).

During a research tour to some European museums for the ORBIT project on wild bees, I had the opportunity to examine the Indian unidentified material preserved at the Biodiversitätszentrum Oberösterreich in Linz, Austria (BZL), at the Naturhistorisches Museum Wien, Austria (NHMW) and at the Naturalis Biodiversity Center, Leiden, The Netherlands (RMNH). In total, I examined 43 specimens, some of which belonged to three genera not yet recorded for India, namely *Cleptes* LATREILLE, 1802, and the Amiseginae genera *Atoposega* KROMBEIN, 1983 and *Serendibula* KROMBEIN, 1980. These Amiseginae genera were already expected in India (ROSA et al. 2021a), as they are found in numbers in Sri Lanka. One of these two Amiseginae species is hereby described as new to science, along with another three species from the genus *Chrysis* LINNAEUS, 1761 belonging to the *succincta* group, *varidens* group and *wahlbergi* group. The last two species groups are recoded for the Oriental region for the first time and the new finding of a member belonging to the *wahlbergi* group is of particular relevance because this group was so far considered to be Afrotropical only. Finally, the female of *C. aswathiae* ROSA, 2021 and the male of *Chrysis travancoriana* ROSA, 2021 are here described and illustrated for the first time.

Materials and methods

The specimens examined for this article are deposited at the Biodiversitätszentrum in Linz, at the Naturhistorisches Museum Wien, Zimmermann collection and at the Naturalis Biodiversity Center, Leiden. Specimens were examined under a Carton Togonal SCZ stereomicroscope. Photographs were taken with a Keyence VHX-970 microscope. New records for India are marked with an asterisk (*). For each species the following data are given: number and sex of specimens; all label data; remarks (where necessary).

List of species

Subfamily *Cleptinae*

Genus *Cleptes* LATREILLE, 1802

Cleptes asianus KIMSEY, 1987 (Figs 1A-1D, 2A-2D)

Material examined: Meghalaya: 1♂, Nokrek Nat. Park, 25°40'N 91°04'E, xii.1997, leg. Murzin (BZL).

Indian records: India (Meghalaya). First record of the genus *Cleptes* in the country.

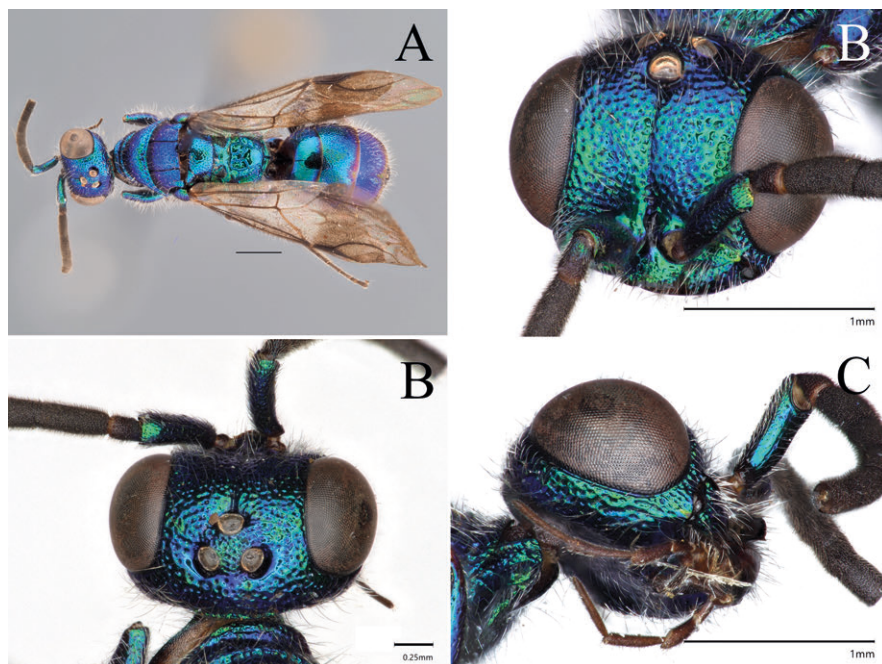


Fig. 1. *Cleptes asianus* KIMSEY, male; (A) habitus, dorsal view; (B) head, frontal view; (C) head, dorsal view; (D) head, ventro-lateral view.

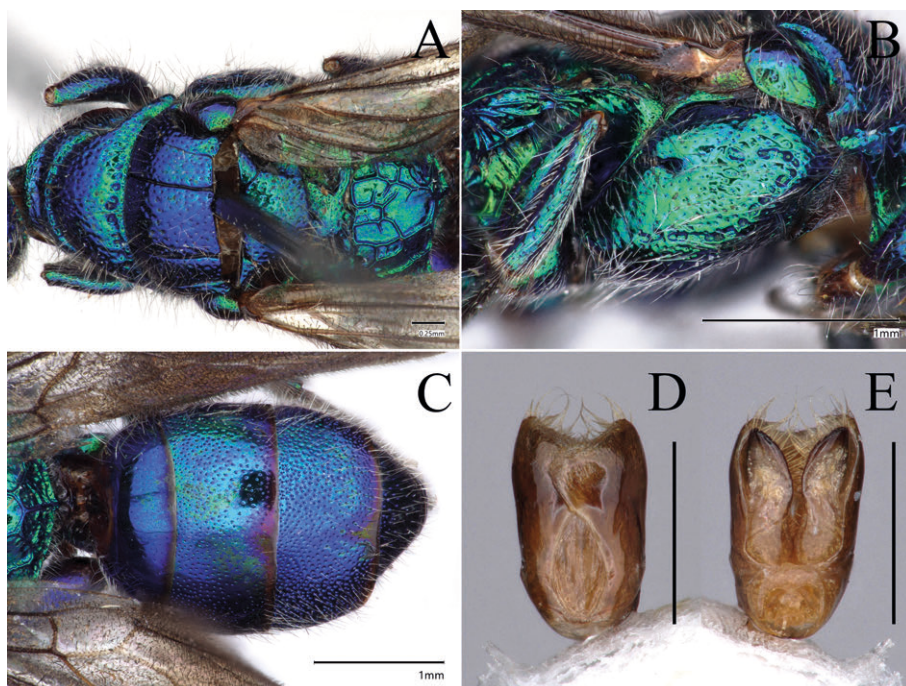


Fig. 2. *Cleptes asianus* KIMSEY, male; (A) mesosoma, dorsal view; (B) mesopleuron, lateral view; (C) metasoma, dorsal view; (D) genital capsule, dorsal view; (E) genital capsule, ventral view.

Distribution: India; Taiwan (WEI et al. 2013).

Remarks: *Cleptes asianus* was described on a single female from Taiwan. The sex association proposed here is doubtful because I could not examine the type specimen, which was not available for this study or for the revision of the Chinese *Cleptes* (WEI et al. 2013). An examination and redescription of *Cleptes asianus* based on the holotype, is needed because important diagnostic characters, such as the shape and sculpture of the propodeum, are not provided in the original description.

Subfamily *Amiseginae*

Genus *Atoposega* KROMBEIN, 1983

Atoposega estherinae ROSA nov.sp. (Figs 3A-3F, 4A-4D)

Material examined: Kerala: 1♀, 15 km SW of Munnar, Kallar Valley, 10°02'N 76°58'E, 1250m, leg. Dembický & Pacholátka (BZL). Paratypes: Tamil Nadu: 3♀♀, Anamalai Hills, Cinchona, 3500 ft., May 1967, leg. P.S. Nathan (RMNH).

Diagnosis: The genus *Atoposega* was recently revised by KIMSEY (2014) and includes only six species: *A. lineata* (KROMBEIN, 1957); *A. rieki* (KROMBEIN, 1957); *A. rufithorax* KIMSEY, 2014; *A. simulans* KIMSEY, 1986; *A. striata* KIMSEY, 2014; and *A. thailandica* KIMSEY, 2014. The occurrence of this genus in India was expected (ROSA et al. 2021a) because one species, *A. rieki*, was recorded in Myanmar and the genus has a

wide distribution in the Oriental region from Borneo to Myanmar (KIMSEY 2014). *Atoposega estherinae* nov.sp. can be easily distinguished from other species by the following combination of characters: second metasomal tergum with lateral patch of dense, longitudinal scratches not joining posteriorly or appearing U-shaped as in *A. rieki*, *A. rufithorax* and *A. striata*; first flagellomere $5\times$ as long as broad (vs. $4\times$ in *A. thailandica*, and $3\times$ in *A. lineata* and *A. simulans*); forewing not banded; pronotum and mesonotum with large, contiguous punctures, separated by longitudinal ridges.

Atoposega estherinae nov.sp. mostly resemble *A. thailandica* but can be distinguished by: first tergum fully impunctate and polished medially (Fig. 4C) (vs. only medial two-thirds

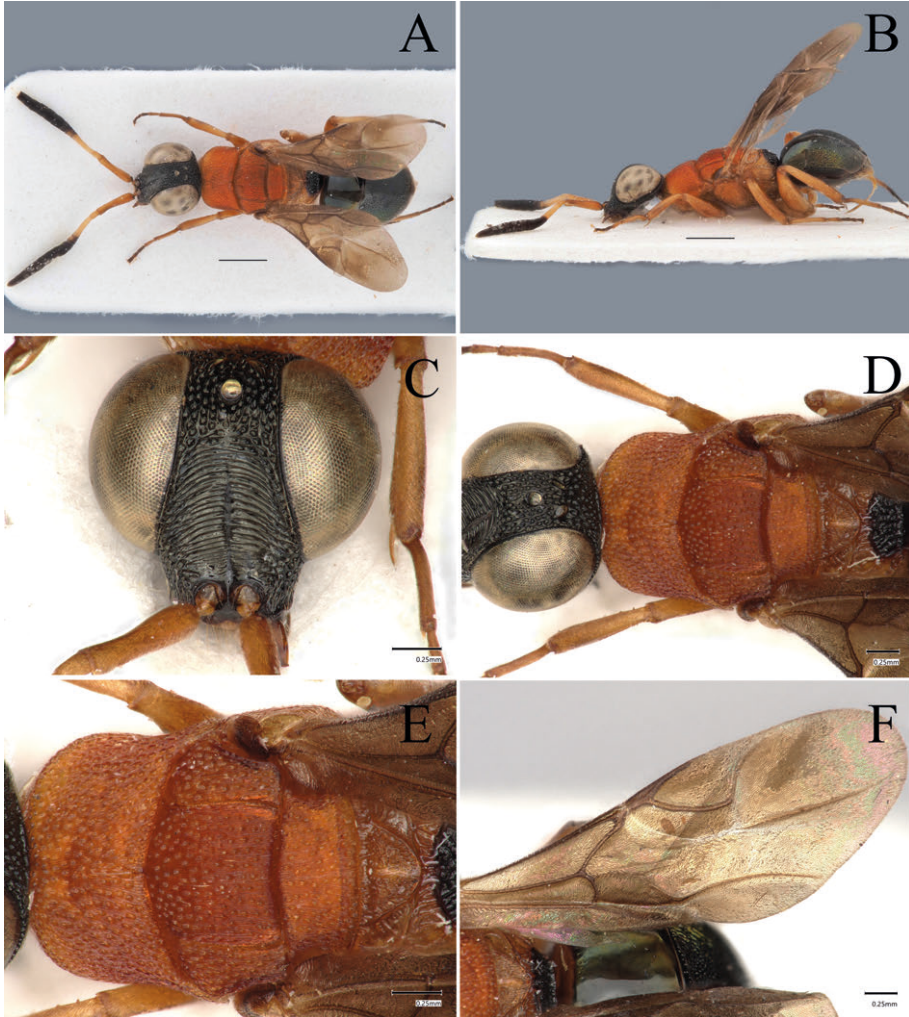


Fig. 3. *Atoposega estherinae* ROSA, holotype, female; (A) habitus, dorsal view; (B) habitus, lateral view. Scale bars 1 mm; (C) head, frontal view; (D) head and mesosoma, dorsal view; (E) mesosoma, dorsal view; (F) forewing.

impunctate) with lateral patch of fine, dense longitudinal scratches (Fig. 4A) (vs. laterally with zone of small punctures, separated by 0.5–1.0 puncture diameters); second tergum fully punctate dorsally, with impunctate median line and punctures becoming denser at sides, align anterolaterally and becoming striatiform (Fig. 4B, D) (vs. medial third polished and impunctate on anterior half of tergum, lateral third punctate, with punctures separated by 0.5–1.0 puncture diameters, becoming slightly striatiform laterally); wing membrane ambrate (Fig. 3F) (vs. wing membrane bicolored, dark brown with broad pale band across wing at stigma). Other different characters are: OOL $0.5\times$ MOD (vs. $0.8\times$ MOD); malar space shorter $2.3\times$ MOD (vs. $2.6\times$ MOD); anterior ocellus $1.8\times$ MOD from eye margin; (vs. $2.2\times$ MOD); scapal basin fully cross-ridged medially, with a single row of punctures between scapal basin and eye (vs. not fully ridged, with more punctures between scapal basin and eye in *A. thailandica*); first flagellomere length $5\times$ breadth (vs. $4\times$); fore femur ventrally carinate (vs. unmodified); metapleuron longitudinally striate (Fig. 4A) (vs. transversely striate); scape pale reddish (vs. bicolored, red to light brown ventrally, blackish dorsally); all legs red (vs. hind femur largely black); propodeum black posteriorly (vs. black dorsally and posteriorly).

Description: Female body length 5.7 mm. Fore wing length 3.8 mm.

Head. Frons with contiguous punctures; scapal basin fully cross-ridged medially, with a single row of punctures between scapal basin and eye (Fig. 3C); malar space long, $2.3\times$ MOD; anterior ocellus $1.8\times$ MOD from eye margin (Fig. 3D); OOL $0.5\times$ MOD; clypeus polished and flattened apically; subantennal distance $0.9\times$ MOD; first flagellomere $l/w = 5$; second flagellomere $l/w = 1$; third flagellomere 0.6 ; eleventh flagellomere $l/w = 1.6$. Relative length of P:F1:F2:F3 = $1:2.6:0.7:0.6$.

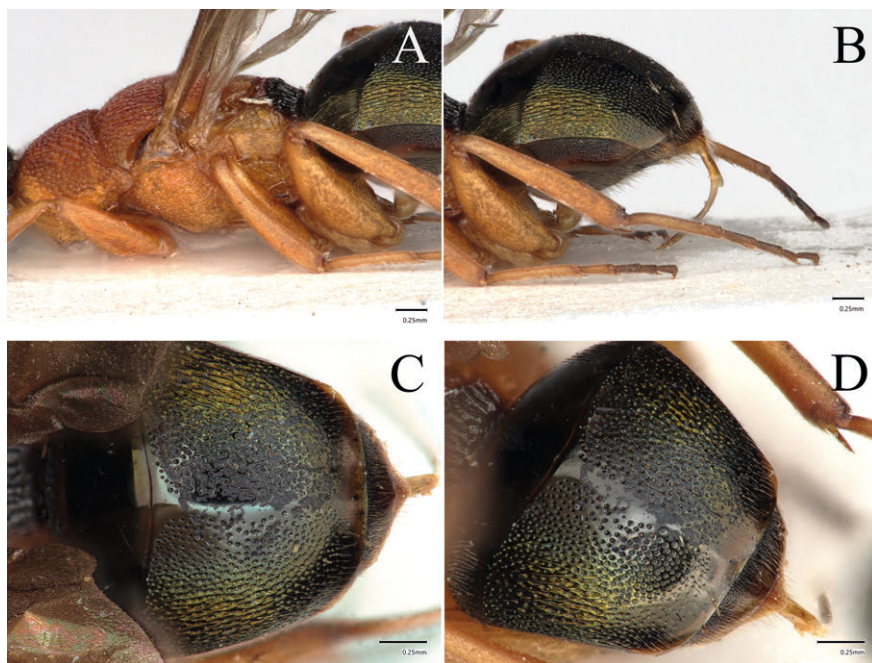


Fig. 4. *Amisega estherinae* ROSA, holotype, female; (A) mesosoma, lateral view; (B) metasoma, lateral view; (C) metasoma, dorsal view; (D) metasoma, dorso-lateral view.

Mesosoma: Length 2.4 mm. Pronotum and mesonotum with large, subcontiguous punctures, separated by longitudinal ridges (Fig. 3E); pronotum and scutum subequal in length; scutum with notauli deeper and larger posteriorly; mesopleuron with relatively small, even punctures; metanotum $0.6\times$ as long as scutellum, medial enclosure coarsely, irregularly punctate, with medial ridge (Fig. 3D); propodeum areolate on dorsal surface, with numerous cross-ridges on posterior surface; metapleuron transversely striate (Fig. 4A); propodeum laterally with a stripe covered with short, silvery pubescence; posterior propodeal projections spiny and pointing upwards; fore femur ventrally carinate.

Metasoma. Length 1.9 mm. First tergum impunctate and polished medially; laterally with patch of fine, dense, longitudinal scratches; second tergum fully punctate dorsally, with impunctate median longitudinal line; punctures becoming denser at sides, anterolaterally aligned and becoming striatiform; third metasomal tergum with small, dense and subcontiguous punctures; first sternum produced into large basal keel.

Coloration. Head black; scape pale reddish, pedicel and first flagellomere pale to whitish; first flagellomere distally dark brown; second flagellomere partially light brown and partly blackish, rest of flagellum black; mesosoma and legs red, propodeum black posteriorly; second metasomal tergum green metallic laterally (Fig. 4A-D); sternal keel brownish; wing membrane ambrate, densely setose.

Male. Unknown.

D i s t r i b u t i o n : India (Kerala, Tamil Nadu).

E t y m o l o g y : The specific epithet *estherinae* (feminine noun in genitive) is dedicated to Esther Ockermüller, curator of the Hymenoptera at BZL, who entrusted me in the study of the Chrysididae deposited in the museum collection over the years.

Genus *Cladobethylus* KIEFFER, 1922

***Cladobethylus ceylonicus* KROMBEIN, 1980 (Figs 5A-5F, 6A-6D)**

M a t e r i a l e x a m i n e d : Meghalaya: 1♂, Tura peak, 25°30'N 90°14'E, 600-1000m, 12.-22.vi.2007, leg. Pacholátko (BZL).

I n d i a n r e c o r d s : This is the first confirmed record of *Cladobethylus* in the country. Although the genus was previously mentioned for southern India by KIMSEY & BOHART (1991), none of the species listed in the checklist were associated with India, leaving uncertainty on its occurrence. Additionally, in Kimsey's revision of the genus (2019), none of the eleven species were recorded for India. However, the genus was expected to be present in the country (Rosa et al. 2021a), considering that *Cladobethylus ceylonicus* KROMBEIN was described from Sri Lanka.

R e m a r k s : The Indian specimen matches the original description and the description given by KIMSEY (2019). However, some differences can be observed, probably related to different populations. In particular, first flagellomere $6.0\times$ as long as broad (vs. $4.5\times$), flagellar setae $0.7\times$ as long as flagellomere breadth taken proximally (vs. $0.5\times$); second flagellomere $4.2\times$ as long as broad (vs. $3.3\times$); last flagellomere $8\times$ as long as broad ($5\times$).

Pronotum and scutum with even punctures (not subcontiguous, coarser than on vertex); metanotal median area suboval, l/w 0.68 (not triangular, about as long as basal width); mesopleuron with large and subcontiguous punctures covering the segments, 2-3 times larger

than those on pronotum (vs. lower two thirds of mesopleuron with punctation similar to that on pronotal dorsum, the upper third with smaller, more scattered punctures (KROMBEIN 1983) or ventrally polished, impunctate (KIMSEY 2019)). Antennae dark brown contrasting light yellowish legs.

Distribution: India (Meghalaya), Sri Lanka.

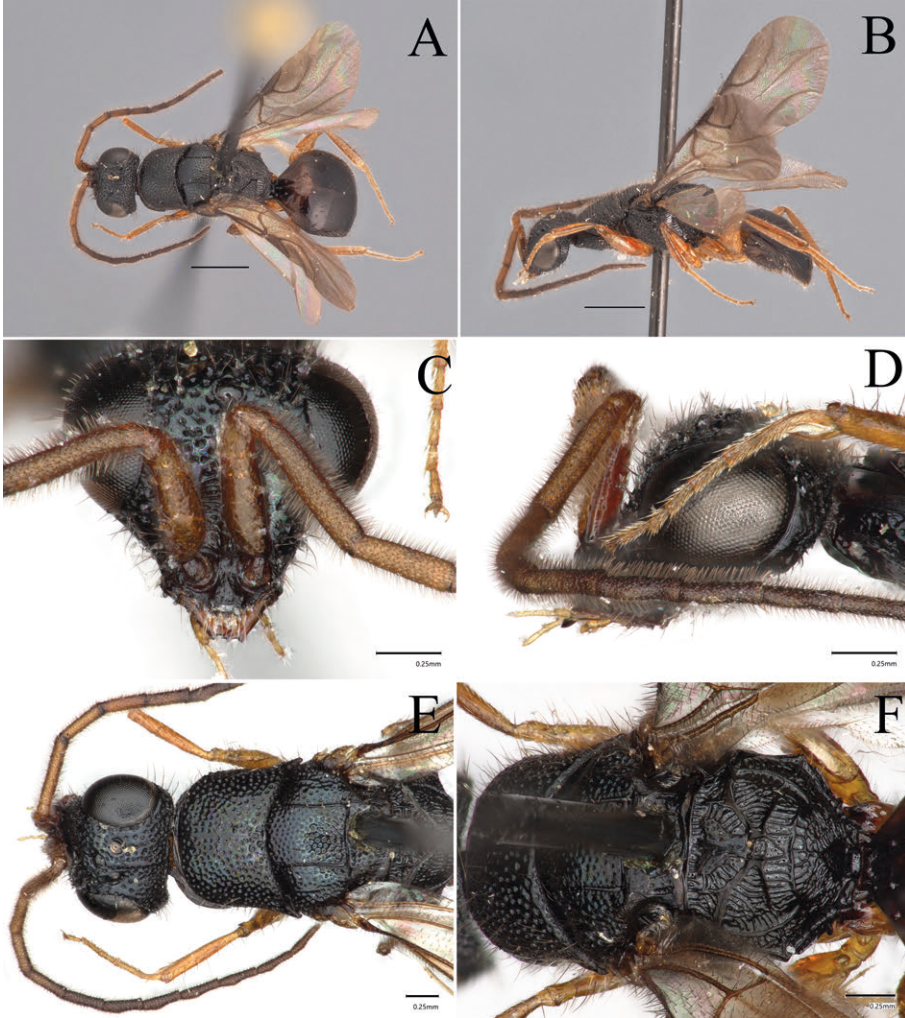


Fig. 5. *Cladobethylus ceylonicus* KROMBEIN, male; (A) habitus, dorsal view; (B) habitus, lateral view. Scale bars 1 mm. (C) head, frontal view; (D) head, lateral view; (E) head and mesosoma, dorsal view; (F) mesosoma, posterior view.

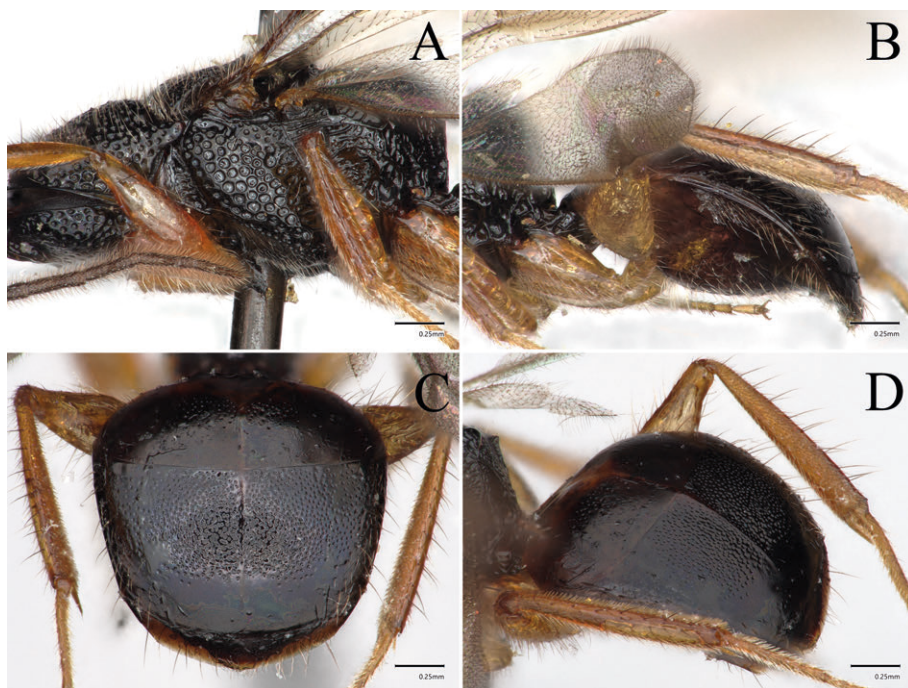


Fig. 6. *Cladobethylus ceylonicus* KROMBEIN, male; (A) mesosoma, lateral view; (B) metasoma, lateral view; (C) metasoma, dorsal view; (D) metasoma, postero-lateral view.

Subfamily *C h r y s i d i n a e*

Tribe *E l a m p i n i*

Omalus aeneus (FABRICIUS, 1787)

Material examined: Tamil Nadu: 1♀, Anamalai Hills, Cinchona [= Cinkona], without further information (NHMW).

Indian records: Tamil Nadu*, Uttarakhand (ROSA & HALADA 2021).

Distribution: Palaearctic, Oriental and accidentally introduced in North America (KIMSEY & BOHART 1991; ROSA et al. 2014).

Holophris taiwana (TSUNEKI, 1970)

Material examined: Tamil Nadu: 3♀♀, Coimbatore, without further information (NHMW).

Indian records: Karnataka, Tamil Nadu (ROSA et al. 2021a).

Distribution: India, China (Taiwan, Guangdong, Hainan), Indonesia, Laos and Thailand (ROSA et al. 2021a).

Tribe *Chrysidini*

Chrysidea falsa ROSA & XU, 2015

Material examined: Odisha: 1♀, Bhubaneswar, Orissa [without further information] (NHMW). West Bengal: 1♂, 2♀♀, Birbhum, Santiniketan, 9.-11.x.1937, leg. T.C. Ma Colln., (26), *scioensis* Grib. (NHMW).

Indian records: Kerala, Odisha*, West Bengal* (ASWATHI & BIJOY 2021).

Distribution: India, China, Malaysia, Philippine (ROSA et al. 2015; ASWATHI & BIJOY 2021).

Chrysidea pumila (KLUG, 1845)

Material examined: Puducherry: 2♀♀, Karikal [= Karaikal], South India, without further information. (NHMW).

Indian records: Maharastra, Puducherry* (ROSA et al. 2021a).

Distribution: Subcosmopolitan species, distributed in the Afrotropical, Palaearctic and Oriental regions (KIMSEY & BOHART 1991).

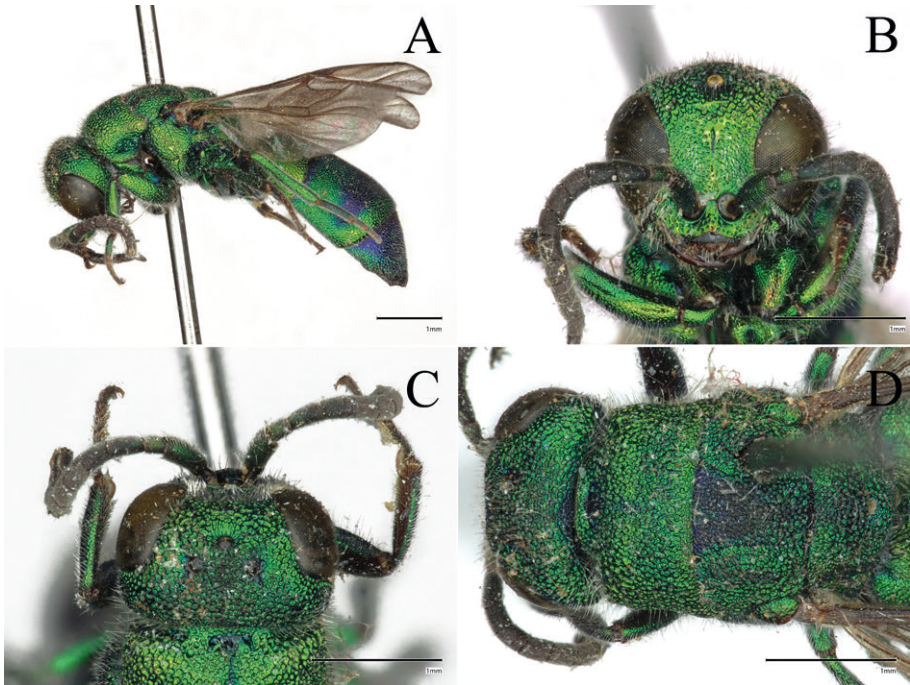


Fig. 7. *Chrysis aswathiae* ROSA, female; (A) habitus, lateral view; (B) head, frontal view; (C) head, dorsal view; (D) head and mesosoma, dorsal view.

***Chrysis arkadyi* ROSA, BAIOCCHI, HALADA & PROSHCHALYKIN, 2021**

Material examined: Tamil Nadu: 2♂♂, Coimbatore, Madras, South India, [without further information] NHMW).

Indian records: Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttarakhand (ROSA et al. 2021b; ROSA 2023b).

Distribution: India, Pakistan (ROSA et al. 2021b).

***Chrysis aswathiae* ROSA, 2021 (Figs 7A-7D, 8A-8D)**

Material examined: Pondicherry: 4♂♂, Karikal [= Karaikal], South India, [without further information] (NHMW); 1♂: Karaikkal [= Karaikal], II.1962 leg. P. Susai Nathan (Naturalis); 1♀, same locality and collector, II.1963 (RMNH); 1♀, Tanjore province [= Thanjavur, currently Tamil Nadu], Nedungadu, 28.II.1938, P.S. Nathan (RMNH).

Indian records: Pondicherry*, Tamil Nadu (ROSA et al. 2021a).

Distribution: India (ROSA et al. 2021a).

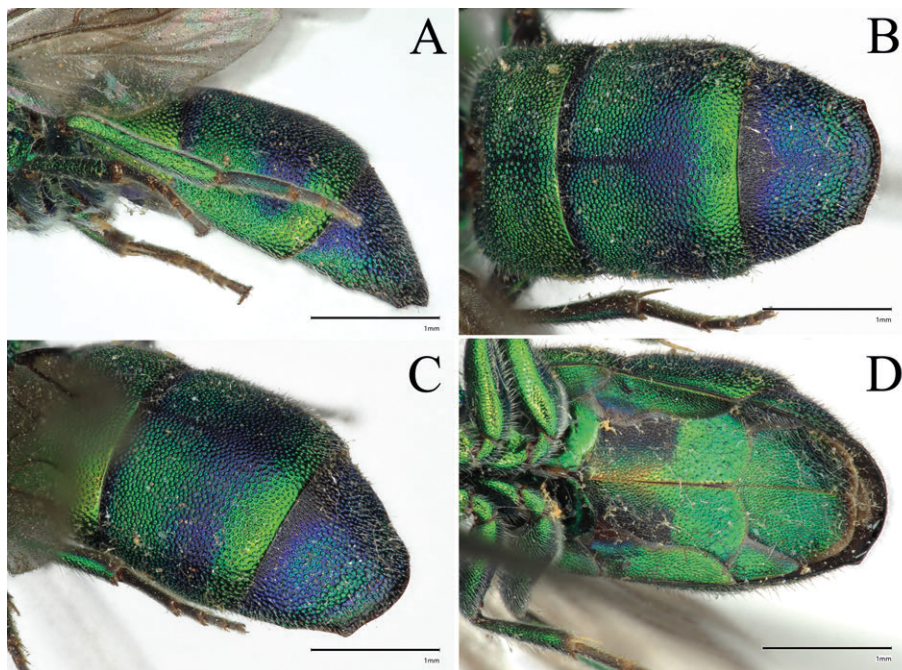


Fig. 8. *Chrysis aswathiae* ROSA, female; (A) metasoma, lateral view; (B) metasoma, dorsal view; (C) metasoma, postero-lateral view; (D) metasoma, ventral view.

Remarks. *Chrysis aswathiae* was described based on a single male from Tamil Nadu. After that, additional five specimens were found from Pondicherry at RMNH and NHMW, all conform to the original description. At Naturalis two undescribed females were observed, one collected in the same locality where the male of *Chrysis aswathiae* was found, Karaikal in Pondicherry, and the second one from Tamil Nadu. These females significantly differ from the male of *C. aswathiae* by larger size and shape of the apical margin of the last tergum with two lateral teeth and a convexity on lateral margin.

However, they both belong to the *elegans*-group, they share the shape of the head and body sculpture with dense, small and subcontiguous punctures. Sex associations in Chrysididae may be often challenging, but in this case, based on experience, the collecting localities and the fact that there are only two Oriental species known in the *elegans* group, *C. aswathiae* and *C. lapislazulina* in China, known on the female sex only, I consider these two unidentified specimens as the undescribed female of *C. aswathiae* and the observed differences as sexual dimorphic characters. However, a confirmation based on specimens found in copula or based on molecular analyses is needed. A third Oriental species included in the *elegans* group by Kimsey & Bohart (1991), *Chrysis dissimilis* DAHLBOM, 1854, was transferred to the *scutellaris* species-group by ROSA (2023b).

***Chrysis cataka* ROSA nov.sp.** (Figs 9A-9F)

Material examined: Holotype ♀; Pondicherry: Karikal [= Karaikal], South India, [without further information] (NHMW).

Diagnosis: *Chrysis cataka* ROSA nov.sp. belongs to the *succincta* group. Indian species of this group were recently revised and keyed by Rosa et al. (2021b). *Chrysis cataka* ROSA nov.sp. is distinct from any other species due to the combination of (i) apical margin of the third tergum with two blunt lateral angles and two short median teeth closely positioned and protruding from the profile of the tergum (Fig. 9E); (ii) shape of the head in frontal view, with the frontal carina topping scapal basin, continuing downwards to the malar spaces with long branches between scapal basin and eye, ending at 2/3 of basin length; (iii) the colour pattern, with green head and mesosoma, red mesoscutum and metasoma (Fig. 9C). The only similar species in terms of small dimension, the shape of the head in frontal view, with almost polished scapal basin, frontal carina, long malar spaces, and apical margin with two lateral teeth and closely positioned median ones is *Chrysis minutissima* RADOSZKOWSKI, 1876, known from Egypt to Palestine (LINSSENMAIER 1959). The female of *Chrysis minutissima* can be distinguished by its body being entirely red, golden-red or golden-greenish (in prepared specimens), with coarse metasomal punctuation, lateral teeth strongly pointed with hyaline apex, and rounded black spots on the second sternum separated medially; the male of *C. minutissima* has four sharp, aligned teeth bordered by a hyaline margin, while the male of *C. cataka* ROSA nov.sp. is unknown. The unusual shape of the head with polished scapal basin, frontal carina topping the scapal basin, and long malar spaces place these two species in a separated subgroup, somehow close to the *leachii* (sub)group.

Description: Female. Body length 5.1 mm; anterior wing length 2.9 mm.

Head. Vertex and ocellar triangle with dense, small to medium punctures ($0.3\text{--}0.5\times$ MOD); frons before scapal basin with irregular, subcontiguous to confluent punctures continuing on face down to malar spaces, between eye and scapal basin; posterior ocelli with postero-lateral deep, black fovea; scapal basin deep below upper margin, only slightly wrinkled, polished between wrinkles and large punctures at side of scapal basin; malar space densely punctate; frontal carina sharp, topping the scapal basin and continuing along scapal basin, up to 2/3 of basin length (Fig. 9B), genal carina sharp, straight, fully developed from temples to mandibular insertion; subantennal space short, $0.5\times$ MOD; apex of clypeus straight, slightly arcuate upward with narrow, dark brown rim. Distance between anterior ocellus and margin of frontal carina = $2.0\times$ MOD. OOL $1.3\times$ MOD; POL $2.3\times$ MOD; MS $1.1\times$ MOD; relative length of P:F1:F2:F3 = 1.0:1.3:0.9:0.8.

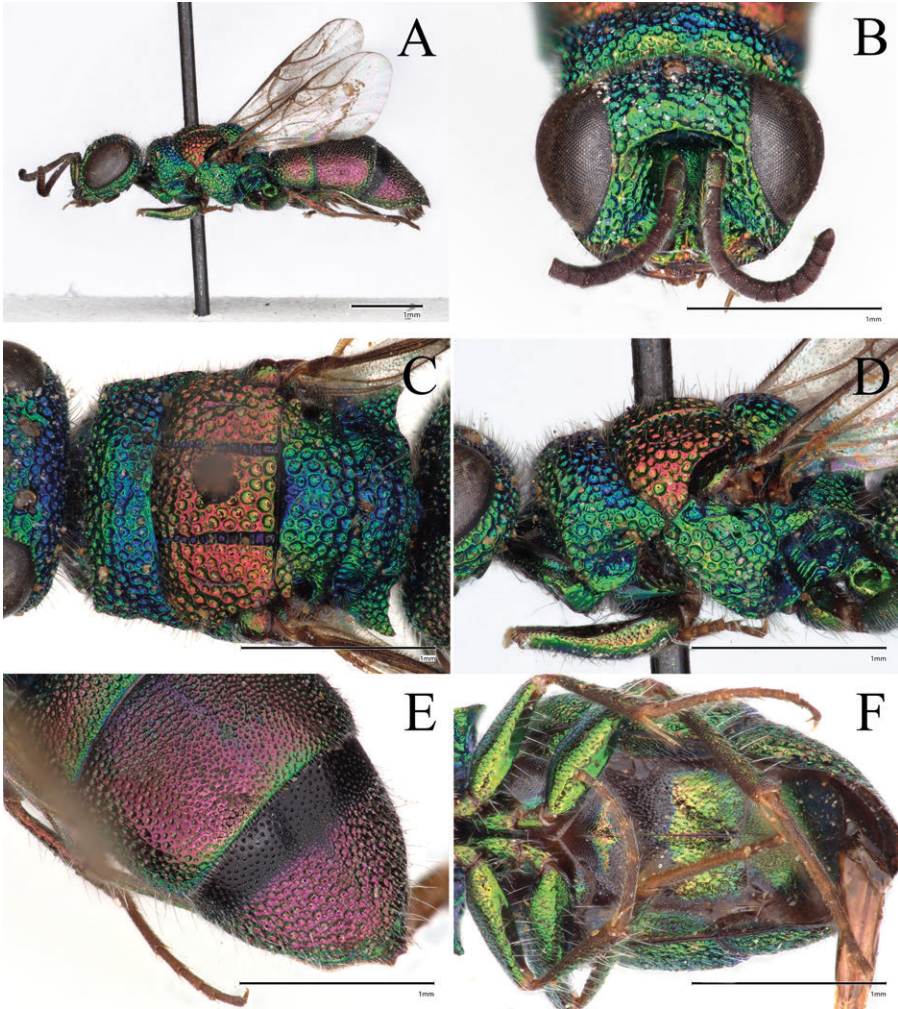


Fig. 9. *Chrysis cataka* ROSA, holotype, female; (A) habitus, lateral view; (B) head, frontal view; (C) mesosoma, dorsal view; (D) mesosoma, lateral view; (E) metasoma, postero-lateral view; (F) metasoma, ventral view.

Mesosoma. Medial pronotal furrow shallow, barely visible; pronotum with uneven punctures, small to medium sized ($0.1\text{--}0.5\times \text{MOD}$), subcontiguous to confluent, with small punctures on interspaces; mesoscutum with larger punctures postero-medially on median area, smaller antero-medially and on lateral area; median area with polished interspaces and scattered small punctures; notauli formed by deep blue foveae contrasting with red metallic colour of mesoscutum; notaular foveae as large as larger punctures adjacent basally, decreasing towards anterior margin; parapsidal signum deep; mesoscutellum with punctures similar to those at base of mesoscutum, laterally with denser, smaller punctures; scutellar-metanotal suture deep, formed by longitudinally elongate foveae; metanotum densely punctate, with irregularly

sized and shaped punctures; posterior propodeal projections slightly divergent, pointed downwards; mesopleuron densely and deeply punctate, with episternal sulcus formed by large, subrectangular foveae (Fig. 9D).

Metasoma. Punctures on first tergum small, larger at sides, with dots on interspaces; two dorso-lateral patches without punctures, only with dense dots; second tergum with dense small punctures, subcontiguous and aligned, forming obliquous striae; punctures at sides twice as large as those on median area, widely separated by polished interspaces; longitudinal median carina weak; third tergum with large and dense punctures; pits of pit row, deep, brown, 2-3× larger than tergal punctures; apical margin with narrow hyaline rim, with two lateral blunt angles and two small median teeth, close each other, on apex of protruding area; black spots on second sternum small, covering less than half of sternum length; spots only partially fused medially with straight margin (Fig. 9F).

Coloration. Body with similar colour pattern like *C. succincta*, with head and mesosoma green, mesoscutum and metasoma red, excluding the green apical margin of metasomal segments; dark blue on ocelli area, temples and occipital area, posterior half of propodeum dorsally, mesoscutellum and metascutum; sterna greenish to golden-green; hind legs greenish, mid and hind legs red; tegula metallic red; scape and pedicel green, flagellum brown.

Vestiture. Setae whitish and relatively short (1.0× MOD) on head and mesosoma; longer (up to 2× MOD) on metasoma laterally and on femora and tibiae, erect on both sides.

Male. Unknown.

Distribution: *India (Pondicherry).

Etymology: The specific epithet *cataka* derives from the Indian name *cāta* (masculine name in apposition), a fabulous bird of the Indian mythology.

***Chrysis cotesi* DU BUYSSON, 1893**

Material examined: Tamil Nadu: 1♀, Koyampattur, iii.1964, leg. T.R. Susai Nathan (RMNH).

Indian records: Bengal; Gujarat; Karnataka; Maharashtra; Tamil Nadu* and Central provinces (locality not specified) (ROSA et al. 2021a; ROSA 2023b).

Distribution: India (ROSA et al. 2021a; ROSA 2023b).

***Chrysis dissimilis* DAHLBOM, 1854**

Material examined: Jammu & Kashmir: 1♀, Srinagar, Kashmir, NW Himalayas, [without further information] (NHMW). Pondicherry: 1♂, Karikal [=Karaikal], South India, [without further information] (NHMW). Tamil Nadu: 1♂, Coimbatore, South India, [without further information] (NHMW).

Indian records: Bengal, Gujarat, Jammu & Kashmir*, Pondicherry*, Tamil Nadu* (ROSA et al. 2021a; ROSA 2023b).

Distribution: India (ROSA et al. 2021a; ROSA 2023b).

***Chrysis hecate* MOCSÁRY, 1889**

Material examined: Tamil Nadu: 1♂, 1♀, Coimbatore, South India, [without further information] (NHMW).

Indian records: Tamil Nadu (ROSA et al. 2021a).

Distribution: India, Indonesia (ROSA et al. 2021a).

***Chrysis ignifascia* MOCSÁRY, 1893* (Figs 10A-10D)**

Material examined: Odisha: 1♂, 1♀, Teypore, [without further information] (NHMW); 1♂, Tamil Nadu: Coimbatore, Lix.1939, P. S. Nathan (RMNH).

Indian records: Odisha*, Tamil Nadu*.

Distribution: India*, China (Fujian, Taiwan, Guangdong), Myanmar (ROSA et al. 2017).

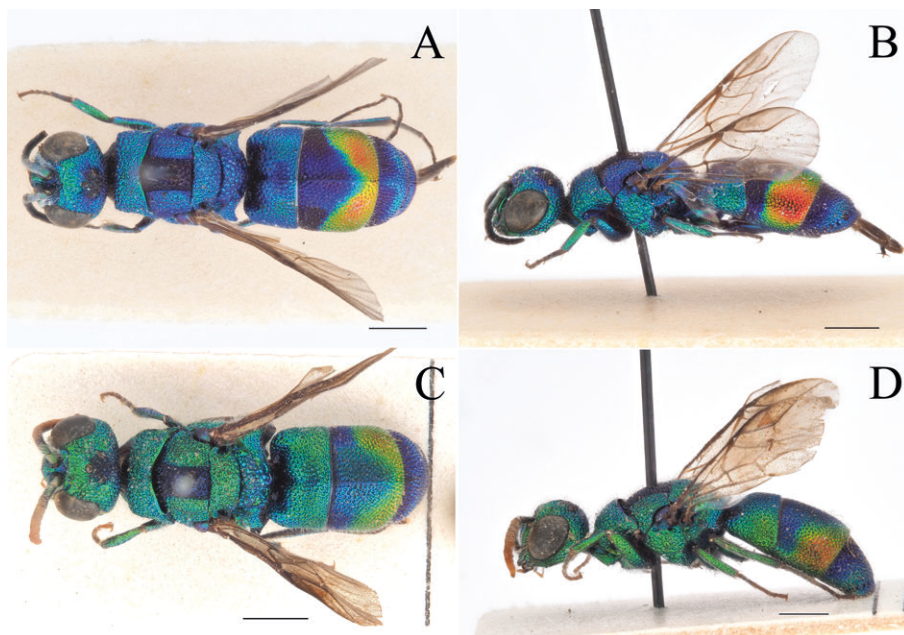


Fig. 10. *Chrysis ignifascia* MOCSÁRY; (A) female, habitus, dorsal view; (B) female, habitus, lateral view; (C) male, habitus, dorsal view; (D) male, habitus, lateral view. Scale bars 1 mm.

Remarks: *Chrysis ignifascia* was listed as an expected species for India by ROSA et al. (2021a), considering its common occurrence throughout the Oriental region, particularly in Myanmar. However, the male specimen does not match the current interpretation of the male of *C. ignifascia*, raising doubts about the previous sex association. In fact, MOCSÁRY (1893) described both *Chrysis ignifascia*, based on a female from Myanmar, and *C. birmanica*, based on a male specimen from Myanmar but collected in a different locality. KIMSEY & BOHART (1991) synonymised the two species, an interpretation followed by ROSA et al. (2017). However, the discovery of these males raises doubts about the real identity of *C. birmanica*. The male specimen deposited at NHMW and

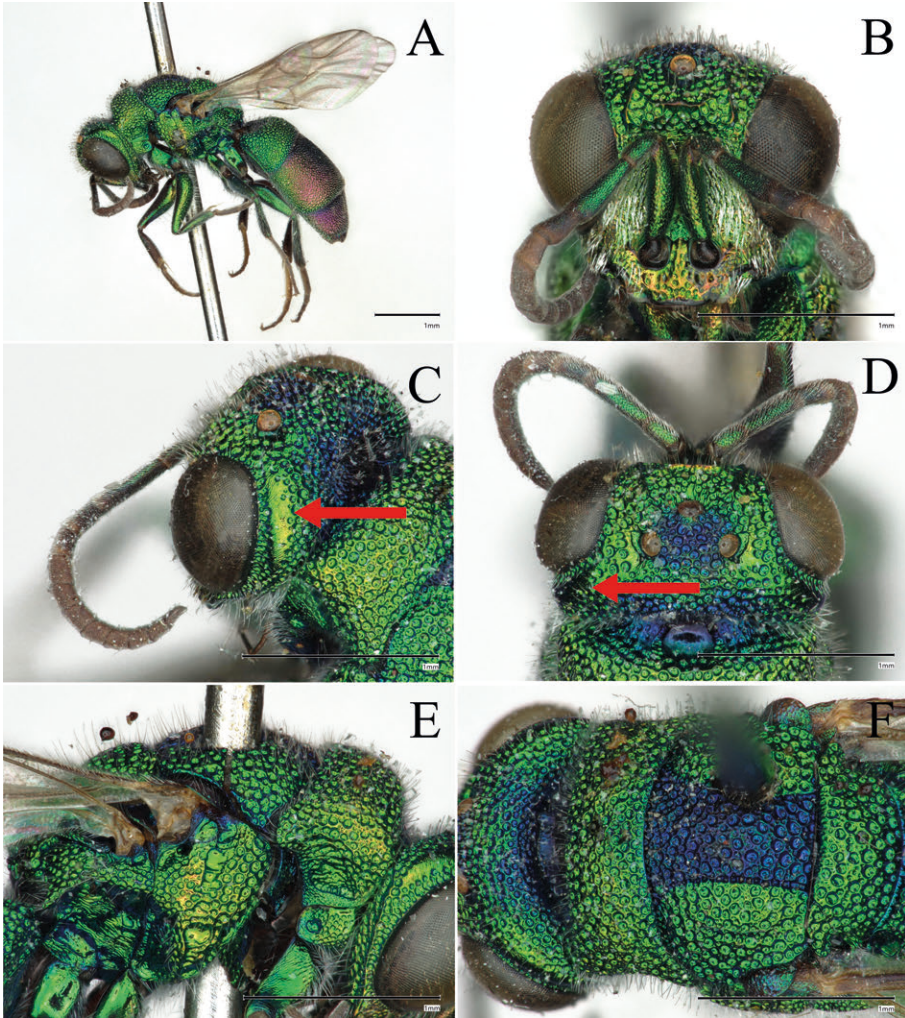


Fig. 11. *Chrysis incisatempora* ROSA, holotype, male; (A) habitus, lateral view; (B) head, frontal view; (C) head, postero-lateral view; (D) head, dorsal view; (E) mesosoma, lateral view; (F) mesosoma, dorsal view.

RMNH exhibit a similar colour pattern to the female, with a golden band on the second tergum and light brown flagellomeres, resembling the male of *Chrysis jalala* NURSE, 1902; the pits of the pit row are single and small, similar to the male of *C. taiwana* TSUNEKI, 1970 (synonymised with *C. ignifascia* by ROSA et al. 2017) and a male identified as *C. burmanica* (sic) by Mocsáry at the Hungarian Natural History Museum in Budapest (ROSA et al. 2017). These males have a complete apical margin of the third tergum, without concavity. However, the male of *C. birmanica* has black flagellomeres, deep pits of the pit row, partially confluent laterally and longitudinally elongate; finally, the apical margin is

concave medially. A revision of the group based on more material, examination of the male genital capsule, and study of the black spots on the second sternum are needed to confirm the taxonomic status of the species in this group and the relative sex associations.

***Chrysis incisatempora* ROSA nov.sp.** (Figs 11A-11F, 12A-12E)

Material examined: Holotype ♂; Pondicherry: Karaikkal [= Karaikal], ii.1963, leg. P. Susai Nathan (collectie Zoölogisch Museum Amsterdam) (RMNH).

Diagnosis: *Chrysis incisatempora* ROSA nov.sp. is the first known member of the *varidens* group from the Oriental region. It is easily recognisable from other species of this group by a deep and elongate longitudinal incision on temples (Figs 11C, 11D), by elongate first flagellomere (5× as long as wide at base) and sharp transverse frontal carina with acute angles.

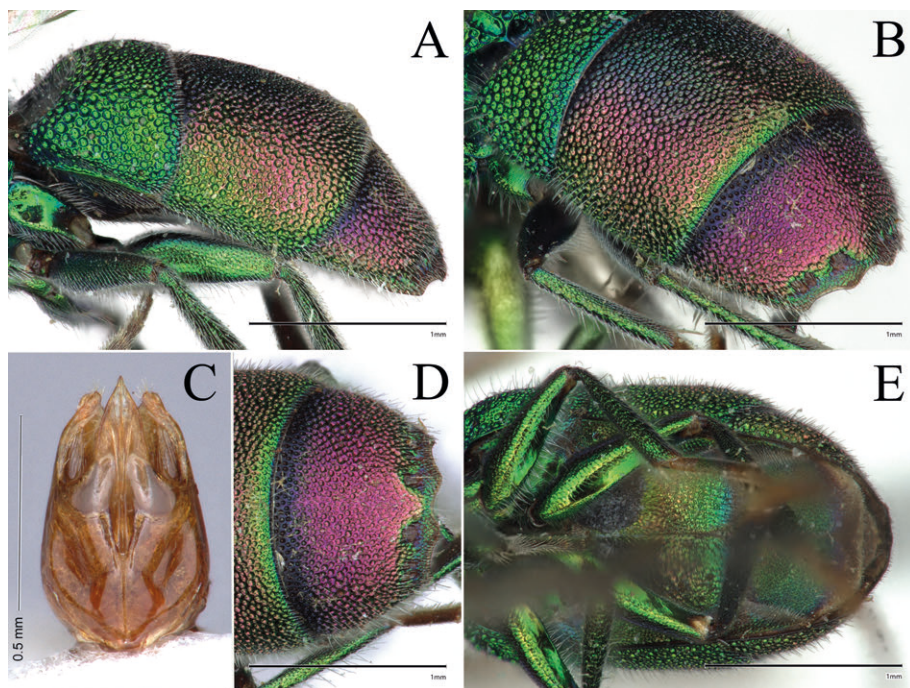


Fig. 12. *Chrysis incisatempora* ROSA, holotype, male; (A) metasoma, lateral view; (B) metasoma, postero-lateral view; (C) genital capsule; (D) third tergum, dorsal view; (E) metasoma, ventral view.

Description: Male. Body length 5.6 mm; anterior wing length 3.5 mm.

Head. Frons and vertex with dense, medium-sized punctures (up to $0.5\times$ MOD), with small and denser punctures on ocelli area; posterior ocelli with elongate postero-lateral foveae; punctuation sparser postero-lateral to ocelli; transverse frontal carina slightly arcuate medially and forming acute angle with lateral branches; scapal basin densely micropunctate; median longitudinal stripe $1\times$ MOD wide, wrinkled transversally; clypeus large, subantennal space $1.4\times$ MOD with large, spaced punctures and polished interspaces, contrasting with the dense, micropunctate scapal basin (Fig. 11B); temple between eye and

occiput with deep, elongate and impunctate incision, slightly wrinkled (Fig. 11C); malar space micropunctate; genal carina sharp, fully developed from temples to mandibular insertion; apex of clypeus straight, bordered by thick, apico-median, black rim; malar space long ($1.4 \times \text{MOD}$); first flagellomere distinctly elongate ($5 \times \text{MOD}$). Distance between anterior ocellus and margin of frontal carina = $1.2 \times \text{MOD}$. OOL $1.5 \times \text{MOD}$; POL $2.1 \times \text{MOD}$; relative length of P:F1:F2:F3 = 1.0:3.2:1.3:1.0.

Mesosoma. Pronotum as long as scutellum (Fig. 11F); medial pronotal furrow deep, as long as half pronotal length; punctures even, small to medium sized ($0.3\text{--}0.4 \times \text{MOD}$), with micropunctate interspaces; mesoscutum with larger punctures on median area basally; lateral area with denser punctures, micropunctate on interspaces; notauli formed by small subsquare to subrectangular foveae, distinctly smaller than punctures on median area; parapsidal signum shallow and elongate; mesoscutellum with large punctures, micropunctate on interspaces, denser at side; scutellar-metanotal suture as deep line; metanotum antero-apical margin with large fovea; densely punctate, with subcontiguous punctures; posterior propodeal projections triangular, slightly divergent, pointed downwards; mesopleuron densely and deeply punctate, with larger punctures on mesepimeron; episternal sulcus formed by large foveae on upper mesopleuron, almost vanishing on lower part (Fig. 11D).

Metasoma. Punctures on first tergum even, large, micropunctate on interspaces; second tergum with dense, contiguous punctures on basal half, becoming smaller and not contiguous on apical half; longitudinal median carina on second tergum formed by stripe with small dots; third tergum with even punctures; pits of pit row very large, deep, non-metallic (Fig. 12D); apical margin with four blunt teeth, median teeth more like undulations; black spots on second sternum subsquare, separated medially by thin line and fused to lateral margin of sternum (Fig. 12F).

Coloration. Body green on head, mesosoma, first metasomal tergum, lateral and posterior margins of second and third tergum; red to violet on second and third tergum dorsally; dark blue on ocelli triangle, occipital area and median area of mesoscutum. Scape, pedicel, first and partially second flagellomere green. Tegula and legs green metallic. Wing slightly infusate, lighter on outer margin.

Vestiture. Setae whitish to greyish, short and dense, around $1.0 \times \text{MOD}$, on the whole body.

Female. Unknown.

D i s t r i b u t i o n : India (Tamil Nadu).

E t y m o l o g y : The specific epithet *incisatempora* is derived from the Latin adjective *incisus* (= engraved) and the Latin name *tempora* (plural of *tempus*, neuter) (= temples) and refers to the elongate incision on temples.

***Chrysis oblita* BOHART in KIMSEY & BOHART, 1991**

M a t e r i a l e x a m i n e d : Pondicherry: 1♀, Karikal [=Karaikal], South India, [without further information] (NHMW). Tamil Nadu: 1♂, 1♀, Coimbatore, South India, [without further information] (NHMW).

I n d i a n r e c o r d s : Delhi, Gujarat, Maharashtra, Pondicherry*, Tamil Nadu, West Bengal, India Orientalis (locality not specified), Central provinces (locality not specified) (ROSA et al. 2021a).

D i s t r i b u t i o n : India, Pakistan (NURSE 1903b).

***Chrysis pandyana* ROSA nov.sp.** (Figs 13A-F, 14A-14D)

Material examined: Holotype ♀; Tamil Nadu: Coimbatore, Kallar, 500m, 7.iv.1970, leg. R.T. Simon Thomas (collectie Zoologisch Museum Amsterdam) (RMNH). Paratype: 1 ♀, same labels as the holotype (RMNH).

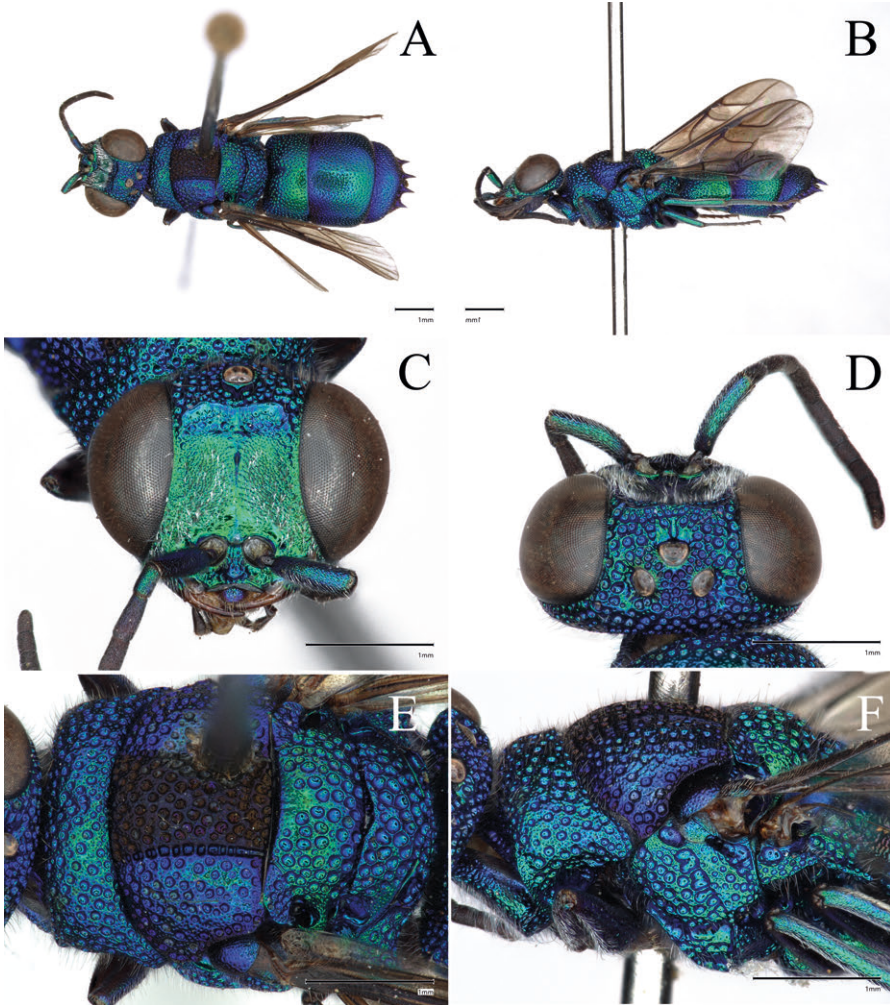


Fig. 13. *Chrysis pandyana* ROSA, holotype, female; (A) habitus, dorsal view; (B) habitus, lateral view; (C) head, frontal view; (D) head, dorsal view; (E) mesosoma, dorsal view; (F) mesosoma, lateral view.

D i a g n o s i s : *Chrysis pandyana* ROSA, nov.sp. is an unusual species that I include in the *wahlbergi* group due to the structure of its third metasomal tergum with four distal teeth and a basolateral bulge (Fig. 13B, 14B), the scapal basin micropunctate, the shortened pronotum, the frontal carina parenthesis-like, and the shape of the black spots on second sternum large and separated medially. This species group was previously known

only from the Afrotropical region (KIMSEY & BOHART 1991; MADL & ROSA 2012). *Chrysis pandyana* ROSA nov.sp. is distinct from all the other members of the group by its relatively large ocelli (Fig. 13D); the shape of the four apical teeth, which are normally close-set and triangular, whereas in *C. pandyana*, they are spiniform, and the raised square parenthesis-like frontal carina. Other diagnostic characters are the elongate, subrectangular black spots on the second sternum (Fig. 14D), the double metasomal punctation with small and sparse punctures in the second half of the second tergum (Fig. 14A); the black median area of mesoscutum with dark violet reflections on the bottom of the large punctures.

Description: Female. Body length 8.9 mm; anterior wing length 5.5 mm.

Head. Vertex and ocellar triangle with dense, small to medium punctures ($0.2\text{--}0.5\times \text{MOD}$), with the largest between ocelli and eye, the smallest above frontal carina and on ocelli area; polished area in front of anterior ocellus, sulcate medially; ocelli relatively large compare to other species of the species group (Fig. 13D); anterior ocellus subtrapezoidal, sunken; transverse frontal carina raised, square parenthesis-like with small to medium punctures between carina and scapal basin; scapal based densely micropunctate, with punctures aligned transversally; median longitudinal stripe ($1\times \text{MOD}$ wide) impunctate, weakly wrinkled transversally; area before clypeus polished to shallowly wrinkled; scapal basin covering almost the entire face, at sides with sparse, small to median punctures; malar space micropunctate; gena narrow, less than $1\times \text{MOD}$; genal carina sharp, fully developed from temples to mandibular insertion; subantennal space short, $0.75\times \text{MOD}$; apex of clypeus straight, slightly arcuate upward with thick, apico-median, black rim. Malar space very short ($0.3\times \text{MOD}$). Distance between anterior ocellus and margin of frontal carina = $1.2\times \text{MOD}$. OOL $1.0\times \text{MOD}$; POL $1.2\times \text{MOD}$; relative length of P:F1:F2:F3 = $1.0:1.3:1.1:1.0$.

Mesosoma. Pronotum narrow medially, shorter than scutellum (Fig. 13E); medial pronotal furrow shallow, as long as $2/3$ of pronotal length; punctures medium sized ($0.4\text{--}0.5\times \text{MOD}$), spaced (1 puncture diameter apart), interspaces micropunctate; mesoscutum with larger punctures on median area; lateral area with denser punctures, micropunctate on interspaces; notauli formed by deep, blue, subsquare to subrectangular foveae, smaller than punctures on median area; parapsidal signum shallow; mesoscutellum with larger punctures than mesoscutum, micropunctate on interspaces, denser at side; scutellar-metanotal suture as deep line, enlarged medially; metanotum densely punctate, with subcontiguous punctures; posterior propodeal projections triangular, slightly divergent, pointed downwards; mesopleuron densely and deeply punctate, with episternal sulcus formed by large, subrectangular foveae (Fig. 13F); noticeable deep meso- and metapleural foveae.

Metasoma. Punctures on first tergum even, small, micropunctate on interspaces; second tergum with similar punctation on basal half, with smaller and sparser punctures on apical half; longitudinal median carina weak, yet visible on all terga; third tergum with larger punctures basally, becoming denser on pre pit area, which is slightly saddled; pits of pit row deep, non-metallic, $2\text{--}3\times$ larger than larger tergal punctures; third tergum with basolateral bulge, apical margin with four sharp, spiniform teeth; black spots on second sternum subrectangular, elongate, covering about two thirds of sternum length, largely separated medially and not touching lateral margin of sternum (Fig. 14F).

Coloration. Body blue with greenish reflections on face and dorsally on pronotum, scutellum, first tergum and apico-laterally on second tergum; median area of mesoscutum

black with violet reflection on the bottom of punctures. Wing infusate, lighter on outer margin.

Vestiture. Setae whitish and short, sparse, less than or $1.0\times$ MOD, on the body.

Male. Unknown.

Etymology. The specific epithet *pandyana* (adjective) is named after the Pandyan dynasty, an ancient Tamil dynasty who ruled extensive territories in southern India over a period of almost 1800 years.

D i s t r i b u t i o n : India (Tamil Nadu).

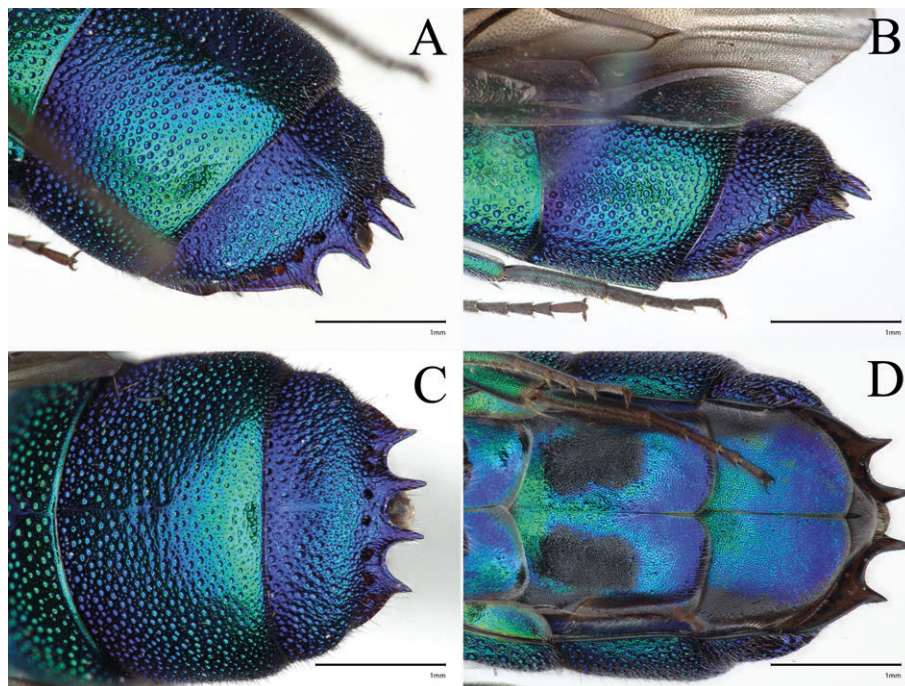


Fig. 14. *Chrysis pandyana* ROSA, holotype, female; (A) metasoma, postero-lateral view; (B) metasoma, lateral view; (C) metasoma, posterior view; (D) metasoma, ventral view.

***Chrysis travancoriana* ROSA in ROSA et al., 2021 (Figs 15A-15E)**

M a t e r i a l e x a m i n e d : Pondicherry: 1♂, Karikal [= Karaikal], South India, [without further information] (NHMW).

R e m a r k s : *Chrysis travancoriana* was described based on two females. The male found at NHMW can be easily associated with the female of *C. travancoriana*, exhibiting the same diagnostic characters, such as the colour pattern green and blue with golden and red patches apico-laterally on first and second terga (Fig. 15E); the same structure of the third metasomal tergum, with six teeth, four of which apically aligned and two positioned on lateral edge (Fig. 15E); the peculiar sculpture on lateral area of mesoscutum between the notauli and the parapsidal signum, with punctures transversally contiguous (Fig. 15D). Other characters as follow: body length 5.3 mm, forewing length 3.0 mm. OOL = $1.5\times$

MOD; POL = $2.1 \times$ MOD (in female, POL is $1.8 \times$ MOD and not 6.7 as erroneously given in the original description); MS distinctly shorter than in female = $0.7 \times$ MOD; subantennal distance less than 1.0 MOD; relative length of P:F1:F2:F3 = 1.0:1.3:1.2:1.2, with very short first flagellomere, as long as the second. Scapal basin with the area below frons impunctate (fully punctate in females) and without the frons distinctly prominent over the scapal basin (Fig. 9B). All the differences mentioned above are compatible with sexual dimorphism.

Indian records : Pondicherry*, Tamil Nadu (ROSA et al. 2021a).

Distribution : India (ROSA et al. 2021a).

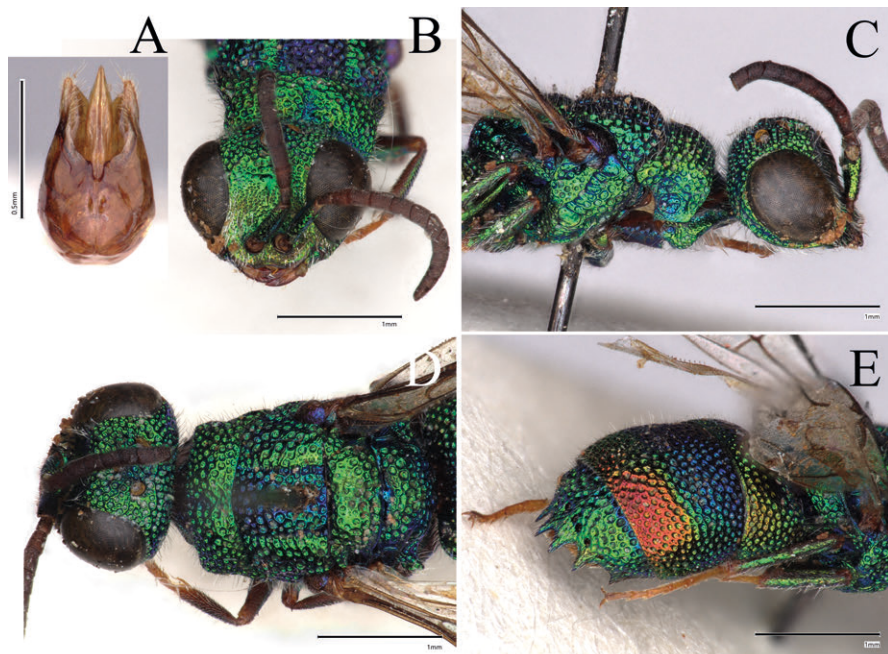


Fig. 15. *Chrysis travancoriana* ROSA, male; (A) genital capsule; (B) head, frontal view; (C) head and mesosoma, lateral view; (D) head and mesosoma, dorsal view; (E) metasoma, postero-lateral view.

***Trichrysis poseidonia* ROSA, ASWATHI, WISNIOWSKI & BIJOY, 2022**

Material examined : West Bengal: 1 ♀, Birbhum Dt. W. Bengal India, without further information (NHMW).

Indian records : Kerala, Tamil Nadu, West Bengal* (ROSA et al. 2022).

Distribution : India, Nepal (ROSA et al. 2022).

***Trichrysis lanka* (BINGHAM, 1903)**

Material examined : Tamil Nadu: 3 ♀♀, Nadungadu, 30.v.1938, 1.vi.1938, 2.vi.1938, leg. P.S. Nathan (RMNH).

Indian records : Kerala, Tamil Nadu (ROSA et al. 2022).

D i s t r i b u t i o n : India, Sri Lanka (ROSA et al. 2022).

Tribe P a r n o p i n i

***Cephaloparnops oberthueri* (DU BUYSSON, 1904)**

M a t e r i a l e x a m i n e d : Tamil Nadu: 1♀, Madras [= Chennai], Krishagiri, 500m, 8.iv.1970, leg. R.T. Simon Thomas (RMNH).

I n d i a n r e c o r d s : Karnataka, Tamil Nadu* (DU BUYSSON, 1904).

D i s t r i b u t i o n : India (ROSA et al. 2022).

Discussion

ASWATHI & BIJOY (2021), ROSA & HALADA (2021), ROSA et al. (2021a, b, 2022a) and ROSA (2023a, b) have contributed to increase the number of Indian species from 93 in 19 genera to 129 species in 24 genera, including records presented in this article. However, the true extent of Indian species diversity remains largely unknown, and extensive investigations are required for a better comprehensive understanding of the Indian fauna and its relationships with the Oriental, Palaearctic and Oriental faunas. In fact, due to the geographic position of the Indian subcontinent, mountain species distributed in the northern part of the country exhibit clear affinity with Palaearctic species and species groups (ROSA 2024, in print), while recent findings have highlighted affinities between the Indian and African species groups (ROSA & HALADA 2021).

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Zusammenfassung

Drei Gattungen werden erstmals für Indien gemeldet: *Cleptes* LATREILLE, 1802, *Atoposega* KROMBEIN, 1983 und *Cladobethylus* KIEFFER, 1922. Vier neue Arten werden beschrieben: *Atoposega estherinae* nov.sp. und *Chrysis cataka* nov.sp. (*succincta* Gruppe), *C. incisatempora* nov.sp. (*varidens* Gruppe), und *C. pandyana* nov.sp. (*wahlbergi* Gruppe). *Cleptes asianus* KIMSEY, 1987, *Cladobethylus ceylonicus* KROMBEIN, 1983 und *Chrysis ignifascia* MOCSÁRY, 1893 werden erstmals aus Indien gemeldet. Neue Nachweise für Indien werden für elf Arten dokumentiert. Das Weibchen von *Chrysis aswathiae* ROSA, 2021 und das Männchen von *C. travancoriana* ROSA, 2021 werden erstmals beschrieben und illustriert.

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