



Short Communication

Description of *Uroobovella tripophinae* Sp. Nov. (Acarina: Uropodidae) Phoretic association with grasshopper *Trilophidia turpis* Walker (Acrididae: Orthoptera) from Tamil Nadu, India

Radhakrishnan Vaithianathan¹, Vijay Srinivasan^{1*}, Baskaran Varadharajan², Allwin Loveson³, Ravi Madhaiyan⁴, Indiragandhi Pandiyan⁵, Periyar Ramasamy Duraiyappan⁶, Ramaraju Kunjithapatham² and Sivakumar Senjeriputhur Devaraj¹

¹Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Trichy, Tamil Nadu, India

²Department of Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

³Rice Research Station, Tamil Nadu Agricultural University, Ambasamudram, Tamil Nadu, India

⁴Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Sandhiyur, Tamil Nadu, India

⁵Regional Research Station, Tamil Nadu Agricultural University, Vriddhachalam, Tamil Nadu, India

⁶ICAR-Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Thiruvarur, Tamil Nadu, India

ABSTRACT

The phoretic mites are attached with various body parts of the insects viz., head, thorax, abdomen, acarinarium, legs, wings and antennae. The relationship is purely temporary and the mites opted mainly for the transportation. The phoretic mites are distributed almost all parts of the world. In this study, we describe one new species, *Uroobovella tripophinae* Sp. Nov. (Acarina: Uropodidae) phoretic attachment on grass hopper *Trilophidia turpis* Walker (Acrididae: Orthoptera) from Tamil Nadu, India. The attachment is purely phoretic and it attached on the thoracic region of grasshopper. Two long pectinate setae (distally) are present at the posterior end of idiosoma in the new species as against serrate in *Uroobovella passalaephora* and *Uroobovella bassiliana*. The *Uroobovella tripophinae* is distributed in the tropical region of Tamil Nadu, India.

Article Information

Received 07 March 2024

Revised 06 May 2024

Accepted 12 May 2024

Available online 16 October 2024 (early access)

Published 29 August 2025

Authors' Contribution

RV: Conceptualization, data curation, formal analysis, methodology, validation, visualization, writing original draft, writing review and editing.

VS: Data curation, resources.

BV and PRD: Data curation, formal analysis, software.

AL: Data curation, formal analysis, software, validation.

RM: Data curation, formal analysis, writing review and editing.

IP: Methodology, software, validation.

RK: Conceptualization, supervision, validation, project administration.

SSD: Formal analysis, resources, software, supervision.

Key words

Grasshopper, Phoresy, Pectinate setae, Serrate, Idiosoma and Thoracic region

The phoretic association of insect mites comprises of several insect orders viz., Diptera, Coleoptera, Hymenoptera, Hemiptera, Orthoptera and vice-versa in different mite families includes Ascidae, Macrochelidae, Pyemotidae, Scutacaridae, Digamasellidae, Uropodidae,

Canestriniidae, Eviphididae, Macrochelidae, Parasitidae, Winterschmidtidae, Cheyletidae, Chaetodactylidae, Tarsonemidae and Erythraeidae. The phoretic relationship is purely temporary and the mites opted mainly for the transportation. Although, the phoretic mites are distributed almost all parts of the world, the insect orders Diptera, Coleoptera and Hymenoptera were predominantly associated with mite species. The uropodid mites are free living and found under the bark of trees, lichens, soil and other vegetable matter and also found in tropical and subtropical areas (Lindquist *et al.*, 2009). An uropodid mite constitutes a characteristic group of phoretic mites and the second nymph will be attached with the host by anal pedicel and it never parasite on their host.

* Corresponding author: svijayento@gmail.com
0030-9923/2025/0005-2493 \$ 9.00/00



Copyright 2025 by the authors. Licensee Zoological Society of Pakistan.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Uroobovella phoenicicola were collected from cocoon and the body of *Rhynchophorus phoenicis* and also acted as a biological control agent (Kontschan *et al.*, 2012). *Uroobovella hungarica* Hirschmann and Zirngiebl-Nicol was reported from the soil and forest leaf litter (Kontschan, 2013). New uropodina species were documented from the deutonymphs from the beetles (Wisniewski and Hirschmann, 1993). Even some of the bamboo plantations also possess uropodina mite species in Taiwan (Kontschan *et al.*, 2015).

Beside the exhaustive studies, bountiful numbers of species haven't been recorded from India. To keep this in view, we describe one new species, *Uroobovella tripophinae* Sp. Nov. (Acarina: Uropodidae) phoretic attachment on grass hopper *Trilophidia turpis* Walker (Acrididae: Orthoptera) from Tamil Nadu, India.

Materials and Methods

The grasshoppers were collected through direct survey and collection from various locations of Tamil Nadu, India. For this study, live and dead insect specimens were used for examining the presence of mites. After examination, the insect specimens containing mites were photographed with the help of image analyzer (GAIA Red software) and camera (Nikon F10). Special emphasis was given to visualize the exact place of attachment of mites in various insect specimens. The mite specimens were processed through clearing agent (Lactic acid-50ml, Phenol - 25 ml and distilled water - 25 ml) to soften internal tissues of preserved mites with little or no damage to the exoskeleton (Krantz, 1968). The lactophenol treated mite specimens were cleaned 2-3 times in distilled water until the cloudy interface of lactophenol and water disappeared. Permanent slides were prepared using Hoyer's medium distilled water, 50 ml; gum arabic (Crystals), 30 g; chloral hydrate, 200 g and glycerine, 20 g.

The exact location of the mite specimens on the slide was also marked on the back side of the slides as per the procedure adopted by Evans (2003). All the mite specimens on permanent slides were closely examined for taxonomic identification using a Carl zeiss phase contrast microscope (Model: Axiostar Plus). The dorsum, ventrum, legs, gnathosoma and other striking characters were drawn using a drawing tube. In this study, Zeiss drawing tube is used, which fits into the light path between the eyepiece and objective lens of a microscope. Drawing was initially done on a tracing sheet with a pencil and inking was performed by means of rotring isograph (0.1mm to 0.6 mm). Then, the measurements of the important taxonomic structures of mite specimens were made with the help of a calibrated ocular micrometer and expressed in microns. The taxonomic drawing was made with camera lucida

and the measurements were given in micrometers (μm) and the setal pattern and abbreviation were followed by Evans (2003). The voucher slides have been retained in the collection curated by Dr. V. Radhakrishnan as mentioned in the deposition of materials at Department of Agricultural Entomology, Acarology laboratory, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

Family: Urodinychidae
Subfamily: Uropodinae
Tribe: Trichouropodini
Genus: *Uroobovella* Berlese, 1903
Uroobovella tripophinae sp. nov.
(Fig. 1)

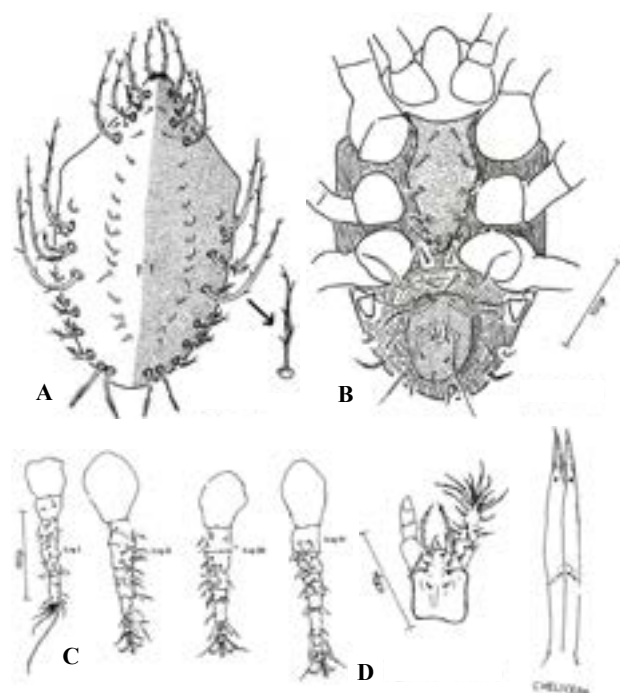


Fig. 1. *Uroobovella tripophinae*, new species; A, dorsum; B, ventrum; C, Legs I – IV; D, gnathosoma.

Female deutonymph dorsum

Dorsum 368 long and 225 wide. The vs setae 65 long and pilose. The setae are simple, stout and serrate. 19 pairs of simple, stout setae in the middle of dorsum 15 long; 15 pairs of pilose setae (28-133 long) on the marginal surface of idiosoma. Dorsal surface finely ornamented and punctate in nature. Two pairs of distally pectinate setae present on the posterior end of idiosoma.

Venter

Sternal shield 133 long and 75 wide with five pairs

of setae. Sternal setae I 13 long, sternal setae II, III and IV are 15 long and sternal setae V 35 long. Sternal setae V longer than other setae. The anal shield 85 long and 65 wide. Two pairs of long setae (58 and 82) and two pairs of small (8) simple, stout setae and two paranal and an adanal setae are present. Two pairs of simple setae present in between sternal shield and anal shield. The ornamentation is prominent. One pair of metapodal plate are present at the lateral side of anal shield 25 in width and the distance between the two metapodal plates is 133; 7 pairs of setae present at the lateral side of anal shield.

Legs

Leg I to IV measures 170, 203, 188 and 225 long, respectively.

Leg chaetotaxy

Leg I: 0-2-6-2-7-4; Leg II: 0-2-5-5-2-8; Leg III: 0-3-4-5-4-8 and Leg IV: 0-5-6-6-4-8.

Gnathosoma

Gnathosoma 130 long and 65 wide. Four pairs of setae are present on the hypostome; setae C₃ prominent, pilose and very long. Palpal pretarsus consist of fine hair like setae.

Male

Not found

Types

The holotype (Female) marked on the slide, India: Tamil Nadu, Coimbatore. 17.VII.2006. Eg: *Trilophidia turpis* Walker (Acrididae: Orthoptera), Coll: V. Radhakrishnan, (No: 221/1). Three paratype slides and collection data same as type.

Differential diagnosis

This new species differs from all other species of *Uroobovella* by the following characters. The length of the idiosoma is similar to *Uroobovella phoenicicola* (Kontschan *et al.*, 2012), in contrast it differs from

Uroobovella hungarica (Kontschan 2013) and *Uroobovella bambicola* (Kontschan *et al.*, 2015). Number of sternal setae was also similar to *U. hungarica* (Kontschan, 2013) and differs from all other two species (Table I). Width of the idiosoma also varies from all the three species (Table I). Two long pectinate setae (distally) are present at the posterior end of idiosoma in the new species as against serrate in *U. passalaephorae* and *U. bassiliana*. 19 pairs of simple short setae are present in the new species while in contrast to serrate setae (55) on Idiosoma of *U. bassiliana*.

Relationship to the host

The orange-coloured mites were found attached to the thoracic region of the grasshopper. These mites can attach their chelicerae on the host and the nature of attachment suggests phoresy.

Etymology

The mite species is named after the type host genus.

Discussion

In this study, we described and illustrated a new *Uroobovella tripophinae* from India. This mite species was belonging to the subfamily Uropodinae based on the distinct morphological characters. Sometimes the Uropodina mites constitute with their deutonymphs and attached with anal pedicel associated with the host insects. This particular new species belongs to the subfamily Uropodinae (Urodinychidae), based on the morphological characters *viz.*, tortoise like uropodine mesostigmatans, typically oval to circular in the dorsoventral portion, marginal setae are fringe or basket like arrangement, anal opening with 2–5 circumanal setae, chelicerae typically slender, coeneculi horn-like (Ainscough, 1981).

These mites species will never parasitise with the host insects *viz.*, beetles, flies, etc., and it utilizes as a transportation element (Szymkowiak *et al.* 2007), this was in accordance with the present study. Our new species was strongly attached with their chelicera in grasshopper as that of Szymkowiak *et al.* (2007). It possesses long marginal

Table I. Comparison of important traits among *Uroobovella* spp.

Details	<i>Uroobovella tripophinae</i> Sp. Nov.	<i>Uroobovella phoenicicola</i> Kontschan <i>et al.</i> (2012)	<i>Uroobovella hungarica</i> Kontschan <i>et al.</i> (2013)	<i>Uroobovella bambicola</i> Kontschan <i>et al.</i> (2015)
Length of idiosoma (μm)	368	370-380	650-670	370-390
Width of idiosoma (μm)	225	270-280	540-570	270-300
Number of sternal setae	5	8	5	6
Hypostomal setae	h ₃ long	h ₁ long	h ₁ long	h ₁ and h ₃ long

pilose setae as against small simple setae in *Uroobovella passalaephora* Ram., *Uroobovella bassiliana* Ram., *U. zairensis* Hirschmann, *U. californiana* (Wisniewski and Hirschmann, 1992), *U. plaumanni* Sellnick (1962) and *U. axana* (Wisniewski and Hirschmann, 1992). The species *Uroobovella trilophinae* group can be found in tropical regions of India, therefore the first finding in India was no surprise.

Statement of conflict of interest

The authors have declared no conflict of interest.

References

- Ainscough, B.D., 1981. *Int. J. Acarol.*, **7**: 47-56. <https://doi.org/10.1080/01647958108683242>
- Evans, G.O., 2003. *Principles of acarology*. CAB International, Cambridge, UK. pp. 565.
- Kontschan, J., Wang, G-Q. and Nemenyi, A., 2015. *Spixiana*, **38**: 263–272.
- Kontschan, J., Tambe, J.T. and Riolo, P., 2012. *Afr. Inverteb.*, **53**: 593–600. <https://doi.org/10.5733/afin.053.0205>
- Kontschan, J., 2013. *Opusc. Zool. Budapest.*, **44**: 91-95.
- Krantz, G.W., 1968. *A manual of acarology*. 2nd edition. Oregon State University Bookstores, Corvallis. pp. 235.
- Lindquist, E.E., Krantz, G.W. and Walter, D.E., 2009. *A manual of acarology*, 3rd ed. Lubock, USA. pp. 124-232.
- Sellnick, R., 1962. *Acarologia*, **4**: 520-531.
- Szymkowiak, P., Gorski, G. and Bajerlein, D., 2007. *Biol. Lett.*, **44**: 75-101.
- Wisniewski, V.J. and Hirschmann, W., 1992. *Aus Polen. Acarol.*, **33**: 5–15.
- Wisniewski, V.J. and Hirschmann, W., 1993. *Acarologia*, **34**: 313-322.