Devagiri Journal of Science 3(1), 110-120

www.devagirijournals.com
ISSN 2454-2091

A Taxonomic Review of the genus *Trirogma* Westwood (Hymenoptera: Ampulicidae) from the Indian subcontinent with the description of a New Species

[1]Girish Kumar P.* and [2]Sheela S.

[1]Western Ghats Regional Centre, Zoological Survey of India, Eranhipalam, Kozhikode, Kerala- 673006, India.
[2]Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal-700053, India.

Received: 04.09.2017

Revised and Accepted: 29.09.2017

Key Words: *Trirogma,* Indian subcontinent, taxonomy, new species, new record, checklist

Abstract

The genus *Trirogma* Westwood, 1841, is reviewed from the Indian subcontinent with the description of a new species, namely, *Trirogma kohima* **sp. nov.** from north eastern India. Key to species of the Indian subcontinent and a worldwide checklist of species are provided. The species *T. caerulea* Westwood, 1841 is reported here for the first time from Chhattisgarh, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, and Sikkim.

1. Introduction

The wasps of the genus *Trirogma* Westwood, 1841, are commonly called as cockroach wasps. These wasps prey on cockroaches and are generally found on dead woods, leaf litter, or on tree trunks. They are moderately large and metallic in colour with elongate body and slender appendages. Legs are modified for running with the femora distinctly drumstick-like, their distal third usually fusiform. The genus *Trirogma* is considered to be one of the most primitive groups among sphecoid wasps. Sexual dimorphism is rather strong in this genus. Mandibles of female specialized for gripping but that of male simple. While females have 6 visible metasomal segments, males have only three visible segments. In female metasomal punctures are usually fine but that of male usually coarser.

Westwood (1841) erected the genus *Trirogma* (Hymenoptera: Ampulicidae) based on the type species *Trirogma caerulea*. This is not a widely distributed genus, restricted to Oriental and Palaearctic Regions. Seven species are recorded under this genus worldwide (Bohart & Menke, 1976; Pulawski, 2009) of which three species namely *Trirogma caerulea* Westwood, 1841, *T. narendrani* Madhavikutty, 2004 and *T. regalis* Krombein, 1979 are recorded from the Indian subcontinent. In this paper, the genus *Trirogma* is reviewed from the Indian subcontinent with the description of a new species, namely, *Trirogma kohima* sp. nov. from north eastern India (Nagaland). A key to species of the Indian subcontinent and a worldwide checklist of species are also provided. The species *T. caerulea* Westwood, 1841 is reported here for the first time from Chhattisgarh, Himachal Pradesh, Jharkhand,

*Corresponding author
E-mail:kpgiris@gmail.com

Karnataka, Madhya Pradesh, and Sikkim.

2. Materials and Methods

This study is based on the unidentified specimens present in the Hymenoptera Section of the Zoological Survey of India, Kolkata, collected from various localities of the Indian subcontinent. The specimens were studied and photographed by using a Leica Stereo microscope with LAS software version 3.6.0. All the specimens were properly preserved and added to the 'National Zoological Collections' of the Hymenoptera Section of the Zoological Survey of India, Kolkata (NZC).

Abbreviations used for the Museums: NZC — Zoological Survey of India, Kolkata, India; USNM — National Museum of Natural History, Washington, D.C., U.S.A.; ZSIC — Western Ghat Regional Centre, Zoological Survey of India, Kozhikode (= Calicut), India.

Abbreviations used for the terms: F = Flagellar segment; OOL = Ocellocular length; POL = Posterior ocellar length; S = Metasomal sterna; T = Metasomal terga.

3. Results

Genus *Trirogma* Westwood, 1841

1841. *Trirogma* Westwood, 152. Type species: *Trirogma caerulea* Westwood, 1841, by monotypy.

Diagnosis: Forewing media diverging at or before cu-a; hind wing media diverging after cu-a; metasoma distinctly petiolate; antennal bases covered by a median frontal platform; metasternum somewhat emarginate posteriorly but not Y-shaped; petiole inserted above and somewhat after hind coxae.

Distribution: Oriental and Palearctic Regions.

Key to *Trirogma* Westwood of Indian subcontinent

(Modified from Krombein, 1979)

1. Female. ….. 2

– Male. …… 3

2. Upper mesopleural groove not crenulate; metasoma purplish; S2 with semicircular groove on anterior half extending beyond tubercle; frons with confluent larger punctures, thickened side of frontal platform with several fine, shallow grooves; median lobe of clypeus broader. …… ***regalis*** Krombein, 1979

– Upper mesopleural groove crenulate (Fig. 3); metasoma usually bluish, rarely with greenish or purplish reflections; S2 with bisinuate groove on anterior third, terminating at tubercle; frons with separated larger punctures and interspersed scattered smaller ones, thickened side of frontal platform with a single, deep, broad groove; median lobe of clypeus narrower. …… ***caerulea*** Westwood, 1841

3. Upper mesopleural groove crenulate; notauli strongly crenulate; sternaulus present, crenulate; S2 with a bisinuate groove interrupted only on median tubercle. ……. 4

– Upper mesopleural groove not crenulate; notauli weakly or not crenulate; sternaulus absent; S2

with only a very short, curved lateral groove. …… 5

4. Frons immediately above platform without a deep, transverse bisinuate groove; posterolateral tubercle of pronotum sharply angled. …….. ***caerulea*** Westwood, 1841

– Frons immediately above platform with a deep, transverse bisinuate groove; posterolateral tubercle of pronotum not sharply angled, rounded. …….. ***kohima*** sp. nov.

5. Mandible yellowish white on basal half, black at apex; integument metallic purplish; body length 14 mm. …….***regalis*** Krombein, 1979

– Mandible entirely black; integument bluish green; body length 10 mm. …….. ***narendrani*** Madhavikutty, 2004

1. *Trirogma caerulea* Westwood, 1841

(Figs. 1-6)

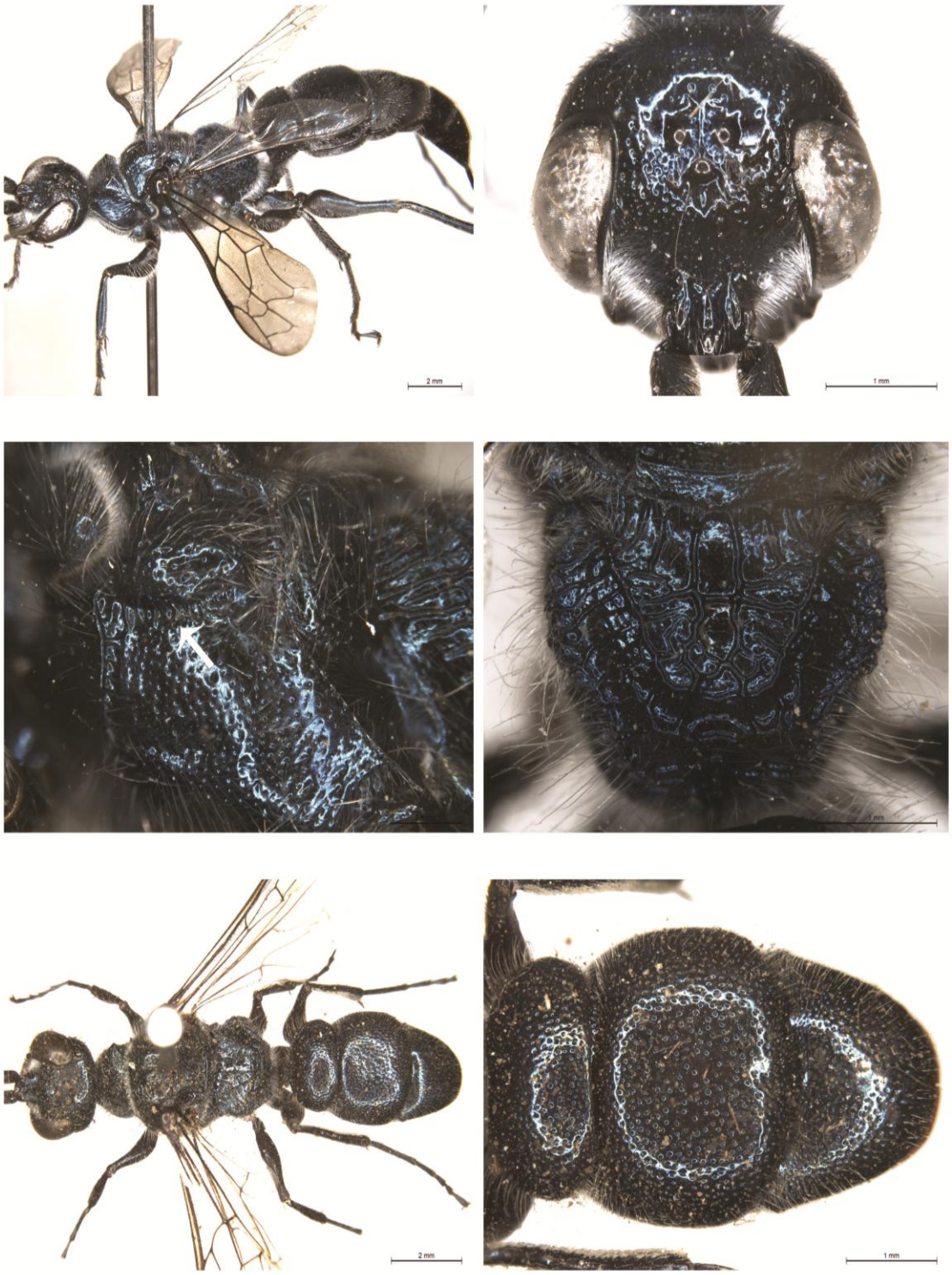
1841. *Trirogma caerulea* Westwood, 152, ♂. Holotype or Syntypes: ♂, northern India: no specific locality (depository ?).

Diagnosis: *Female* (Fig. 1): Length 16.5-18.5 mm. Integument usually shining metallic blue, rarely metasoma greenish or purplish; antenna and mandible black; wings hyaline; vestiture white. Head (Fig. 2) arched above eyes; eyes converging above, minimum interocular distance 1.1x as long as F1; clypeal lobe narrower; frontal platform deeply furrowed, thickened lateral edge with a broad, deep groove; frons with shallow, slightly separated punctures; posterior ocelli margined by a shallow posterior groove; F2 & F3 subequal in length, and combined 1.7x as long as F1; pronotal disc with scattered small punctures; posterolateral tubercle weakly acute; upper mesopleural groove crenulate; sternaulus absent; S2 with a bisinuate groove passing well behind basal tubercle.

Male (Fig. 5): Length: 8-13 mm. Colouration and vestiture as in female. Eyes not converging above, minimum interocular distance above and below subequal, and 1.2x as long as F1; clypeal lobe with rounded lateral angles; lateral edge of frontal platform with several fine, shallow grooves; frons immediately above platform without groove; ocellar triangle with a shallow posterior groove; F1-F3 subequal in length; pronotal disc coarsely punctate; posterolateral tubercle angular; notauli strongly crenulate; upper mesopleural groove and sternaulus crenulate; S2 with a bisinuate groove interrupted at median tubercle.

Material examined: INDIA: CHHATTISGARH: Koriya District, near Base Camp, 1♀, 28.ii.2012, Coll. A. Parida& Party, NZC Regd. No. 16783/H3. HIMACHAL PRADESH: Kangra Valley, 1♀, Sept. 1899, Coll. Dudgeon, NZC Regd. No. 16673/H3. JHARKHAND: Hazaribag, 1♀, 27.xi.1988, Coll. R. Tilak& Party, NZC Regd. No. 16674/H3. KARNATAKA: Bangalore, 1♀, date of collection unknown, Coll. J. Cameron, NZC Regd. No. 16675/H3. MADHYA PRADESH: Shivpuri District,

Plate I



Figs. 1-6. *T. caerulea* Westwood. Figs. 1-4 ♀. 1. Body profile; 2. Head dorsal view; 3. Mesopleura; 4. Propodeum. Figs. 5-6 ♂. 5. Body profile; 6. Metasoma.

Government Garden, 1♂, 13.v.1975, Coll. S.K. Gupta & Party, NZC Regd. No. 16676/H3. SIKKIM, exact locality unknown, 1♀, July 1897, Coll. Dudgeon, NZC Regd. No. 16677/H3. TELANGANA, Nalgonda District, Nandikonda, 6♀ & 2♂, 4-7.x.1963, Coll. B. Nath, NZC Regd. Nos. 16678/H3–16685/H3. WEST BENGAL, Darjeeling, 1♀, July 1912, Coll. Lord Carmichael, NZC Regd. No. 16686/H3.

Distribution: *Indian subcontinent*: India: Chhattisgarh (new record), Himachal Pradesh (new record), Jharkhand (new record), Karnataka (new record), Madhya Pradesh (new record), Maharashtra, Sikkim (new record), Uttarakhand, West Bengal; Sri Lanka; Myanmar. *Elsewhere*: China; Indonesia; Iran; Iraq; Singapore; Taiwan. (Smith, 1860; Cameron, 1889; Bingham, 1897; Rothney, 1903; Dover, 1926; de Beaumont, 1961; Tsuneki, 1967; Krombein, 1979; Gupta, 1995; Ebrahimi, 2008).

2. *Trirogma kohima* sp. nov.

(Figs. 7-12)

Description: *Holotype Male* (Fig. 7): Length 13 mm. Head and mesosoma shining metallic blue, metasoma shining violet; antenna black; mandible blackish brown; legs brown with bluish and purplish reflections; wings almost hyaline, slightly uniformly infumated; vestiture white.

Head (Fig. 8): Minimum interocular distance above and below of eye subequal, and 1.17x as long as F1; clypeus smooth without punctures; clypeal lobe with rounded lateral angles; lateral edge of frontal platform with several fine, shallow grooves; frons immediately above platform with a deep transverse bisinuate groove; frons with strong rugose punctures, interspaces carinate; ocellar triangle with a deep posterior groove; POL 0.5x OOL; vertex sparsely punctured; lower side of temple strongly punctured.

Mesosoma: Pronotal disc coarsely punctate; posterolateral tubercle of pronotum not sharply angular, rounded; notauli strongly crenulate; scutellum with a cone like projection at middle; upper mesopleural groove (Fig. 10) and sternaulus crenulate; forewing as in Fig. 9; propodeum as in Fig. 11.

Metasoma (Fig. 12): T1 1.78x wider than its median length in dorsal view; T2 1.27x wider than its median length, 1.33x wider than T1; metasoma distinctly punctate, diameter of punctures less than interspaces on median area of T2; S2 with a bisinuate groove interrupted at median tubercle.

Female: Unknown.

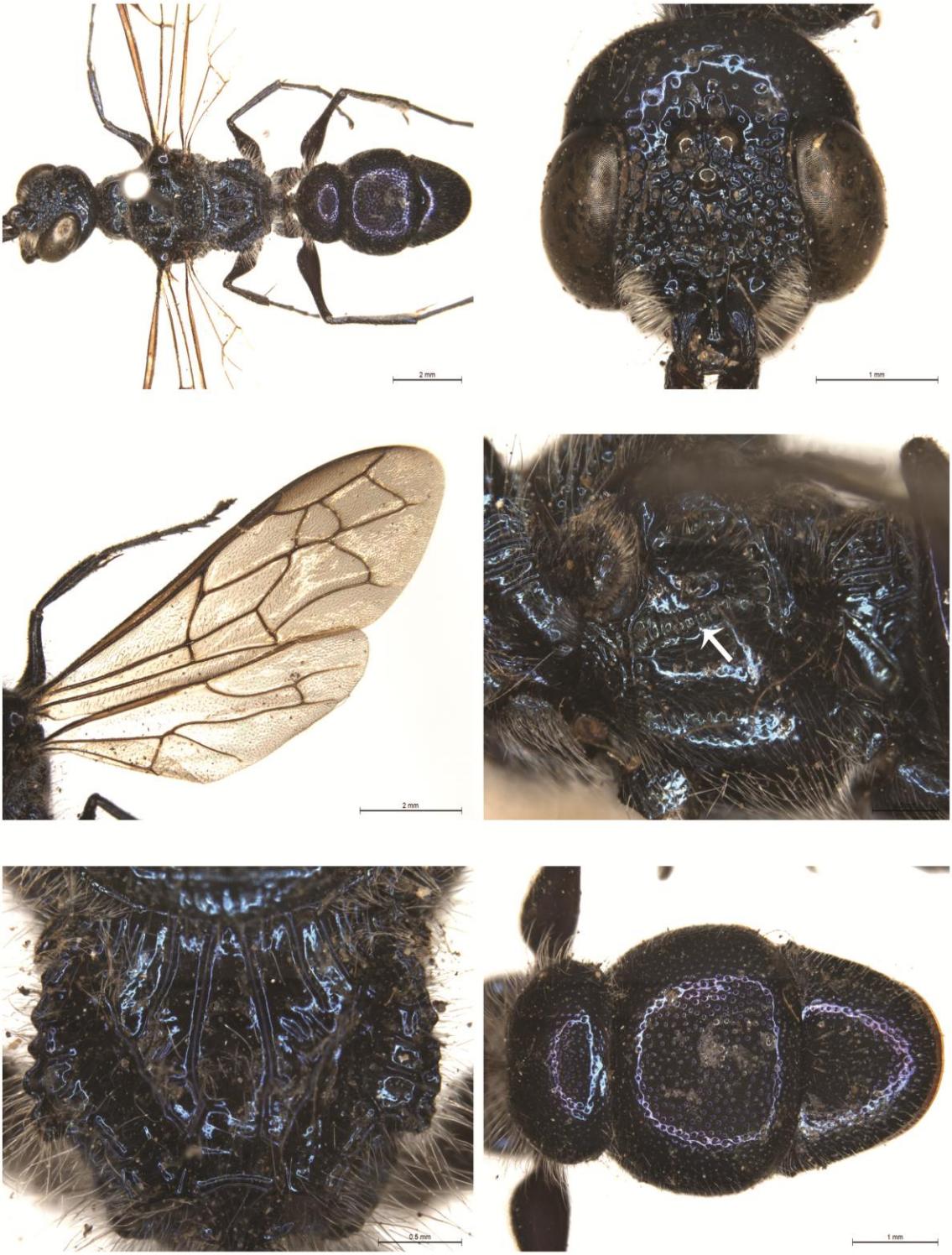
Material examined: Holotype male, INDIA: NAGALAND, Kohima, 15.ix.1975, Coll. M. S. Shishodia& Party, NZC Regd. No. 17559/H3.

Distribution: India: Nagaland.

Etymology: The species is named after the type locality.

Discussion: This new species comes close to the widely distributed species *T. caerulea* Westwood in having upper mesopleural groove crenulate and S2 with a bisinuate groove interrupted only on median tubercle. But this new

Plate II



Figs. 7-12. *T. kohima* sp. nov. holotype ♂. 7. Body profile; 8. Head dorsal view; 9. Forewing & Hindwing; 10. Mesopleura; 11. Propodeum; 12. Metasoma.

species strongly differs from *T. caerulea* in having: (1). Frons immediately above platform with a deep, transverse bisinuate groove (in *T. caerulea* frons immediately above platform without groove); (2). Posterolateral tubercle of pronotum rounded, not sharply angled (in *T. caerulea* posterolateral tubercle of pronotum sharply angled); and Ocellar triangle with a deep posterior groove (in *T. caerulea* ocellar triangle with a shallow posterior groove).

This new species comes close to other two species from Indian subcontinent such as *T. regalis* Krombein and *T. narendrani* Madhavikutty in having frons immediately above platform with a deep, transverse bisinuate groove and posterolateral tubercle of pronotum not sharply angled, rounded. But this new species strongly differs from *T. regalis* and *T. narendrani* in having: (1). Upper mesopleural groove crenulate (in *T. regalis* and *T. narendrani* upper mesopleural groove not crenulate); (2). S2 with a bisinuate groove interrupted only on median tubercle (in *T. regalis* and *T. narendrani* S2 with only a very short, curved lateral groove); (3). Notauli strongly crenulate (in *T. regalis* and *T. narendrani* notauli weakly or not crenulate); (4).Sternaulus present (in *T. regalis* and *T. narendrani* sternaulus absent); and (5). Head and mesosoma shining metallic blue, metasoma shining violet (in *T. regalis* integument metallic purplish; in *T. narendrani* integument bluish green).

This new species differs from the Bornean (Sarawak) species *T. nigra* Cameron in having: Head and mesosoma shining metallic blue, metasoma shining violet (in *T. nigra* integument shining black). This new species also differs from another Bornean (Sarawak) species *T. prismatica* Smith in having: Mandible blackish brown (in *T. prismatica* mandible white at base). This new species also differs from Chinese species *T. balaensis* Pu and Zhouin having the arrangement of carina on propodeum distinctly different (cf. Fig. 4 of Pu & Zhou, 1989).

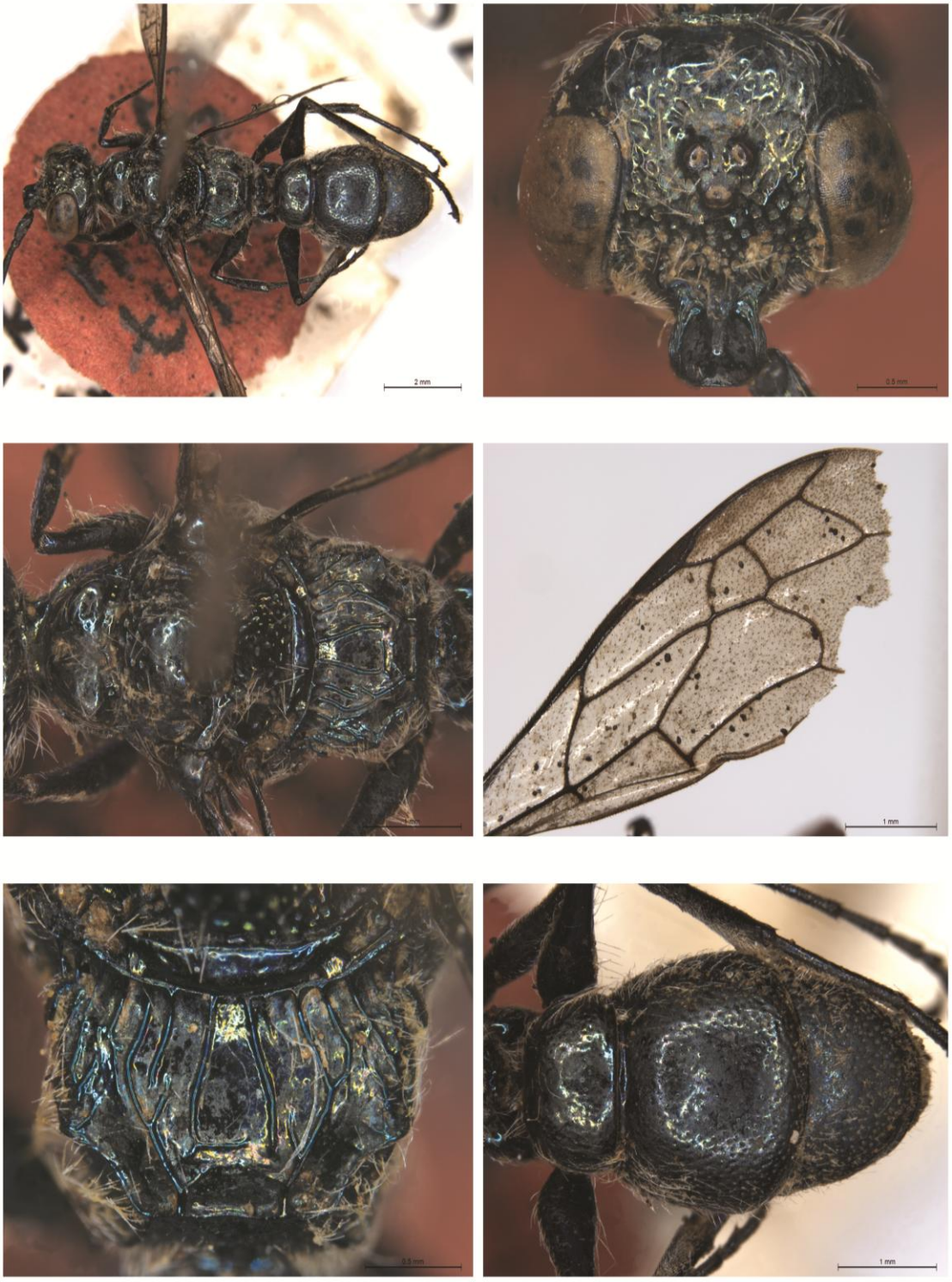
3. *Trirogma narendrani* Madhavikutty, 2004

(Figs. 13-18)

2004. *Trirogma narendrani* Madhavikutty, 594, ♂ [wrongly described as ♀]. Holotype: ♂ [♀], India: Kerala: Wayanad: Chembra Hills (ZSIC). Type examined.

Diagnosis: *Holotype Male* (Fig. 13). Length: 10 mm. Integument bluish green; flagellum and mandible black; wings hyaline; vestiture erect, silvery. Head (Fig. 14) with upper and lower minimum interocular distances about equal (45:44), and 1.20x as long as F1; clypeal lobe with rounded lateral angles; lateral edge of frontal platform with several fine, shallow grooves; frons immediately above platform with a deep, transverse bisinuate groove; ocellar triangle with a deep posterior groove; F2 & F3 equally long, and 1.09x as long as F1; pronotal disc delicately punctate; posterolateral tubercle rounded; notauli not crenulate; upper mesopleural groove simple, not crenulate; sternaulus absent; S2 with only a short, curved lateral groove.

Plate III



Figs. 13-18. *T. narendrani* Madhavikutty holotype ♂. 13. Body dorsal view; 14. Head dorsal view; 15. Mesosoma dorsal view; 16. Forewing; 17. Propodeum; 18. Metasoma.

Female: Unknown.

Material examined: Holotype ♂, INDIA: KERALA, Wayanad District, Chembra Hills, 10.iii.2001, Coll. T. Jobiraj, ZSIC 1.0105; INV. 1924.

Distribution: *Indian Subcontinent*: India (Kerala) (Madhavikutty, 2004).

Remarks: After examining the holotype, the following major errors found in the original description of Madhavikutty (2004): Type specimen is male but originally described as "female". Body size 10 mm (originally described as "15 mm"). Vertex glossy with few shallow punctures (originally described as "coarsely punctured"). In the type examined, only scape, pedicel and F1-F3 of one antenna are available. But antenna will be 13-segmented (originally described as "14 segmented"). F2 and F3 of equal length (originally described as "F2 = 15; F3 = 13"). Pronotal disc delicately punctate (originally described as "coarsely punctate").

4. *Trirogma regalis* Krombein, 1979

1979. *Trirogma regalis* Krombein, 12, ♂, ♀. Holotype: ♂, Sri Lanka: Kandy District: Kandy, Udawattakele Sanctuary (USNM).

Diagnosis: *Male* Length: 14 mm. Integument metallic purplish; flagellum black; mandible yellowish white at base, black on apical half; wings hyaline; vestiture erect, silvery. Head with upper and lower minimum interocular distances equal, and 1.30x as long as F1; clypeal lobe with rounded lateral angles; lateral edge of frontal platform with several fine, shallow grooves; frons immediately above platform with a deep, transverse bisinuate groove; ocellar triangle with a deep posterior groove; F2 & F3 equally long, and 1.1x as long as F1; pronotal disc delicately punctate; posterolateral tubercle rounded; notauli very weakly crenulate; upper mesopleural groove simple; sternaulus absent; S2 with only a short, curved lateral groove.

Female: Length 14 mm. Colouration and vestiture as in male except mandible black. Head less strongly arched above eyes; eyes converging above, minimum interocular distance 1.1x as long as F1; clypeal lobe broadly rounded; frontal platform shallowly depressed, thickened lateral edge with several fine, shallow grooves; frons closely pitted, immediately above platform with a pair of small, oblique pits; posterior ocelli margined by a deep posterior groove; F2 & F3 equally long, and combined 1.5x as long as F1; pronotal disc with scattered small punctures; posterolateral tubercle rounded; upper mesopleural groove simple; sternaulus absent; S2 with a semicircular groove passing well behind basal tubercle.

Distribution: *Indian Subcontinent*: India (Tamil Nadu: Anamalai Hills, Kadamparai); Sri Lanka (Krombein, 1979).

Remarks: No material is available for our studies; hence the description is taken from Krombein (1979).

Checklist of world species of the genus *Trirogma* Westwood

1. *T. balaensis* Pu and Zhou, 1989 – China.

2. *T. caerulea* Westwood, 1841 – India: Chhattisgarh (new record), Himachal Pradesh (new record), Jharkhand (new record), Karnataka (new record), Madhya Pradesh (new record), Maharashtra, Sikkim (new record), Uttarakhand, West Bengal; Sri Lanka; Myanmar; China; Indonesia; Iran; Iraq; Singapore; Taiwan.

3. *T. kohima* sp. nov. – India: Nagaland.

4. *T. narendrani* Madhavikutty, 2004 – India: Kerala.

5. *T. nigra* Cameron, 1903 – Malaysia.

6. *T. pingsheensis* Pu and Zhou, 1989 – China.

7. *T. prismatica* Smith, 1858 – Malaysia.

8. *T. regalis* Krombein, 1979– India: Tamil Nadu.

4. Acknowledgements

The authors are grateful to Dr. Kailash Chandra, Director, Zoological Survey of India, Kolkata for providing facilities and encouragements. We are also thankful to Dr. P. M. Sureshan, Officer-in-Charge, Western Ghat Regional Centre of Zoological Survey of India, Kozhikode for for providing facilities and encouragements. The first author is thankful to Dr. Ting-jing Li, Institute of Entomology & Molecular Biology, College of Life Sciences, Chongqing Normal University, China and Dr. Lien T. P. Nguyen, Insect Ecology Department, Institute of Ecology & Biological Resources, Vietnamese Academy of Science & Technology, Vietnam for providing us some important literatures for our studies.

5. References

Beaumont, de J. (1961). Sphecidae de l'Iraq (Hym.). *Opuscula Zoologica (München),* No. **56**: 1-5.

Bingham, C.T. (1897).*The Fauna of British India, including Ceylon and Burma, Hymenoptera, I. Wasps and Bees*: Taylor and Francis, London, 579+ i- xxix.

Bohart, R.M and Menke, A.S. (1976). Sphecid wasps of the world.A generic revision. University of California Press, Berkeley, Los Angeles, London. 1 colour plate, IX + 695 pp.

Cameron, P. (1889). Hymenoptera Orientalis [sic]; or contributions to a knowledge of the Hymenoptera of the Oriental Zoological Region. Memoirs and Proceedings of the Manchester Literary & Philosophical Society, (Series 4) 2: 91-152.

Dover, C. (1926).A contribution to a list of the aculeate Hymenoptera (excepting ants) of Hongkong, China. Journal of Science & Arts, **4**: 233-235.

Ebrahimi, E. (2008). A contribution to the sphecid wasps of Iran (Hymenoptera: Sphecidae), including first record of six species. Journal of Entomological Society of Iran, **28**: 93-97.

Gupta, S.K. (1995). Hymenoptera.*In*: *Zool. Surv. India*, *Himalaya Ecosystem Series*: *Fauna of Western Himalaya*, Part **1**, Uttar Pradesh: 81-89.

Krombein, K.V. (1979). Biosystematic studies of Ceyloneses wasps, V: a monograph of the Ampulicidae (Hymenoptera: Sphecoidea). Smithsonian Contributions to Zoology 298:1-29.

Madhavikutty, M. (2004). Description of a new species of the genus *Trirogma* Westwood (Hymenoptera: Spheciformes) from India, pp. 593-596. *In*: K. Rajmohana, K. Sudheer, P. Girish Kumar, S. Santhosh (editors). Perspectives on biosystematics and biodiversity.Prof. T.C. Narendran commemoration volume.University of Calicut, Kerala, India.666 pp.

Pu, T. and Zh. Zhou, (1989). Descriptions of two new species of the genus *Trirogma* from China (Hymenoptera, Sphiecidae: Amplicinae) [sic]. *Entomotaxonomia*, **11**: 303-305.

Pulawski, W.J. (2009). Catalog of Sphecidae. Available on: http://research.calacademy. org/ent/catalog_sphecidae.

Rothney, G.A.J. (1903). The aculeate Hymenoptera of Barrackpore, Bengal.*Trans. Royal Ent. Soc. London,* 93-116.

Smith, F. (1860).Descriptions of new species of hymenopterous insects collected by Mr. A. R.

Wallace at Celebes.*Journal of the Proceedings of the Linnean Society, Zoology*,**5**: 57-93 (published as supplement to vol. 4).

Tsuneki, K. (1967). On some Ampulicidae from Formosa (Hymenoptera).*Etizenia*, **21**: 1-13.

Westwood, J.O.(1841). Descriptions of exotic hymenopterous insects belonging to the family Sphegidae. The Annals and Magazine of Natural History **7**:151-152