



A taxonomic study of the genus *Tiphia* Fabricius (Hymenoptera: Tiphidae: Tiphinae) from Kashmir, India with the description of one new species

Raveendran K.P. Hanima¹, Puthuvayi Girish Kumar¹, Pavittu Meethal Sureshan¹ and Altaf Hussain Sheikh²

¹ Western Ghats Regional Centre, Zoological Survey of India, Eraniel, Kozhikode, Kerala - 673006, India.

² Government Degree College, Pulwama, Jammu & Kashmir- 192305, India.

ABSTRACT. A new species of tiphid wasp, namely, *Tiphia kashmirensis* Hanima & Girish Kumar **sp. nov.** is described from Kashmir, India. Male of *Tiphia khasiana* is described for the first time. Key to species of *Tiphia* from the Indian subcontinent of Allen (1975) is modified here to accommodate the new species and male of *T. khasiana*.

Key words: *Tiphia kashmirensis*, New species, *T. khasiana*, *T. exacta*, key

Received:
02 May, 2019

Accepted:
08 June, 2019

Published:
13 June, 2019

Subject Editor:
Ali Asghar Talebi

Citation: Hanima, R.K.P., Girish Kumar, P., Sureshan, P.M. & Sheikh, A.H. (2019) A taxonomic study of the genus *Tiphia* Fabricius (Hymenoptera: Tiphidae: Tiphinae) from Kashmir, India with the description of one new species. *Journal of Insect Biodiversity and Systematics*, 5 (2), 127–141.

Introduction

Tiphia Fabricius, 1775 is the largest genus among the subfamily Tiphinae of the family Tiphidae. Wasps of this genus are the predominant parasitic insects that attack white grubs in the soil (Rogers & Potter, 2002). This genus contains about 500 described species worldwide and about 100 from the Oriental Region (Kimsey, unpublished data). Sixty-nine species are reported from the Indian subcontinent of which 61 from India and only three from Kashmir (Allen, 1975; Krombein, 1982; Bartalucci, 2011). The Kashmir species are: *Tiphia pulchaurkiae* (Allen, 1975), *T. palmi* (Krombein, 1938), and *T. exacta* (Nurse, 1903). In this paper, we describe a new

species of *Tiphia* from Kashmir and discuss the affinities of the new species with its nearest relatives. Male of *Tiphia khasiana* is described for the first time. To accommodate the new species and male of *T. khasiana*, the Allen's (1975) key to the Indian subcontinent species of *Tiphia* is partly modified.

Material and methods

The specimens were collected from different localities of Kashmir using sweep net. The specimens were then pinned and photographed using a LEICA M 205A Stereo microscope equipped with a LEICA DFC 500 Camera. All studied specimens

Corresponding authors: Raveendran K.P. Hanima, E-mail: hanimaraveendrankp@gmail.com

Copyright © 2019, Hanima et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

including types of new species are deposited at ZSIK.

Abbreviations are used for the Museums: BMNH – The Natural History Museum, formerly British Museum (Natural History), London, England; HDOU – Hope Department of Entomology, Oxford University, England; ZSIK – Western Ghat Regional Centre, Zoological Survey of India, Kozhikode.

Abbreviations are used in the description: EL = Eye length; F = Flagellar segments; HL = Head length; HW = Head width; IOD = Interocular distance; LOL = Lateral ocellar length; OOL = Ocellular length; POL = Posterior ocellar length; TL = Total body length.

The terminology used in the description follows Allen (1975).

Results

Tiphia kashmirensis Hanima & Girish Kumar, sp. nov. (Figs 1–16)

<http://zoobank.org/NomenclaturalActs/723C-C269-777C-4A29-8447-DE3F522B3A91>

Material examined: Holotype ♂, India: Kashmir, Srinagar district, Shalimar garden (34°08'56.40" N, 74°52'22.80" E), 02.VIII.2018, Coll. Altaf Hussain Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12268. Paratypes: 1♀, same collection data as that of holotype, ZSIK Regd. No. ZSI/WGRC/IR/INV.12269; 3♀♀, Pulwama (33°52'18.62" N, 74°53'57.75" E), 06.VII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. Nos. ZSI/WGRC/IR/INV.12270–12272.

Diagnosis: Male of this species is characterised by having upper half of frons with inter spaces between punctures not narrower than ocellus (Fig. 2), metanotum with less concentration of punctures in middle (Fig. 3), and POL 0.80–0.84x OOL. Male is also characterised by having antennal flagellum black, lateral pronotum

with transverse groove intersected with ridges (Fig. 4), apical part of median lobe of clypeus smooth and not punctured, legs black (except on the sides of spur of fore tibia orange coloured), sixth sternum with elongated vitta, POL 1.9x LOL. Female is also characterised by having antennal flagellum (except F1) dull reddish in ventral side, lateral pronotum with a short groove in middle of disk, middle and hind trochanters, femur and tibia entirely bright red; apical margin of clypeal lobe rounded or plane and not smooth, POL 2.08x LOL.

Description: Holotype ♂ (Figs 1–7).

Head: Shining, punctate with setigerous punctures; frons with punctures irregularly spaced and with interspaces not narrower than ocellus (Fig. 2); HW 1.74x least distance between eyes; eye without setae; ocelli forming acute triangle; POL 1.9x LOL and 0.8x OOL; longitudinal carina in lower front above antennal toruli small and punctures adjacently placed at sides of this carina; temple with scattered white setae, wider than antennal fossa; median lobe of clypeus emarginate, apical part of median lobe smooth, without punctures; mandible stout, slightly curved, with a small inward depression at apex and without preapical denticle; antennae 13-segmented, masked with small setae (setae large and sparsely concentrated in scape), scape with setigerous punctured region mixed with smooth regions and coarsely punctured in ventral side, small constriction in between scape and pedicel; length of scape: pedicel: F1: F2: F3: F4: F5: F6: F7: F8: F9: F10: F11 = 0.304: 0.109: 0.128: 0.142: 0.160: 0.160: 0.158: 0.173: 0.165: 0.163: 0.160: 0.172: 0.257.

Mesosoma: Uneven and with scattered punctures in dorsal part except propodeum (Fig. 3); dorsal side of pronotum with low and weak anterior transverse carina, posterior part without punctures except laterally;



Figures 1-7. *Tiphia kashmirensis* Hanima & Girish Kumar **sp. nov.**, Holotype, male. **1.** Body profile; **2.** Head, frontal view; **3.** Mesosoma, dorsal view; **4.** Mesosoma, lateral view; **5.** Wings; **6.** Metasoma, dorsal view; **7.** Genitalia.

lateral side of pronotum (Fig. 4) with a broad, short transverse groove, crossed with 1-4 ridges, a smooth surface above the groove (side toward tegula with strong setigerous punctures and side toward head with ridges) and adjacently placed transverse striations below the groove; mesoscutum coarsely punctured; mesopleuron entirely punctured and covered with setae; metanotum in middle part smooth without punctures, laterally with large strong punctures; tegula punctured in the inner part (concentration high on lower corner), 1.35x as long as its median width; dorsal side of propodeum (Fig. 3) entirely sculptured, areola tricarinate, basal part of lateral two carina curved outward and apically straight, middle one reaching to apex, many bridging ridges between middle and each lateral carina (present on almost three-fourth of areola), longitudinally arranged small grooves and ridges arise from the posterior margin of dorsal side of propodeum, submarginal carina present and from it small, transversely oriented elevated ridges arise, strong aciculate striations in the lateral part of areola, adjacent to lateral carina, with irregularly shaped ridges; median length of areola 2.1x its apical width and 1.47x its basal width, lateral side of propodeum on upper part with moderately well spaced rugae and lower part with longitudinal ridges, posterior side of propodeum largely reticulate, covered with setae in basal three half but apex bare and slightly rough; fore wing (Fig. 5) with stigma large, lateral extension of radial cell distinctly less than that of the second cubital cell; sectors of second cubital cell in terms of inner sector are 10: 23: 21: 24; hind tibia carinate on inner face; tibial spur formula 1:1:2, spur on fore leg bifurcate, one spur of hind leg long and other small; hind basitarsus without groove on inner surface.

Metasoma: Smooth with many punctures and hairs (Fig. 6); metasoma 1.5x as long as mesosoma; first tergum without anterior transverse carina; second tergum with linearly arranged longitudinal small ridges and grooves; all terga with a mixture of small and large setigerous punctures; fifth sternum with lateral denticle and sixth sternum with elongated vitta bordered by setae and punctures; last visible metasomal sternum forming medial up curved hook; genitalia as in figure 7.

Colour: Body black except on sides of fore tibial spur and middle margin of most apical part of pronotum with orange shade. Wings hyaline, fore wing with a brown tinge with stigma and veins black. Body setae silvery white.

Measurements (mm): HL - 1.611; HW - 1.213; EL - 0.903; the least distance between eyes - 0.696; IOD - 1.206; POL - 0.203; LOL - 0.106; OOL - 0.252; length of scape - 0.304; length pedicel - 0.109; F1 - 0.128; F2 - 0.142; F3 - 0.160; F4 - 0.160; F5 - 0.158; F6 - 0.173; F7 - 0.165; F8 - 0.163; F9 - 0.160; F10 - 0.172; F11 - 0.257; length of areola - 0.414; apical width of areola - 0.195; basal width of areola - 0.281; length of sectors of second cubital cell inner - 0.184, top - 0.436, outer - 0.396, bottom - 0.443; length of mesosoma - 3.5; length of metasoma - 5.26; TL - 10.37.

Paratype: ♀ (Figs 8-16) (description based on specimen from Shalimar garden). **Head:** Shining, with scattered setigerous punctures; head 1.5x as wide as IOD at anterior ocellus; temple masked with white setae; upper frons with punctures irregularly spaced and with interspaces not narrower than ocellus (Fig. 11); ocellus crescent shaped in frontal view; eye without setae; ocelli forming acute triangle; POL 2.08x LOL and 0.84x OOL; longitudinal carina in lower frons above antennal toruli small and punctures adjacently placed at sides of this carina;

clypeus almost rounded, median lobe without punctures; median lobe of clypeus 1.7x as wide as antennal fossa; mandible long, and broad without preapical denticle; antennae (Fig. 10) 12-segmented, apex of ventral side of scape with long, stiff transparent light yellowish setae; length of scape: pedicel: F1: F2: F3: F4: F5: F6: F7: F8: F9: F10 = 0.447: 0.151: 0.162: 0.211: 0.192: 0.180: 0.185: 0.188: 0.180: 0.189: 0.19: 0.349.

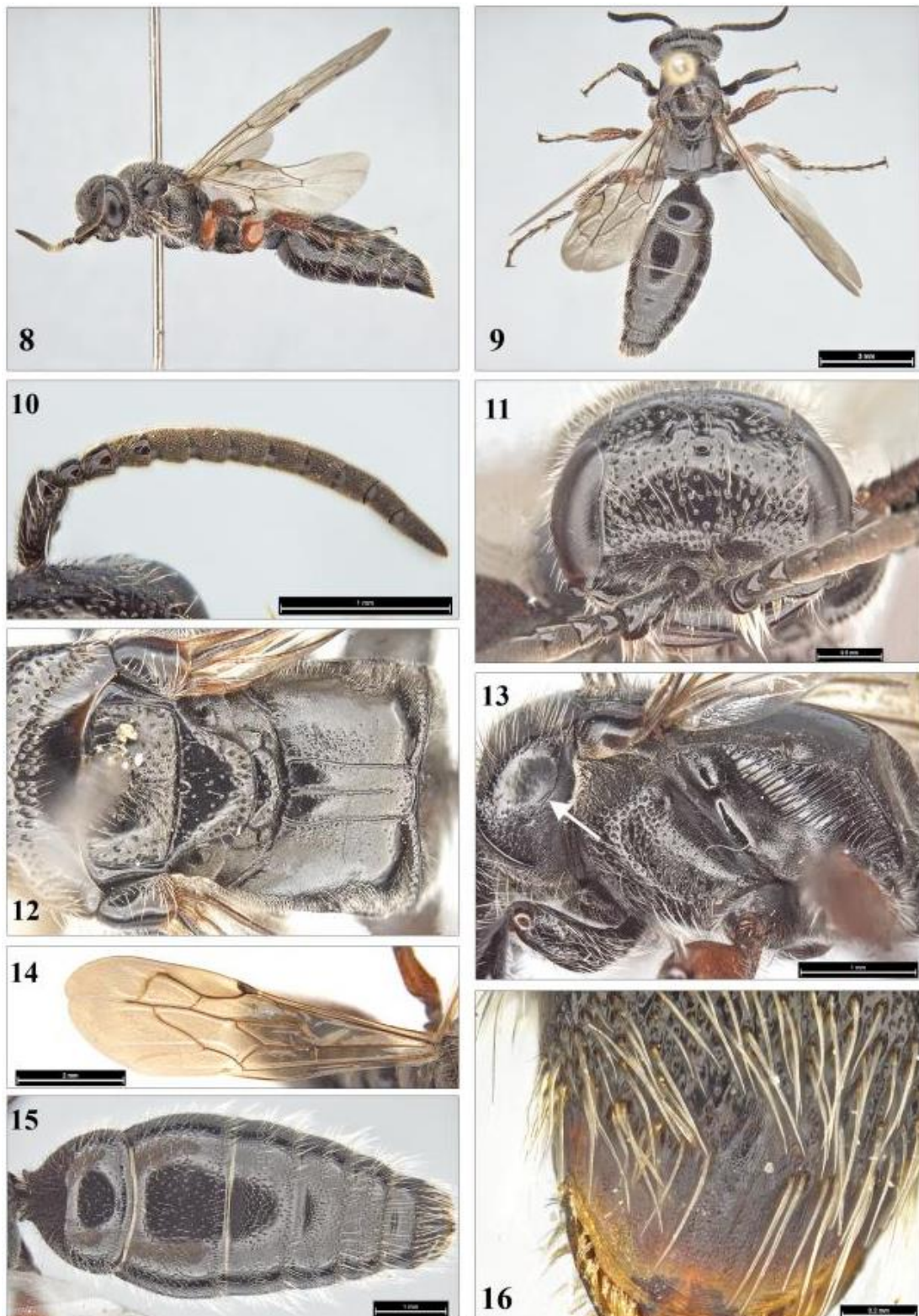
Mesosoma: Uneven and with scattered punctures (Fig. 12); dorsal side of pronotum without anterior transverse carina, posterior part impunctate except laterally; lateral side of pronotum (Fig. 13) with a short transverse groove across its disk, aciculate above the groove and striated below; mesoscutum with anteromedian escarpment and notaulices not connected; mesopleuron entirely punctured with large and small punctures; mesoscutum, scutellum and metanotum with less punctures; inner margin of tegula with setae and lower corner with punctures and 1.27x as long as its median width; propodeum with areola almost rectangular, tricarinate, basal part of lateral two carina slightly curved, middle one not reaching to apex, below the median carina a small groove, 6-8 punctures in the apex of areola lateral to median carina, median length of areola 2.8x apical width and 2.3x basal width, inside areola with some scattered punctures and lineolate sculpture, outer side of two lateral carinae with scattered punctures, other part of dorsal side of propodeum with lineolate and reticulate sculpture, submarginal carina absent, lateral apex of dorsal side of propodeum with longitudinal streak of white setae, the most apical part of dorsal side of propodeum with transversely oriented crenulations besides areola, lateral side of propodeum on upper part with many widely spaced rugae and lower part with minute setigerous punctures and reticulate sculpture, posterior side of propodeum

with distinct median carina on lower three-fourths and adjacently placed small and large punctures and many setae; fore wing (Fig. 14) with stigma elongated; inner surface of hind tibia with a median carina; hind basitarsus with groove on inner surface; tibial spur formula 1:1:2; spur on fore leg bifurcate, inner side of basitarsus with comb like seta.

Metasoma: Smooth with many setigerous punctures (Fig. 15); metasoma 1.83x as long as mesosoma; first tergum without anterior transverse carina; apex of all terga with transversely arranged one to five rows of setigerous punctures; pygidium coarsely punctate on basal half, punctures apically elongated and with broad median emargination and some punctures with long setae, apical half of pygidium coriaceous and the most apical part shrinkled, not polished (Fig. 16); apex of second to fifth sterna with long setae; apex of last sternum bordered with a tuft of roundly arranged long setae.

Colour: Body black and shining except following parts bright red: trochanter ventrally, mid femur and mid tibia and hind legs; dull red: ventral side of F2-F10; orange: middle of apical part of dorsal side of pronotum, lower and outer margin of tegula; yellowish brown: apical part of pygidium. Fore wing transparent and lightly infumated with yellow colour, stigma dark brown and veins honey coloured; hind wings transparent. Body setae silvery white except apex of last sternum with golden white.

Measurements (mm): HL - 1.387; HW - 1.727; EL - 0.843; IOD at anterior ocellus - 1.126; IOD - 1.193; POL - 0.311; LOL - 0.149; OOL - 0.368; length of scape - 0.447; length pedicel - 0.151; F1 - 0.162; F2 - 0.211; F3 - 0.192; F4 - 0.180; F5 - 0.185; F6 - 0.188; F7 - 0.180; F8 - 0.189; F9 - 0.2; F10 - 0.349; length of mesosoma - 3.563; length of metasoma - 6.548; TL - 12.



Figures 8-16. *Tiphia kashmirensis* Hanima & Girish Kumar **sp. nov.**, Paratype, female. **8.** Body profile; **9.** Body dorsal view; **10.** Antenna; **11.** Head, frontal view; **12.** Mesosoma, dorsal view; **13.** Mesosoma, lateral view (Arrow mark indicates groove on lateral pronotum); **14.** Fore wing; **15.** Metasoma, dorsal view; **16.** Pygidium.

Etymology: The species name is derived from 'Kashmir' where the types are collected.

Distribution: India: Kashmir.

Remarks: The female of this new species comes to *Tiphia khasiana* (Cameron) in the Allen (1975)'s key but distinctly differs by the following characters in combination: (1) lateral pronotum with a short groove (lateral pronotum with long, narrow groove in *T. khasiana*); (2) metanotum with less concentration of punctures (metanotum with numerous punctures on its disk in *T. khasiana*); (3) tegula 1.27x as long as its median width (tegula 1.1x as long as its median width in *T. khasiana*); (4) antennal flagellum (except F1) dull reddish in ventral side (antennal flagellum entirely black in *T. khasiana*); and (5) middle and hind trochanter (ventrally), femur and tibia entirely bright red (middle and hind femur bright red, other leg areas entirely black in *T. khasiana*).

The male of this new species comes to *Tiphia fuscineris* Cameron, 1897, in the Allen (1975)'s key but distinctly differs by the following characters in combination: (1) frons on upper half with inter spaces between punctures as wide as and also wider than ocellus (frons with interspaces between punctures narrower than ocellus in *T. fuscineris*); (2) metanotum with less concentration of punctures (metanotum entirely coarsely punctate in *T. fuscineris*); (3) sixth sternum with elongated vitta (sixth sternum with rounded vitta in *T. fuscineris*); (4) antennal flagellum black (antennal flagellum dull reddish in *T. fuscineris*); and (5) legs entirely black (legs black except fore and mid tarsus in *T. fuscineris*).

***Tiphia khasiana* Cameron, 1902** (Figs 17-23)

Tiphia khasiana Cameron, 1902: 86. Lectotype ♀, "Khasia Hills, Assam"

(HDOU). Additional citation: Allen and Jaynes, 1930: 101.

Tiphia (Tiphia) khasiana Cameron; Allen, 1969: 405.

Material examined: India: Kashmir, Srinagar district, Shalimar garden (34°08'56.40" N, 74°52'22.80" E), 1♂ & 1♀, 02.VIII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. Nos. ZSI/WGRC/IR/INV.12273-12274; Kashmir, Pulwama (33°52'18.6276" N, 74°53'57.7536" E), 1♂, 6.VII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12275; Kashmir, Shopian, Hurpora (33°48'40.7736" N, 75°1'1.1244" E), 2♂♂, 16.VII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. Nos. ZSI/WGRC/IR/INV.12276 & 12277; Kashmir, Srinagar district, University of Kashmir (34°7'40.8" N, 74°50'11.4" E), 1♂, 14.VIII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12278; Kashmir, Kolgam district, Aharbal falls (33°38'40.42" N, 75°01'9.23" E), 1♂ & 1♀, 21.VIII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. Nos. ZSI/WGRC/IR/INV.12279-12280.

Description: ♂ (male is hitherto unknown; description is based on the specimen from Shalimar garden).

Head: Upper frons with scattered setigerous punctures and inter spaces between punctures as wide as and also wider than ocellus (Fig. 18); punctures in lower front adjacently placed; temple and clypeus covered with white setae; median lobe of clypeus emarginated and bidentate; mandible without preapical denticle; HW 2x least distance between eyes; eye without setae; POL 2.08x LOL and 0.79x OOL; antennae 13-segmented; length of scape: pedicel: F1: F2: F3: F4: F5: F6: F7: F8: F9: F10: F11 = 0.305: 0.107: 0.147: 0.148: 0.158: 0.161: 0.161: 0.163: 0.167: 0.165: 0.165: 0.163: 0.265.



Figures 17–23. *Tiphia khasiana* Cameron, male. 17. Body profile; 18. Head, frontal view; 19. Mesosoma, dorsal view; 20. Mesosoma, lateral view; 21. Fore wing; 22. Metasoma, dorsal view; 23. Genitalia.

Mesosoma: Uneven and with scattered punctures (Fig. 19); dorsal side of pronotum with faint anterior transverse carina, posterior part impunctate except laterally, puncture free area smooth with a yellowish orange area in the apical margin; anterior part of lateral side of propleura reticulate and anterior upper margin punctured, an obscure groove present on lower part, and from below this groove to ventral corner with oblique, transverse rugae; mesopleuron entirely with setigerous punctures; metanotum sparsely punctate; areola of propodeum keystone shaped, tricarinate, middle one not reaching apex, with some scattered setigerous punctures in the apical part, small grooves or crenulations adjacent each carina, basal width 1.58x apical width, median length of areola 2.19x apical width and 1.38x basal width, middle of lateral side with coarse punctures, some small ridges present basally at the side of areola, other part of dorsal side of propodeum transversely reticulate; upper half of lateral side of propodeum (Fig. 20) with widely spaced rugae and spaces between rugae reticulately sculptured, and lower half reticulately sculptured with scattered setigerous punctures; tegula shining, 1.1x as long as its median width; fore wing (Fig. 21) with radial cell distinctly less in lateral extension than second cubital cell, sectors of second cubital cell in terms of inner sector are 10: 20: 19: 19; tibial spur formula 1:1:2, tibial spur of fore leg bend, bifurcate and half of inner surface of basitarsus with uniformly arranged setae.

Metasoma: Smooth with many setigerous punctures (Fig. 22); metasoma 1.96x as long as mesosoma; first tergum without anterior transverse carina and longer than second one; all sterna setigerously punctured; fifth sternum with lateral denticle; genitalia as in figure 23.

Colour: Body black and shining except following parts castaneous: outer middle part of mandible, on lower and outer margins of tegula, trochanter and midfemur and hindfemur, forefemur laterally, tibiae of all legs, and a small portion apically of all tarsi. Fore wing lightly infumated, stigma and veins black; hind wing transparent and veins yellow. Body setae silvery white.

Measurements (mm): HL - 1.078; HW - 1.295; EL - 0.729; least distance between eyes - 0.632; POL - 0.196; LOL - 0.094; OOL - 0.246; length of areola - 0.388; apical width of areola - 0.177; basal width of areola - 0.280; length of mesosoma - 2.419; length of metasoma - 4.753; TL - 9.

Distribution: India: Kashmir (**new record**), Meghalaya (Khasia hills).

***Tiphia exacta* Nurse, 1903** (Figs 31–36)

Tiphia exacta Nurse, 1903: 400. Holotype ♀, Kashmir (BMNH).

Tiphia (Tiphia) exacta Nurse; Allen, 1969: 402.

Material examined: India, Kashmir, Shopian (33°48'40.7736" N, 75°1'1.1244" E), 2♀♀, 10.VIII.2017, Coll. Altaf Hussein Sheikh, ZSIK Regd. Nos. ZSI/WGRC/IR/INV.12281–12282; Kashmir, Pulwama (33°52'18.6276"N 74°53'57.7536"E), 1♀, 06.VII.2018, Coll. Altaf Hussein Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12283; Kashmir, Shopian district, Pir Ki Gali (74°31'4.53" N, 33°38'6.2808" E), 1♀, 01.IX.2018, Coll. Altaf Hussain Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12284; Kashmir, Shopian, Nowgam (34°11'56.0868"N 74°37'57.7848"E), 1♀, 04.IX.2018, Coll. Altaf Hussain Sheikh, ZSIK Regd. No. ZSI/WGRC/IR/INV.12285.

Distribution: India: Kashmir.



Figures 24–30. *Tiphia khasiana* Cameron, female. **24.** Body profile; **25.** Head, frontal view; **26.** Mesosoma, dorsal view; **27.** Mesosoma, lateral view (Arrow mark indicates rugae on lateral side of propodeum); **28.** Fore wing; **29.** Metasoma, dorsal view; **30.** Pygidium.



Figures 31-36. *Tiphia exacta* Nurse, female. 31. Body profile; 32. Head, frontal view; 33. Head & Mesosoma, dorsal view; 34. Mesosoma, lateral view; 35. Fore wing; 36. Metasoma, dorsal view.

Modified part of Allen (1975)'s key to the Indian subcontinent species of *Tiphia* to accommodate *T. kashmirensis* sp. nov. and male of *T. khasiana* Cameron

Male

- 26. Lateral extension of radial cell distinctly less than that of second cubital cell (figs 5, 21). 26a
- . Lateral extension of radial cell equaling or exceeding second cubital cell in lateral extension. 27
- 26a. Lateral sides of propodeum with closely spaced rugae; frontal punctures with interspaces narrower than ocellus; metanotum entirely coarsely punctate; antennal flagellum dull reddish.
..... *T. fuscinervis* Cameron
- . Lateral sides of propodeum with widely spaced rugae (Figs 4, 20); frontal punctures with interspaces as wide as or wider than ocellus (Figs 2, 18); metanotum sparsely punctate (Figs 3, 19); antennal flagellum black. 26b
- 26b. Lower half of lateral sides of propodeum with longitudinal ridges (Fig. 4); legs entirely black except on the sides of spur of fore tibia orange coloured (Fig. 1) *T. kashmirensis* Hanima & Girish Kumar **sp. nov.**
- . Lower half of lateral sides of propodeum with reticulate sculpture and scattered setigerous punctures (Fig. 20); legs black except mid and hind trochanters and femora, femur of fore leg laterally, tibiae of all legs, and a small portion apically of all tarsi castaneous (Fig. 17).....
..... *T. khasiana* Cameron

Female

- 25. Pronotum laterally with a distinct groove across its disk (Fig. 13). 25a
- . Pronotum laterally without any groove across its disk, or if present, very weakly developed. 26

- 25a. Mid and hind femora bright red (Fig. 24); areola of propodeum rectangular, without punctures (Fig. 26); apical half of pygidium polished and obscurely wrinkled (Fig. 30); upper part of lateral sides of propodeum with closely spaced rugae (Fig. 27).
..... *T. khasiana* Cameron
- . Mid and hind femora and tibia bright red (Fig. 8); areola of propodeum slightly convex at base, with punctures (Fig. 12); apical half of pygidium mat and strongly wrinkled (Fig. 16); upper part of lateral sides of propodeum with distantly spaced rugae (Fig. 13).
..... *T. kashmirensis* Hanima & Girish Kumar **sp. nov.**

Discussion

This work is based on the specimens collected from different areas of Kashmir. There are about 500 described species of *Tiphia* worldwide. Among these about 100 species are reported from the Oriental Region (Kimsey, unpublished data). No detailed taxonomic studies were conducted in the Indian subcontinent except the works of Allen (1975) and Krombein (1982). Sixty-nine species are reported from the Indian subcontinent of which 61 from India, 30 from Sri Lanka, 16 from Nepal, and 1 from Bangladesh (Allen, 1975; Krombein, 1982; Bartalucci, 2011). Seven species were reported from both India and Sri Lanka. Four species were reported from both India and Nepal. Among the 61 species from India, only 3 species are so far recorded from Kashmir. They are: *Tiphia pulchaurkiae* (Allen, 1975), *T. palmi* (Krombein, 1938), and *T. exacta* (Nurse, 1903) (Allen, 1975; Bartalucci, 2011). In the present study, we added two more species to the tiphid wasps of Kashmir including one new species (fig. 37). We hope that many more species of tiphid wasps will be reported from India after the extensive collections and studies.

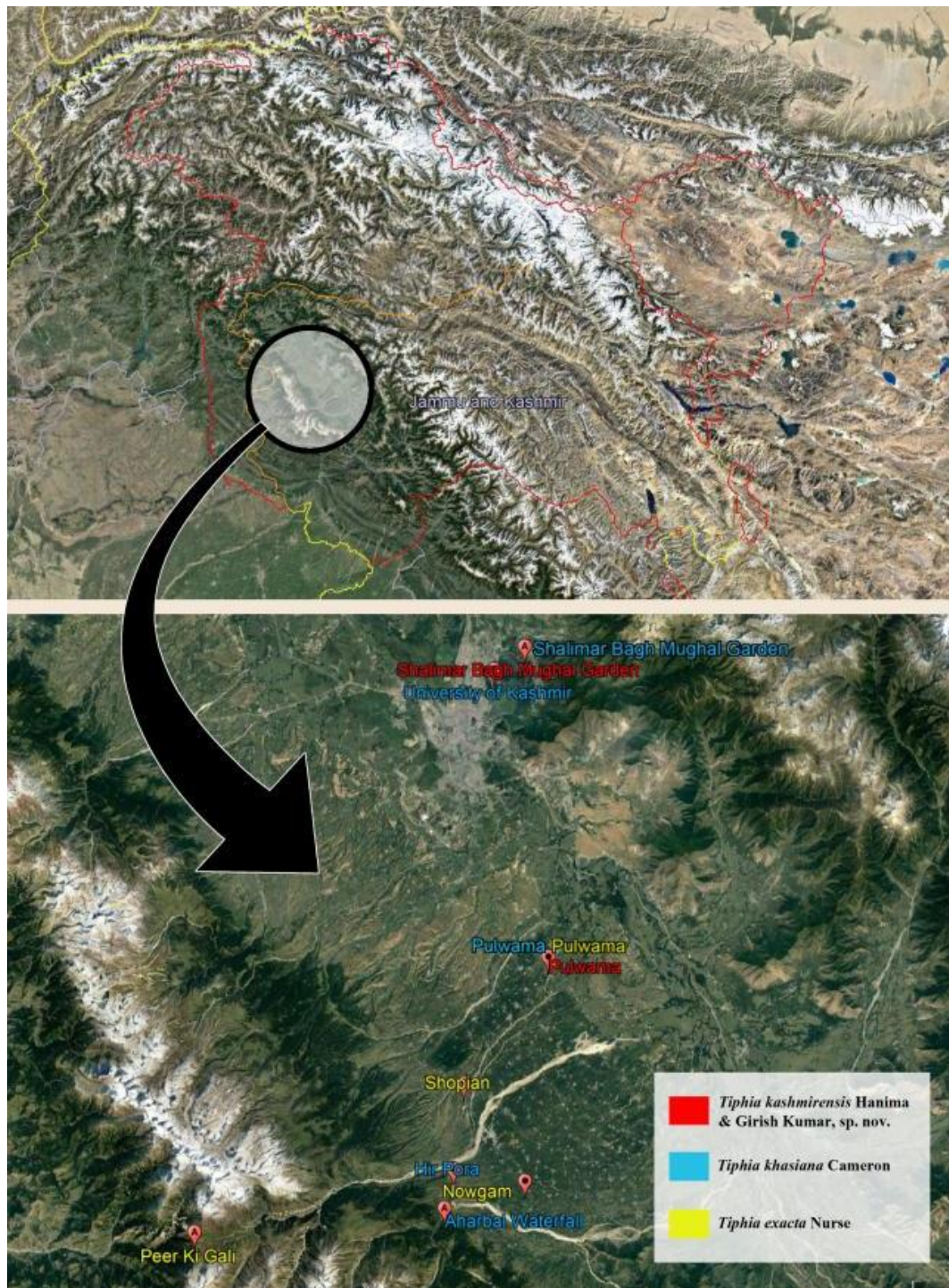


Figure 37. Distribution map of the genus *Tiphia* from Kashmir.

The larvae of Tiphidae are ectoparasitoids of various beetle larvae, especially those in the superfamily Scarabaeoidea, in the soil or decaying wood. As some of the ground-dwelling scarab species are pests, some of

these wasps can be used as biological control agents of these beetles. For example, the tiphid wasps *Tiphia vernalis* and *T. popillivora* are successfully using as biological control agents against the

Japanese beetle, *Popillia japonica*, which is an important pest of ornamentals and turf (Ramoutar & Legrand, 2007). We hope that the biological control workers of India can explore these potential biocontrol agents in future.

Acknowledgments

The authors are grateful to Dr. Kailash Chandra, Director, Zoological Survey of India, Kolkata, for providing facilities and encouragements. KPHR is grateful to the authorities of University of Calicut for Ph.D. registration. KPHR is also grateful to University Grants Commission, Govt. of India, New Delhi for awarding the Junior Research Fellowship to pursue the Ph.D. AHS is grateful to the authorities of Government Degree College, Pulwama, Jammu & Kashmir for the facilities and encouragements.

Conflict of Interests

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

References

- Allen, H.W. (1969) Redescriptions of Types of Tiphinae from Asia, Africa, Oceania in the British Museum (NH) and at Oxford University. *Transactions of the American Entomological Society*, 95, 353–438.
- Allen, H.W. (1975) *The Genus Tiphia of the Indian Subcontinent*. United States Department of Agriculture Technical Bulletin, 1509, 96 pp., 6 plates.
- Allen, H.W. & Jaynes, H.A. (1930) Contribution to the taxonomy of Asiatic wasps of the genus *Tiphia* (Scoliidae). *Proceedings of the United States National Museum*, 76 (17), 1–105, Pls.1–4.
<https://doi.org/10.5479/si.00963801.76-2814.1>
- Bartalucci, M.B. (2011) Tiphidae from South East Asia (Hymenoptera). *Onychium*, 8, 101–144.
- Cameron, P. (1897) Hymenoptera Orientalia, or Contributions to a Knowledge of the Hymenoptera of the Oriental Zoological Region, Part 5. *Manchester Society Memoirs*, 41, 44–51.
- Cameron, P. (1902) Descriptions of new species of fossorial Hymenoptera from the Khasia Hills, Assam. *Annals and Magazine of Natural History*, (7) 10, 86–88.
<https://doi.org/10.1080/00222930208678635>
- Fabricius, J.C. (1775) *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. *Officina Libraria Kortii, Flensburgi et Lipsiae*, 32, 832 pp.
<https://doi.org/10.5962/bhl.title.36510>
- Krombein, K.V. (1938) Studies in the Tiphidae II: A revision of the Nearctic Myzininae. *Transactions of the American Entomological Society*, 64 (3), 227–292.
- Krombein, K.V. (1982) Biosystematic studies of Ceylonese wasps, IX. A monograph of the Tiphidae (Hymenoptera: Vespoidea). *Smithsonian contributions to Zoology, Washington*, 374, 1–121.
<https://doi.org/10.5479/si.00810282.374>
- Nurse, C.G. (1903) New Species of India aculeate Hymenoptera. *Annals and Magazine of Natural History*, (7) 11, 400–401.
<https://doi.org/10.1080/00222930308678789>
- Ramoutar, D. & Legrand, A. (2007) Survey of *Tiphia vernalis* (Hymenoptera: Tiphidae) a parasitoid wasp of *Popillia japonica* (Coleoptera: Scarabaeidae) in Connecticut. *Florida Entomologist*, 90, 780–782.
[https://doi.org/10.1653/0015-4040\(2007\)90\[780:SOTVHT\]2.0.CO;2](https://doi.org/10.1653/0015-4040(2007)90[780:SOTVHT]2.0.CO;2)
- Rogers, M.E. & Potter, D.A. (2002) Kairomones from scarabaeid grubs and their frass as cues in below-ground host location by the parasitoids *Tiphia vernalis* and *Tiphia pygidialis*. *Entomologia Experimentalis et Applicata*, 102, 307–314.
<https://doi.org/10.1046/j.1570-7458.2002.00951.x>

مطالعه تاکسونومیک جنس *Tiphia* Fabricius (Hymenoptera: Tiphidae: Tiphinae) از کشمیر هند و توصیف یک گونه جدید

راوندان هانیم^{۱*}، پوتووی گیش کومار^۱، پویتو میتال سورشان^۱ و الطاف حسین شیخ^۲

۱ مرکز منطقه گاتس غربی، بخش ارزیابی جانورشناسی هند، ارانهی پالام، کوژیکود، کراالا-۶۷۳۰۰۶، هند.
۲ کالج دولتی، پولواما، جامو و کشمیر، هند.

* پست الکترونیکی نویسنده مسئول مکاتبه: hanimaraveendrankp@gmail.com

تاریخ دریافت: ۱۲ اردیبهشت ۱۳۹۸، تاریخ پذیرش: ۱۸ خرداد ۱۳۹۸، تاریخ انتشار: ۲۳ خرداد ۱۳۹۸

چکیده: یک گونه جدید از زنبورهای Tiphidae به نام *Tiphia kashmirensis* Hanima & Girish Kumar **sp. nov.** از کشمیر هند توصیف شد. جنس نر گونه *Tiphia khasiana* نیز برای اولین بار توصیف شد. کلید گونه‌های جنس *Tiphia* از شبه قاره هند ارائه شده توسط Allen (1975) برای گونه جدید و جنس نر گونه *T. khasiana* اصلاح شد.

واژگان کلیدی: *Tiphia kashmirensis*، گونه جدید، توصیف *T. khasiana*، *T. khasiana*، کلید شناسایی