




## *Solierella turneri* Dutt, 1917 (Hymenoptera: Crabronidae: Crabroninae) from India: description of female and new distribution records


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**Received:**

16 June, 2021

**Accepted:**

10 December, 2021

**Published:**

05 January, 2022

**Subject Editor:**

Christian Schmid-Egger

**ABSTRACT.** The crabronid wasp, *Solierella turneri* Dutt, 1917 (Hymenoptera: Crabronidae) is newly recorded from various regions of India and female is described. Hitherto, the *S. turneri* Dutt has been only reported from northern India (Pusa of Bihar), the current record extends its range to southern India (Kerala, Tamil Nadu and Karnataka).

**Key words:** Digger wasp, Miscophini, Apoidea, new record, Southern India

**Citation:** Mawadda, N.V.A. & Girish Kumar, P. (2022) *Solierella turneri* Dutt, 1917 (Hymenoptera: Crabronidae: Crabroninae) from India: description of female and new distribution records. *Journal of Insect Biodiversity and Systematics*, 8 (1), 111–120.

## INTRODUCTION

Species of the genus *Solierella* Spinola, 1851 (Hymenoptera: Crabronidae) are small to medium sized black wasps with white markings on thorax and legs. The gaster and hind legs are often black with white or creamy white maculae. They nest in pre-existing cavities in stems, twigs, galls or in abandoned burrows in soil. Hemipterans, orthopterans and psocopterans are used for provisioning the nest. Nests are made up of loosely packed cells and are closed by pebbles and pieces of grass (Williams, 1927, 1950; Newton, 1960; de Beaumont, 1964; Krombein, 1967; Kurczewski, 1967; Carrillo & Caltagirone, 1970; Bitch et al., 2021). The genus *Solierella* consist of 118 species, worldwide (Pulawski, 2021). Dutt (*in R. Turner, 1917*) studied this genus from India and erected a species named *S. turneri* Dutt, 1917 based on a single specimen. Till then, no study about *Solierella* have been reported from India. The original short description is rather was based on male specimen. So, we described the female here for the first time based on the newly collected specimens from Kerala, Tamil Nadu and Karnataka.

## MATERIAL AND METHODS

This study is based on the specimens collected from the various localities of southern India. Specimens belonging to the genus *Solierella* were collected using about 20-50 yellow pan traps from different months of the year 2015 to 2020, in different parts of three Southern states of India, i.e., Karnataka, Kerala and Tamil Nadu. Yellow pan traps are placed in different habitats like forest, open land, homestead vegetation etc. About 200–300 specimens were collected and sorted. The specimens are studied using a

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LEICA® M 205A Stereo microscope model and photographed with LEICA® DFC 500 Camera. Photographs of the type, *Solierella turneri* Dutt (NHMUK012859085, a male), made available from NHMUK under [Creative Commons License 4.0](#) for comparing with collected specimens. The identified specimens are deposited at Western Ghat Regional Centre, Zoological Survey of India, Kozhikode (ZSIK).

The morphological terminology used in this paper follows [Bohart & Menke \(1976\)](#). The following terms and abbreviations used in the text are redefined as follows: **F1**: First flagellar segment; **G1, G2, G3**: First gastral segment, Second gastral segment, Third gastral segment, etc.; **HL**: Head length; **HW**: Head width; **IODc**: Minimum inter ocular distance at base of clypeus; **IODv**: Minimum inter ocular distance at vertex; **OOD**: Ocello ocular distance, minimum distance between the posterior ocellus and eye; **POD**: Posterior ocellar distance, minimum distance between the posterior ocelli. Episcrobal area: Portion of the mesopleuron above the scrobal groove and below the subalar fossa. Maculae: whitish or creamy white spots or marks. The following abbreviations are used for the depositories in the text: NHM: The Natural History Museum, formerly British Museum (Natural History), London, Great Britain; ZSIK: Western Ghat Regional Centre, Zoological Survey of India, Kozhikode, India. The following abbreviations are used for name of collectors: N.V.A.M.: N.V. Ayisha Mawadda; C.B.: C. Binoy; C.C.: C. Charesh; K.A.: K. Anju; K.J.: Kuriakose Junior; K.P.H.R.: K.P. Hanima Raveendran; P.G.K.: P. Girish Kumar; P.M.R.: P.M. Rajan; R.F.: Raseena Farsana; S.A.: S. Anagha; S.S.: Souvik Sen; T.R.: Tessy Rajan; U.M.S.: U.M. Sheeja.

## RESULTS

### Taxonomic part

Order Hymenoptera Linnaeus, 1758

Superfamily Apoidea Latreille, 1802

Family Crabronidae Latreille, 1802

Subfamily Crabroninae Latreille, 1802

Genus *Solierella* Spinola, 1851

*Solierella turneri* Dutt, 1917 (Figs 1–19)

*Solierella turneri* Dutt in [R. Turner, 1917](#):205, Holotype, male (gender was not indicated originally, India: Bihar, Pusa (NHM).

**Material examined:** INDIA: **Karnataka**, Kodagu district, Bettathur (12°24'26"N, 75°39'41"E 1063 m a.s.l.), 1♂, 23.xii.2019, P.G.K., leg. (ZSIK Regd. No. ZSI/WGRC/IR/INV/15769). **Kerala**, Malappuram district, Calicut University Campus (11°07'58"N, 75°53'28"E 66 m a.s.l.), 2♂♂ & 3♀♀, 10.viii.2018, C.B., leg. (Nos. 15695–15697); Thrissur district, Attoor (10°38'00"N, 76°23'37"E 252 m a.s.l.), 3♂♂ & 5♀♀, 14.iv.2020, N.V.A.M., leg. (Nos. 15703–15710); Kozhikode district, Pazhassi raja Museum (11°17'45"N, 75°46'23"E 10 m a.s.l.), 1♀, 25.x.2015, U.M.S., leg. (No. 15711); Kozhikode district, Koyilandi (11°24'21"N, 75°46'11"E 31 m a.s.l.), 6♀♀, 20.i.2020, C.B., leg. (Nos. 15715–15720); Kozhikode district, Kinaloor (11°28'04"N, 75°51'39"E 27 m a.s.l.), 2♀♀, 27.iii.2019, C.B., leg. (Nos. 15742 & 15743); Kozhikode district, Thunumannil (11°24'44"N, 75°56'03"E 31 m a.s.l.), 1♂ & 1♀, 28.v.2019, C.B., leg. (Nos. 15744 & 15745); Kozhikode district, Manipuram (11°21'43"N, 75°55'59"E 39 m a.s.l.), 2♂♂ & 4♀♀, 26.v.2019, C.B., leg. (Nos. 15746–15751); Kozhikode district, Elathur (11°20'40"N, 75°44'34"E 18 m a.s.l.), 2♀♀, 13.1.2020, C.B., leg. (Nos. 15752 & 15753); Idukki district, Kulamavu (9°48'19"N, 76°53'04"E 654 m a.s.l.), 2♀♀, 17.xii.2019, T.R., leg. (Nos. 15754 & 15755); Kozhikode district, Purameri (11°40'29"N, 75°35'43"E 21 m a.s.l.), 2♂♂, 27.xii.2019, K.P.H.R., leg. (Nos. 15756 & 15757); Kasaragod district, Ranipuram (12°25'53"N, 75°21'01"E 1001 m a.s.l.), 1♂ & 1♀, 17.xii.2017, P.M.R., leg. (Nos. 15758 & 15759); Wayanad district, No specific locality, 1♂, 17.ii.2016, R.F., leg. (No. 15760); Kozhikode district, Jaferkhan colony, Zoological Survey of India campus (11°16'02"N, 75°47'21"E 21 m a.s.l.), 1♂ & 1♀, 15.v.2019, K.P.H.R., leg. (Nos. 15761 & 15762); Kozhikode district, Balussery (11°26'20"N, 75°49'13"E 31 m a.s.l.), 5♀♀, 9.iii.2019, C.B.,

leg. (Nos. 15763–15767); Kozhikode district, Nanminda (11°25'18"N, 75°49'15"E 41 m a.s.l.), 1♀, 9.xii.2018, P.G.K., leg. (No. 15768); Kozhikode district, Edakkara (11°25'36"N, 76°18'12"E 59 m a.s.l.), 1♂, 28.v.2019, C.B., leg. (No. 15770); Kozhikode district, Chathamangalam (11°17'39"N, 75°54'50"E 35 m a.s.l.), 1♀, 9.iii.2016, P.G.K., leg. (No. 15771); Kozhikode district, Payanthong (11°41'04"N, 75°40'16"E 31 m a.s.l.), 1♀, 30.iii.2019, K.P.H.R., leg. (No. 15772); Thiruvananthapuram district, Kerala Agricultural University Campus, Vellayani (8°26'38"N, 76°59'29"E 2 m a.s.l.), 2♀♀, 1.v.2019, C.B., leg. (Nos. 15773 & 15774); Kozhikode district, Chemenchery (11°24'58"N, 75°44'07"E 18 m a.s.l.), 1♀, 8.xi.2018, C.B., leg. (No. 15775); Kannur district, Kannapuram (11°58'33"N, 75°15'33"E 7 m a.s.l.), 2♂♂ & 2♀♀, 10.ii–3.iii.2019, 28.iv.2019, C.C., leg. (Nos. 15776–15779); Wayanad district, Kalloor (11°40'13"N, 76°18'42"E 851 m a.s.l.), 1♂ & 1♀, 10.iii.2020, K.J., leg. (Nos. 15780 & 15781); Kozhikode district, Madappally (9°28'44"N, 76°33'51"E 25 m a.s.l.), 6♂♂ & 8♀♀, 16.iii.2020, S.A., leg. (Nos. 15782–15795); Kozhikode district, Pathirippatta (11°41'37"N, 75°42'21"E 41 m a.s.l.), 2♀♀, 14.iv.2020, K.A., leg. (Nos. 15796 & 15797); Kozhikode district, Vilangad (11°47'41"N, 75°44'48"E 496 m a.s.l.), 1♀, 2.i.2020, K.A., leg. (No. 15798); Kannur district, Vilakkottur (11°45'30"N, 75°39'50"E 24 m a.s.l.), 1♀, 19.xii.2020, K.P.H.R., leg. (No. 15799). **Tamil Nadu**, Kanyakumari district, Kanyakumari Wildlife Sanctuary, Alagiyapandipuram range, Keeriparai (8°26'30"N, 77°25'21"E 30 m a.s.l.), 2♂♂ & 3♀♀, 14–16.ii.2020, S.S. & Party, leg. (Nos. 15687–15691); Coimbatore district, Anaikati (11°19'43"N, 76°45'29"E 557 m a.s.l.), 1♂ & 2♀♀, 4.i.2019, P.G.K., leg. (Nos. 15692–15694); Coimbatore district, Sedivayal (10°56'30"N, 76°43'08"E 516 m a.s.l.), 3♂♂, 5.i.2019, P.G.K., leg. (Nos. 15695–15697); Nilgiri district, Coonoor (11°27'01"N, 76°51'26"E 1777 m a.s.l.), 1♂, 7.i.2019, P.G.K., leg. (No. 15712); Kanyakumari district, Kanyakumari Wildlife Sanctuary, Kulashekaram Range, Peechiparai (8°27'31"N, 77°19'01"E 84 m a.s.l.), 1♂, 20.ii.2020, S.S. & Party, leg. (No. 15713); Chennai district, Velachery (12°58'41"N, 80°12'57"E 7 m a.s.l.), 1♂, 29.iv.2019, S.A., leg. (No. 15714).

**Diagnosis:** Dutt (*in* Turner, 1917) described *Solierella turneri* from India based on a single male specimen. Based on the key of Schmid-Egger et al (2021), it is found that this species shows similarity with some Palearctic species such as *S. compedita* Costa 1867, *S. insidiosa* de Beaumont 1964 and *S. syriaca* de Beaumont 1964. Female of *S. turneri* is very close to *S. compedita* in its coarse comb-like propodeal sculpture (See figure 1 of Schmid-Egger et al., 2021), maculation on the fore femur, impunctate and shiny episcrobal area and shape of clypeus, but differs by the maculation of fore and mid-tibiae. Male of *S. turneri* is characterized by the last antennal segment longer than previous one, where in *S. compedita* Costa it is shorter, or as long as to previous one (in *S. compedita cretica* ssp. last antennal segment is longer than previous one). Female of *S. turneri* is similar to *S. insidiosa* in maculations of fore femur and tibiae, but differ in propodeal sculpture (See figure 5 of Schmid-Egger et al., 2021). Male differ by the length of last antennal segment which is longer than previous one compared to, shorter or at most equal to previous one of *S. insidiosa*. Females of *S. turneri* differ mainly by the maculation of fore femur which is small or at most twice as large as midocellus compared to *S. syriaca* having maculation at least half as long as fore femur. *S. turneri* also differ by mid femur which is black without maculae compared to *S. syriaca* mostly with large maculae, and by maculae of hind tibia which is shorter and does not reaches to the apex compared to *S. syriaca* having maculae as long as hind tibia. Punctations of episcrobal area of mesopleuron is varying even in the specimens collected from the same locality at same time, most of the specimens are provided with shiny and impunctate episcrobal area in varying extent, compared to completely punctated episcrobal area of *S. syriaca*. Male differ by the length of last antennal segment which is longer than previous one compared to *S. syriaca* having last antennal segment, as long as or shorter than previous one.

**Description:** Female (hitherto unknown).

**Head.** Head broader than long; HW1.25–1.30 × HL; IODc 1.20–1.25 × IODv; POD 1.30–1.33 × OOD. Inner eye orbits slightly diverging below; vertex and frons densely punctate, frons with 'V' shaped swelling above antennae, bearing a carinae up to basal half of clypeus (Fig. 3). Clypeus punctate, medioapically sparse; anterior margin of clypeus with a medial rounded protuberance (Fig. 4). Antennae slender, scape slightly longer than F1, F1 2.30–2.35 × its apical width.



**Thorax.** Scutum and scutellum with fine dense punctures (Fig. 5); episcrobal area of mesopleuron more or less impunctate (Fig. 6). Propodeal dorsum coarse comb-like, propodeal enclosure distinct or inconspicuous, truncate posteriorly, with central fovea at the edge of truncation, posterior sides of propodeum transversely striated with medial longitudinal furrow, without lateral carinae (Figs 5–6 & 8–9). Forewing as in Fig. 7.

**Gaster.** Basal portion of G1 slightly concave; base of G2 and G3 slightly constricted; gaster finely punctate, slightly micro coriaceous.

**Vestiture.** Setae silvery; dense on lower frons and vertex behind eye, sparse on mesopleuron and sides of propodeum; microsetae on antennae, frons, legs, thorax and gaster.

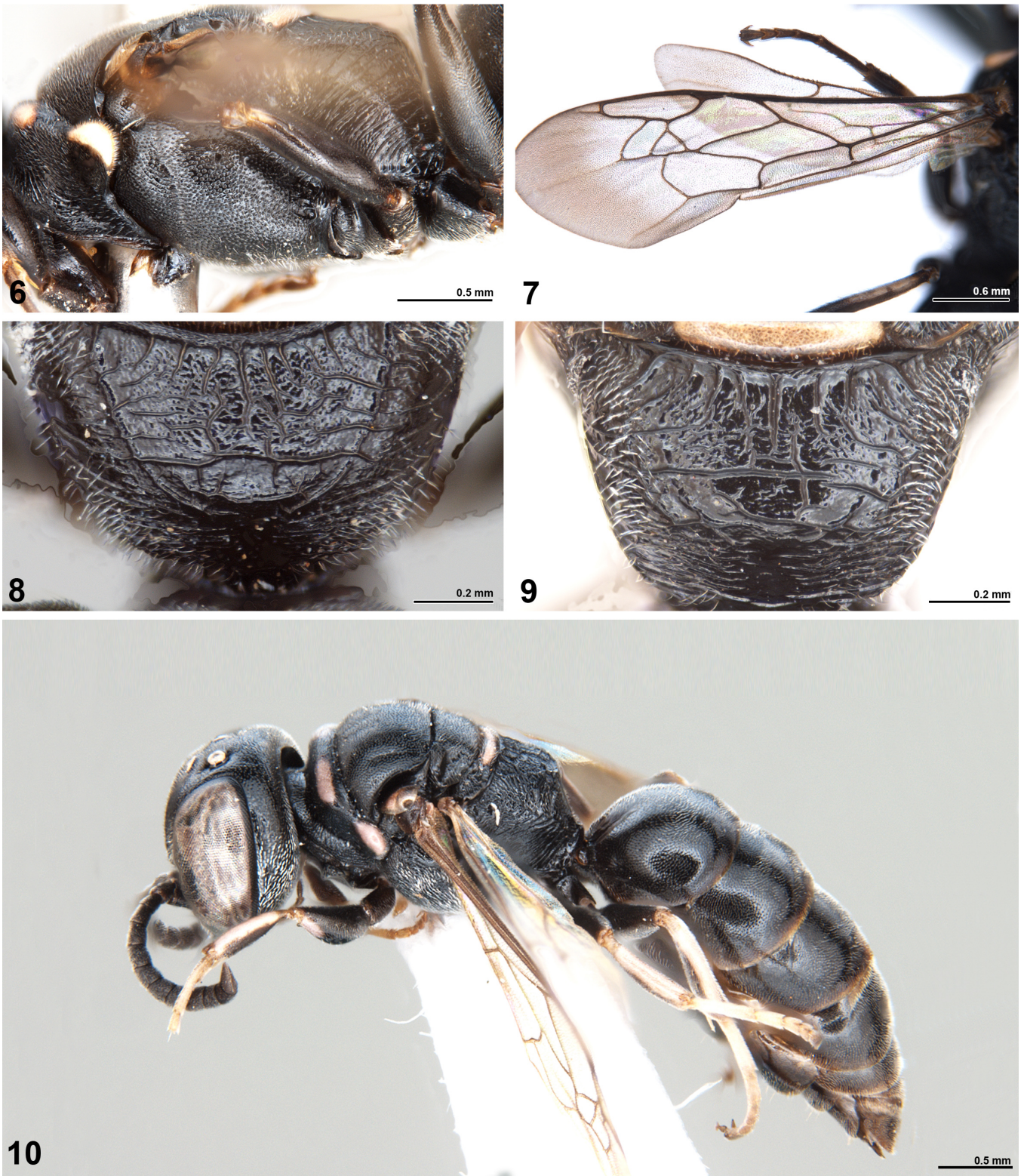
**Coloration.** Black, mandible ferruginous except basally black; whitish or creamy maculae as follows: transverse band on posterior margin of pronotum interrupted in middle, on pronotal lobe, transverse band on metanotum, mid and hind tibiae and tarsi (often with some black marks on them), few maculae on fore femur and tibia (Figs 1, 2 & 10).

Body length (up to the apex of G2). 4.50–4.66 mm.



**Figures 1–5.** *Solierella turneri* Dutt, female. **1.** Habitus, lateral view; **2.** Habitus, dorsal view; **3.** Head, frontal view; **4.** Clypeus; **5.** Thorax, dorsal view.





**Figures 6–10.** *Solierella turneri* Dutt, female (6–9) and male (10), **6.** Thorax, lateral view; **7.** Forewing; **8.** Propodeum, dorsal view; **9.** Propodeum, dorsal view, variation; **10.** Habitus, lateral view.

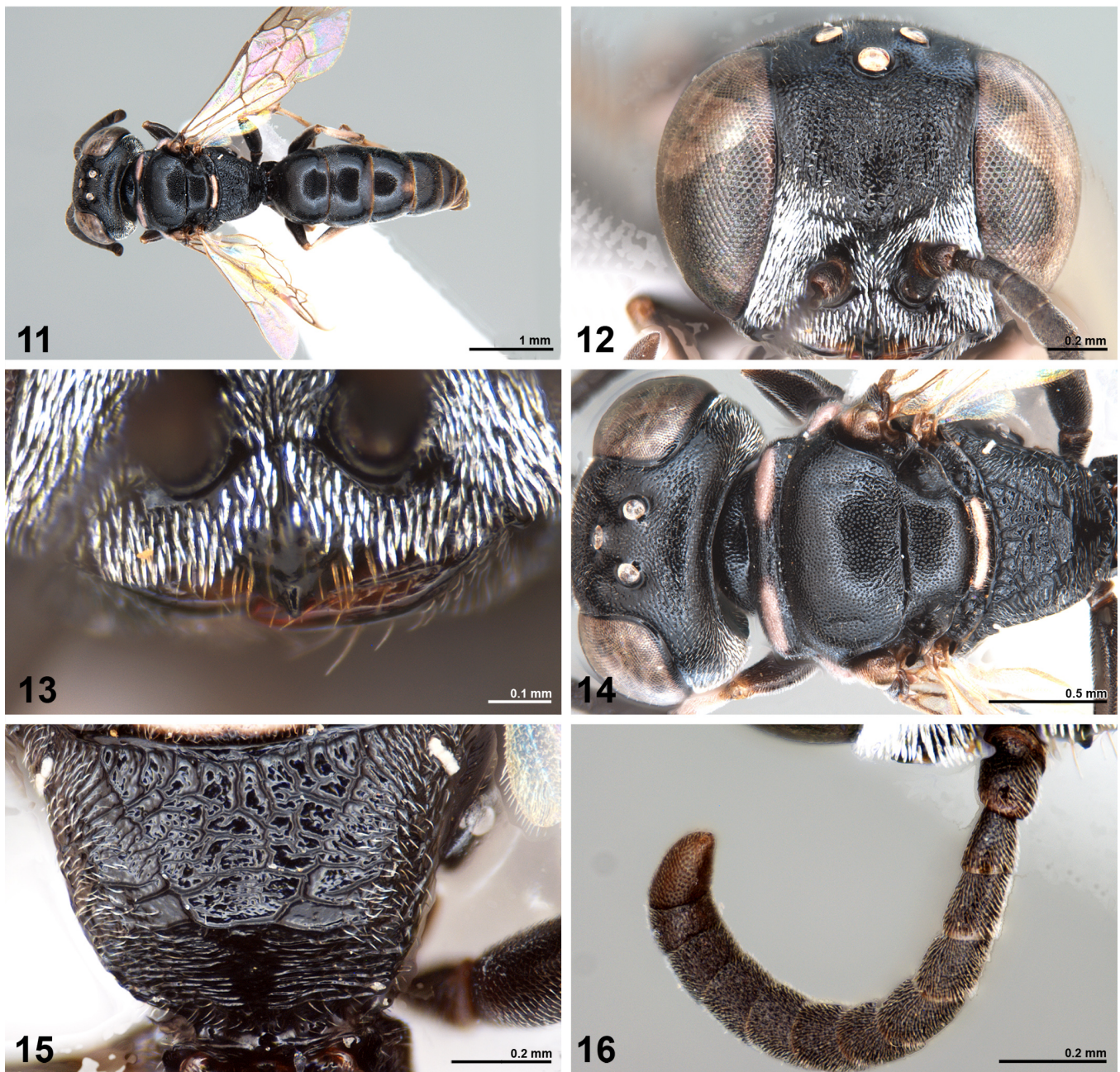
**Male.** Same as female except clypeus with conspicuous medial carina and medio apically pointed tooth like prominence; propodeal enclosure somewhat ‘V’ shaped (Fig. 15).



Body length (up to the apex of G2). 3.05–3.08 mm.

**Variation.** In some specimens, there is a distinct propodeal enclosure present. But in some others, it is inconspicuously present, or with traces of it. Extend of whitish or creamy white maculae on tibiae and tarsi is also vary among specimens, where in some specimens maculae are present on entire tarsi, where in others, it is absent or inconspicuous. Extends of impunctate episcrobal area of mesopleuron vary among specimens.

**Distribution.** India: Bihar, Karnataka (new record), Kerala (new record), Tamil Nadu (new record).



**Figures 11-16.** *Solierella turneri* Dutt, male. **11.** Habitus, dorsal view; **12.** Head, frontal view; **13.** Clypeus; **14.** Head & thorax, dorsal view; **15.**; Propodeum, dorsal view; **16.** Antenna.





**Figures 17–19.** *Solierella turneri* Dutt, male, holotype. **17.** Habitus, lateral view; **18.** Head, frontal view; **19.** Head & thorax, dorsal view. © The Trustees of the Natural History Museum, London.

## DISCUSSION

*Solierella* consist of 118 species distributed worldwide, among them *Solierella turneri* Dutt is the only species which have been reported from India. Hitherto, it is endemic to India, no other studies of *Solierella* genus have been reported yet from Indian subcontinent. According to Dutt in R. Turner (1917), this species is very close to the Palearctic species *S. compedita* Costa, but is different in propodeal sculpture. By comparing the propodeal sculpture of the holotype with studied specimens, we have noticed some changes in the intensity of the sculpture. We assume that this may be among variation as seen in *S. compedita* Costa as mentioned by de Beaumont (1964). From our study, we found that *S. turneri* Dutt is close to Palearctic species such as *S. compedita* Costa, *S. insidiosa* de Beaumont and *S. syriaca* de Beaumont in some of the characters as explained in Diagnosis part of paper. Comparing the known fauna of adjacent Palearctic countries, more species can be expected form extensive surveys throughout India.

## AUTHOR'S CONTRIBUTION

The authors confirm contribution in the paper as follows: N.V.A.M. and P.G.K. designed methodology. Both the authors involved in the collections of some specimens and both are involved in the identification also. N.V.A.M. wrote the manuscript with support of P.G.K. Both the authors discussed the results and contributed to the final manuscript.

## FUNDING

University Grant Commission, Govt. of India by means of UGC-SRF.

## AVAILABILITY OF DATA AND MATERIAL

Not applicable.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

## CONSENT FOR PUBLICATION

Not applicable.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

## ACKNOWLEDGMENTS

The authors are grateful to Dr. Dhriti Banerjee, Director, Zoological Survey of India, Kolkata, and Dr. P.M. Sureshan, Officer-in-Charge, Western Ghat Regional Centre, Zoological Survey of India, Kozhikode, and authorities at University of Calicut for providing facilities and encouragements. The authors also acknowledge the valuable help rendered by Dr. Joseph Monks (Curator, Natural History Museum, London) and 'The Trustee of the Natural History Museum, London' for digital loan of type specimen of *Solierella turneri* Dutt (male) made available under [Creative Commons License 4.0](#). NVAM thankfully acknowledge UGC for financial support by means of UGC-SRF.

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## گونه *Solierella turneri* Dutt, 1917 (Hymenoptera: Crabronidae: Crabroninae) از هند: توصیف ماده و گزارش‌های جدید پراکنش

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تاریخ دریافت: ۲۶ خرداد ۱۴۰۰ | تاریخ پذیرش: ۱۹ آذر ۱۴۰۰ | تاریخ انتشار: ۱۵ دی ۱۴۰۰

**چکیده:** زنبور (*Solierella turneri* Dutt, 1917) (Hymenoptera: Crabronidae)

به تازگی از مناطق مختلف هند گزارش و جنس ماده آن توصیف شده است. پیش از این، تنها از شمال هند (پوسا بیهار) گزارش شده بود. مطالعه جدید نشان‌دهنده پراکنش این گونه تا جنوب (کرالا، تامیل نادو و کارناتاکا) است.

**واژگان کلیدی:** زنبورهای حفار، Apoidea، Miscophini، گزارش جدید، جنوب هند