

SHORT COMMUNICATION

## A new species of *Synopeas* (Hymenoptera: Platygasteridae) parasitizing *Pauropsylla* cf. *depressa* (Psylloidea: Triozidae) in India

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**Abstract.** *Synopeas pauropsyllae* Veenakumari & Buhl, sp. nov., a new species of *Synopeas* Förster, 1856 (Hymenoptera: Platygastroidea: Platygasteridae: Platygasterinae), is recorded from galls induced by *Pauropsylla* cf. *depressa* Crawford, 1912 (Hemiptera: Psylloidea: Triozidae) on *Ficus benghalensis* L. (Moraceae) in India. It is concluded that *S. pauropsyllae* is a parasitoid of this psyllid species. This is the first record of a platygastriid parasitizing this host.

**Key words.** Hymenoptera, parasitoid wasp, Hemiptera, Sternorrhyncha, psyllid, taxonomy, gall, host plant, *Ficus*, India, Oriental Region

**Zoobank:** <http://zoobank.org/urn:lsid:zoobank.org:pub:5D64E6E7-2F4C-4B40-821F-CBF20E864D7D>

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### Introduction

With more than 5700 species and 264 genera, Platygastroidea is the third largest superfamily in the parasitic Hymenoptera after Ichneumonoidea and Chalcidoidea (AUSTIN et al. 2005, JOHNSON 2017). Platygastroidea includes two families, Scelionidae and Platygasteridae. Scelionidae are idiobiont endoparasitoids of eggs of insects (viz. Orthoptera, Coleoptera, Lepidoptera, Mantodea, Odonata, Heteroptera and Embioptera) and spiders while Platygasteridae are koinobiont parasitoids of immature stages of Auchenorrhyncha and Sternorrhyncha (Hemiptera) or Cecidomyiidae (Diptera) (AUSTIN et al. 2005, MASNER 1993, TAEKUL et al. 2014). The checklist of Indian Platygasteridae by RAJMOHANA & DIVYA (2011) indicated the presence of 17 genera and 79 species in the country. The mega-diverse genus *Synopeas* Förster, 1856 which has a worldwide distribution is represented by 23 species in India (RAJMOHANA & DIVYA 2011; VEENAKUMARI et al. 2014, 2015).

Several insect orders such as Diptera, Hemiptera, Hymenoptera, Lepidoptera, Coleoptera and Thysanoptera are known to induce galls on plants (RAMAN & ANANTHAKRISHNAN 1983, SKUHRAVÁ & SKUHRAVÝ 2010, YANG & RAMAN 2007, NARENDRAN et al. 2007, MANI 2000). Hemipterans

inducing plant galls are mostly scale insects, aphids and psyllids. Among psyllids (Hemiptera: Sternorrhyncha: Psylloidea), several families are known to induce galls; gall-making species are particularly numerous in Triozidae, Phacopterionidae and Calophyidae (BURCKHARDT 2005).

Platygasterinae are well-known parasitoids of gall-making species of Cecidomyiidae (Diptera) (MASNER 1993) and have rarely been reported as parasitoids of psyllids. In India, *Inostemma apsyllae* Austin, 1984 was described from the galls of *Apsylla cistellata* (Buckton, 1896) (Hemiptera: Psylloidea: Aphalaridae: Rhinocolinae) on mango (*Mangifera indica* L., Anacardiaceae) by AUSTIN (1984). However, AUSTIN (1984) considered this parasitoid-host insect association as doubtful and hypothesised that *I. apsyllae* might rather be a parasitoid of a cecidomyiid associated with *A. cistellata*. Here we report for the first time an association of a species of the platygastriid genus *Synopeas* Förster, 1856 with the galls of a *Pauropsylla* Förster, 1848 species (Hemiptera: Psylloidea: Triozidae) on the banyan fig tree, *Ficus benghalensis* L. (Moraceae). We describe this species of *Synopeas* as new and provide illustrations of its diagnostic characters and the psyllid galls from which it was reared.



## Material and methods

Leaf galls induced by *Pauropsylla* cf. *depressa* on *Ficus benghalensis* (Fig. 9) were cleaned thoroughly using cotton and water on both surfaces and incubated in plastic covers in the laboratory. Fourteen specimens (12 females and 2 males) of a new species of *Synopeas* were obtained from the galls. No other insect species was found in the incubation chambers. It is therefore surmised that *Pauropsylla* cf. *depressa* is the host of this platygasterid. This however requires confirmation as the rearing methods adopted here did not completely preclude the chances of the presence of other host insects. All specimens were reared by K. Veenakumari.

The specimens were mounted on point-card tips. The holotype and paratypes are deposited in the National Bureau of Agricultural Insect Resources, Bengaluru, India (NBAIR).

The description, measurements and imaging were carried out with a Leica M205A automontage stereomicroscope, with 1× objective and a Leica DFC-500 digital camera. The images were stacked using Leica Application Suite (LAS) software. Morphological terminology follows MASNER & HUGGERT (1989) and MIKÓ et al. (2007, 2010). All the measurements were taken as per MIKÓ et al. (2010). Widths of all metasomal tergites were taken anteriorly.

The following abbreviations are used throughout the text:

A1–A10 – antennomeres 1–10 (A1 = scape, A2 = pedicel);  
 FCI (frontal cephalic index) = HW/HH;  
 H – height;  
 HH – head height;  
 HL – head length;  
 HW – head width  
 IOS – interorbital space;  
 L – length;  
 LCI (lateral cephalic index) = HH/HL;  
 LOL – lateral ocellar line;  
 OOL – ocular ocellar line;  
 POL – posterior ocellar line;  
 T1–T6 – metasomal tergites 1 to 6;  
 S1–S2 – metasomal sternites 1 to 2;  
 W – width.

## Taxonomy

### *Synopeas pauropsyllae* Veenakumari & Buhl sp. nov.

(Figs 1–8)

**Material examined.** HOLOTYPE: ♀, INDIA: KARNATAKA: Bengaluru, Hebbal, 13°02'08"N 77°35'49"E, 906 m, 02.XII.2011 (NBAIR, registration no. ICAR/NBAIR/P1920). PARATYPES: 11 ♀♀ (nos. ICAR/NBAIR/P1921–P1931) and 2 ♂♂ (nos. ICAR/NBAIR/P1932–P1933), same data as holotype (NBAIR).

**Description. Adult female.** Body length: 1.24–1.37 mm (mean = 1.3, SD = 0.04, n = 11; holotype = 1.3 mm).

**Colour.** General body colour black. A1 and legs golden yellow except dark brown coxae, apices of femur and tibia and basitarsi of hind leg; clava dark brown, other antennomeres golden yellow (Figs 1, 5).

**Head** (Figs 1, 2, 4, 5). FCI = 1.23; LCI = 1.44. IOS 0.65× width of head, shortest at the level of mid-frons; frons finely reticulate, sparsely setose; inverted V shaped striae present above toruli; hyperoccipital carina distinct, joining the posterior orbits; hyperoccipital carina extending

anteromedially; occiput finely reticulate; compound eye bare, L/W = 19.4/13.1; posterior ocellus contiguous with orbits; POL > LOL in ratio of 24.4/10.5; clypeus rectangular (L/W = 2.3/12.7); interantennal process projecting; length to width of antennomeres in ratios of 25.1/5.1, 6.7/3.1, 2.8/1.9, 5.5/2.0, 2.5/2.3, 3.7/3.0, 4.2/4.7, 5.1/5.7, 5.1/6.6, 7.7/5.7, respectively; radicle 0.1× length of A1.

**Mesosoma** (Figs 1–3, 6, 8). Mesoscutum as long as wide (L/W = 29.5/30.6), convex, sparsely setose, finely reticulate, reticulations longitudinally elongate medially; posteromedial margin of mesoscutum extending as a short triangular midlobe over mesoscutellum; axilla large, triangular, covered with 12 long white setae; scutoscuteellar sulcus non-foveate; pronotum clearly visible from above, reticulate, sparsely setose; epomial carina faint; cervical pronotal area finely reticulate with anterior rim of pronotum smooth; upper lateral pronotal area reticulate and sparsely setose; lower lateral pronotal area smooth; entire mesopleuron smooth; metapleuron smooth with dense long white setae; mesoscutellum triangular, convex, smooth with a short upturned spine with a lamella posteromedially, L/W = 13.7/20.4; lateral keel broad anteriorly and narrow posteriorly; metascutellum rectangular, smooth; metanotal trough smooth with two transverse median carinae (Fig. 8); propodeum with two median carinae placed close to each other; lateral propodeal area smooth with dense long white setae. Forewing (L/W = 88.7/39.4) and hind wing (L/W = 77.5/14.1) hyaline, with sparse microtrichia; forewing with no marginal cilia; hind wing cilia 0.25× width of wing.

**Metasoma** (Figs 1, 6). L/W = 41.6/34.4; T1 short with median and submedian carinae; T2, entirely smooth with a row of long white setae on anterior margin; remaining tergites anteriorly smooth and with faint reticulations and sparse setae posteriorly; length and width of tergites T1–T6 in ratios of 3.9/11.6, 30.3/18.2, 2.3/32.7, 2.0/28.1, 1.4/24.1, 3.5/18.7, respectively; anterior margin of S2 with dense setae.

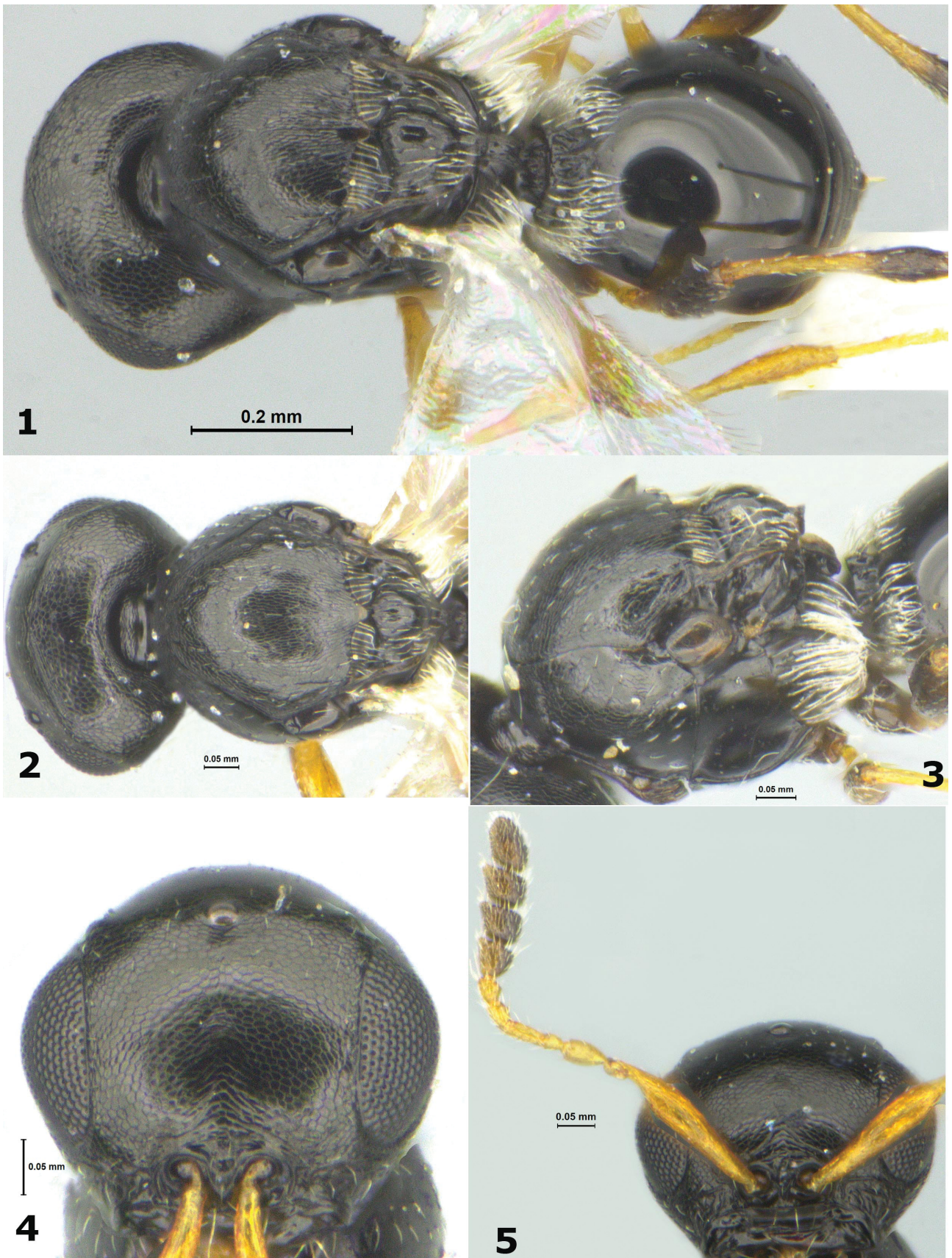
**Adult male.** Similar to female. Body length 1.24–1.28 mm (mean = 1.26, SD = 0.03, n = 2).

Length and width of antennomeres A1–A10 in ratios of 25.6/5.2, 6.2/3.2, 2.2/2.1, 5.8/2.6, 4.3/2.5, 5.0/3.1, 6.0/3.6, 6.1/3.7, 6.0/3.7, 10.0/3.5, respectively (Fig. 7). A3–A10 densely setose, length of setae 0.1× length of A1. Metasoma L/W = 37.3/30.1, with seven tergites; length and width of tergites T1–T7 in ratios of 3.6/14.1, 24.0/17.6, 2.9/29.3, 2.9/26.5, 2.1/21.2, 1.7/14.8, 1.3/8.3, respectively.

**Variability.** Not much variation was found between specimens except for differences in size as mentioned above. This could possibly be the result of all specimens being obtained from a single batch of galls.

**Differential diagnosis.** This new species of *Synopeas* is similar to *S. involutum* Kieffer, 1926, *S. pinnei* Buhl, 2009, *S. mangiferae* Austin, 1984 and *S. fuscum* Buhl, 1998 but differs from them in the following combination of character states: presence of hyperoccipital carina, OOL not distinct, dense setae along hind margin of mesoscutum, shape of scutellum and unusually short female T3–T6. While *S. involutum*, *S. pinnei* and *S. fuscum* are distributed in the Palaearctic Region, *S. mangiferae* is an Oriental species





Figs 1–5. *Synopeas pauropsyllae* sp. nov. 1 – habitus, dorsal view; 2 – head and mesoscutum; 3 – mesoscutum, lateral view; 4 – frons; 5 – frons and female antenna.

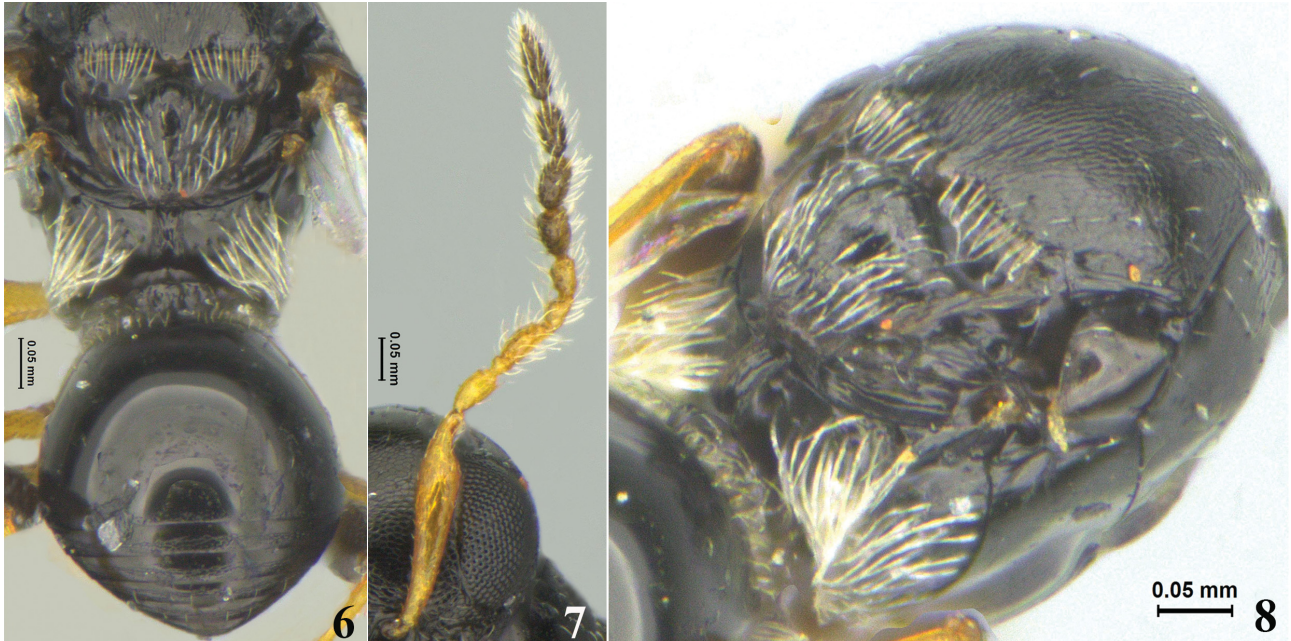


known from India (KIEFFER 1926; AUSTIN 1984; BUHL 1998, 2009).

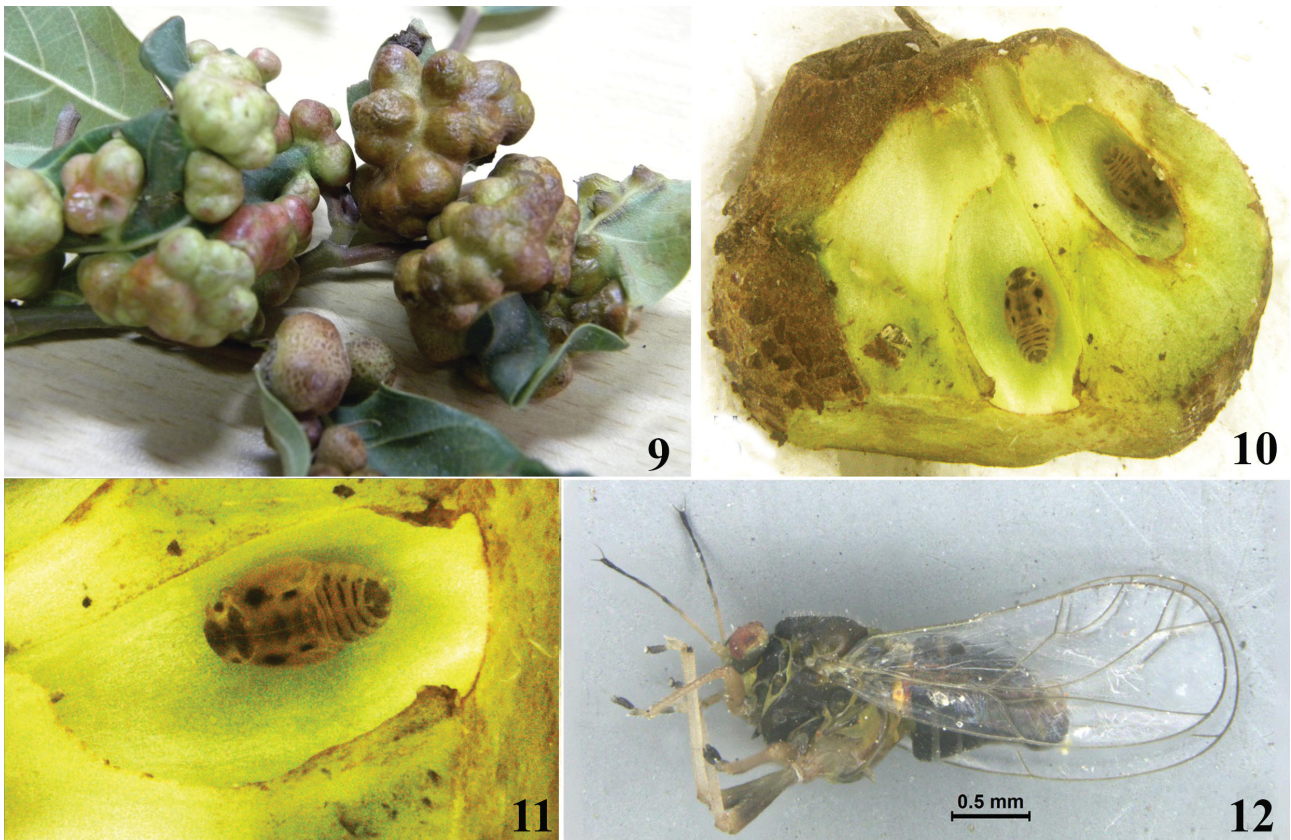
**Biology.** All specimens emerged from galls induced by *Pauropsylla* cf. *depressa* (Hemiptera: Psylloidea: Triozidae) on isolated trees of *Ficus benghalensis* (Figs 9–12) situated in rainfed agricultural land. The adult male psyllid that emerged from the galls closely resembles *P. depressa* Crawford, 1912 as redescribed by MATHUR (1975) in the structure of the head and antenna, the shape and venation of the fore wing and

probably also in the paramere shape, but a more detailed study of the material is needed to confirm the identity (I. Malenovský & D. Burckhardt, pers. comm.). *Pauropsylla depressa* is a widely distributed species in India including Karnataka; it has so far been known to induce galls on *Ficus racemosa* L. (MATHUR 1975, D'SOUZA & RAVISHANKAR 2014).

**Etymology.** This species is named '*pauropsyllae*' based on the generic name of the host of this parasitoid; noun in genitive case standing in apposition.



Figs 6–8. *Synopeas pauropsyllae* sp. nov. 6 – propodeum and metasoma; 7 – male antenna; 8 – metanotum and propodeum, lateral view.



Figs 9–12. Host of *Synopeas pauropsyllae* sp. nov. 9 – galls on *Ficus benghalensis* leaves; 10 – cross section of a gall showing two nymphs of *Pauropsylla* cf. *depressa* Crawford, 1912 in the cavities; 11 – close up of a nymph of *P. cf. depressa*; 12 – lateral view of an adult male of *P. cf. depressa*.

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## References

- AUSTIN A. D. 1984: New species of Platygastriidae (Hymenoptera) from India which parasitise pests of mango, particularly Procontarinia spp. (Diptera: Cecidomyiidae). *Bulletin of Entomological Research* **74**: 549–557.
- AUSTIN A. D., JOHNSON N. F. & DOWTON M. 2005: Systematics, evolution, and biology of scelionid and platygastriid wasps. *Annual Review of Entomology* **50**: 553–582.
- BUHL P. N. 1998: Platygastriidae (Hymenoptera) species of a Juniperus thurifera L. forest of Los Monegros region (Zaragoza, Spain). *Zapateri, Revista Aragonense de Entomologia* **8**: 11–42.
- BUHL P. N. 2009: New or little known Palaearctic species of Platygastriidae (Hymenoptera: Platygastriidae). III. *Entomologica Fennica* **20**: 65–83.
- BURCKHARDT D. 2005: Biology, ecology, and evolution of gall-inducing psyllids (Hemiptera: Psylloidea). Pp. 143–157. In: RAMAN A., SCHAEFER C. W. & WITHERS T. M. (eds): *Biology, ecology, and evolution of gall inducing arthropods*. Science Publishers, New Enfield–Plymouth, USA, 817 pp.
- D'SOUZA M. R. & RAVISHANKAR B. E. 2014: Nutritional sink formation in galls of Ficus glomerata Roxb. (Moraceae) by the insect Pauropsylla depressa (Psyllidae, Hemiptera). *Tropical Ecology* **55**: 129–136.
- JOHNSON N. F. 2017: *Platygastroidea*. Available online: [http://osuc.biosci.ohio-state.edu/hymDB/eol\\_scelionidae.home](http://osuc.biosci.ohio-state.edu/hymDB/eol_scelionidae.home) (accessed on 6.xi.2017).
- KIEFFER J. J. 1926: *Scelionidae. Das Tierreich. Vol. 48*. Walter de Gruyter & Co., Berlin, 885 pp.
- MANI M. S. 2000: *Plant galls of India*. Second edition. Science Publishers, Enfield, New Hampshire, USA, 477 pp.
- MASNER L. 1993: Superfamily Platygastroidea. Pp. 558–563. In: GOULET H. & HUBER J. T. (eds): *Hymenoptera of the world: An identification guide to families*. Canada Communication Group-Publishing, Ottawa, Canada, 668 pp.
- MASNER L. & HUGGERT L. 1989: World review and keys to genera of the subfamily Inostemmatinae with reassignment of the taxa to the Platygastriinae and Sceliotrachelinae (Hymenoptera: Platygastriidae). *Memoirs of the Entomological Society of Canada* **147**: 1–214.
- MATHUR R. N. 1975: *Psyllidae of the Indian subcontinent*. Indian Council of Agricultural Research, New Delhi, 429 pp.
- MIKÓ I., MASNER L. & DEANS A. R. 2010: World revision of Xenomerus Walker (Hymenoptera: Platygastroidea, Platygastriidae). *Zootaxa* **2708**: 1–73.
- MIKÓ I., VILHELMSSEN L., JOHNSON N. F., MASNER L. & PÉNZES Z. 2007: Skeleto-musculature of Scelionidae (Hymenoptera: Platygastroidea) head and mesosoma. *Zootaxa* **1571**: 1–78.
- NARENDHRAN T. C., SANTHOSH S. & SUDHEER K. 2007: Biosystematics and biogeography of Oriental Chalcidoidea (Hymenoptera) associated with plant galls. *Oriental Insects* **41**: 141–167.
- RAJMOHANAK. & DIVYAK. P. 2011: *Checklist of Platygastriinae and Sceliotrachelinae (Hymenoptera: Platygastriidae) of India*. Available online: <http://zsi.gov.in/WriteReadData/userfiles/file/Checklist/Checklist%20Platygastriinae%20and%20Sceliotrachelinae.pdf> (accessed on 6.xi.2017).
- RAMAN A. & ANANTHAKRISHNAN T. N. 1983: Studies on some thrips (Thysanoptera, Insecta) induced galls. 1. Developmental morphology. *Proceedings of Indian National Science Academy* **49**: 313–358.
- SKUHRAVÁ M. & SKUHRAVÝ V. 2010: Species richness of gall midges (Diptera: Cecidomyiidae) in Europe (West Palaearctic): Biogeography and coevolution with host plants. *Acta Societatis Zoologicae Bohemicae* **73**: 87–156.
- TAEKUL C., VALERIO A. A., AUSTIN A. D., KLOMPEN H. & JOHNSON N. F. 2014: Molecular phylogeny of telenomine egg parasitoids (Hymenoptera: Platygastriidae s.l.: Telenominae): evolution of host shifts and implications for classification. *Systematic Entomology* **39**: 24–35.
- VEENAKUMARI K., BUHL P. N. & MOHANRAJ P. 2015: Six new species of Platygastriidae (Hymenoptera: Platygastroidea) from India. *Entomologist's Monthly Magazine* **151**: 35–50.
- VEENAKUMARI K., BUHL P. N., MOHANRAJ P. & KHAN F. R. 2014: Four new species of Platygastriidae (Hymenoptera: Platygastroidea) from India. *Entomologist's Monthly Magazine* **150**: 49–60.
- YANG M. & RAMAN A. 2007: Diversity, richness, and patterns of radiation among gall-inducing psyllids (Hemiptera: Psylloidea) in the Orient and eastern Palaearctic. *Oriental Insects* **41**: 55–65.

