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Short Communication

Description of a new Species of *Trichouropoda* Berlese, 2016 (Acari: Mesostigmata: Uropodina: Trematuridae) from Pakistan

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Abstract

Trichouropoda pseudoovalis spp. nov. (Mesostigmata: Uropodina: Trematuridae) is described and illustrated based on adult male and female, collected from poultry manure from Dera Ghazi Khan, Punjab, Pakistan. The new species differs from the other species based on dorsal and ventral setae patterns, peritreme shape, size and gnathosomal characters. Also, six species of the genus *Trichouropoda* Berlese namely: *T. adjucti*, *T. australis*, *T. fallex*, *T. orbicularis*, *T. ovalis* and *T. polytricha* are reported for the first time from Pakistan. A key to known species of *ovalis* species group of Trichouropoda have been also discussed. © 2019 Friends Science Publishers

Key words: Trematuridae; *Trichouropoda pseudoovalis*; New records; Poultry manure; Cardboard traps

Abbreviations: *h1–h4*: hypostomal setae; DN: deutonymph; PN: protonymph; *St1-St5*: sternal setae.

Introduction

Among the suborder Uropodina, the genus *Trichouropoda* Berlese (Mesostigmata: Trematuridae) is the most diverse genus with approximately 395 species worldwide (Wiśniewski, 1998; Bal and Özkan, 2006). Hirschmann and Wiśniewski identified the members of genus *Trichouropoda* Berlese (1916) and divided the genus into 11 species groups for identification. Mašán (1999, 2001) described the said genus from Europe and divided into 45 species groups. Hirschmann and Zirngiebl-Nicol (1961) separated the *T. ovalis* group on the base of gnathosomal feature of male, protonymph, deutronymph and larvae which is commonly distributed all over the world.

Most of the Mesostigmatid groups poorly explored from Pakistan (Halliday *et al.*, 2018). Previously, *Trichouropoda* is known from Pakistan with unnamed species (Qayyoum and Khan, 2017). This manuscript includes *T. pseudoovalis* spp. nov. along with six species: *T. adjucti* Wiśniewski and Hirschmann, 1988; *T. australis* Hirschmann, 1972; *T. fallex* (Vitzthum, 1926); *T. orbicularis* (Koch, 1839), *T. ovalis* (Koch, 1839); *T. polytricha* (Vitzthum, 1923) as new records. Also, a key to known species of *ovalis* species group of *Trichouropoda* is provided with new records examined specimens (Table 1).

Materials and Methods

Uropodid mites were collected from poultry manure during the year 2014–2015. The poultry manure samples were collected in small plastic bags from different poultry farms at Punjab, Pakistan. The collected samples were processed through a Berlese funnel for the extraction of mites. The specimens were also collected from the field by placement of cardboard. The specimens were mounted on glass slides under a stereoscope [Luxeo 2S, LaboMed, Labo America® (U.S.A.)]. Mite specimens were examined under phase-contrast microscope [MT4210H, Meiji Techno® (Japan)] and identified with help of available literature. Different body of new species were drawn using adobe illustrator (Adobe Systems Incorporated, San Jose, C.A., U.S.A.). All the measurements of are taken in micrometres (μm).

All collected specimens including types were deposited in the Acarology Laboratory-II, Department of Entomology, University of Agriculture, Faisalabad, Pakistan.

Results

Family Trematuridae Berlese (1917) was identified by

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Berlese with a type genus *Trematura* Berlese (1917), which was recommended by Halliday (2016). *Trichouropoda* Berlese, 1916 is largest genus of the said family with a type species *Uropoda longiseta*.

Diagnosis (Based on Berlese, 1916)

Hypostomal setae setiform, smooth, pilose or fringed tectum mostly denticulate and tapering toward the apex, corniculi not cone like (having 1–5 teeths on the corniculi) along with 1–2 pairs of posterior setae. Both the sexes have same gnathosomal characteristics. Chelicerae, fixed digit simple (without extension) while moveable digit with 3–5 teeths.
Trichouropoda pseudoovalis spp. nov. (Fig. 1–5).

Diagnosis

Idiosoma broadly oval, *j1* simple and needle like, longer than other anterior setae on podonotal shield, setae on posterior half of dorsum longer than anterior half, similar in size, semicircular shields present around the bases of all setae on posterior half and few setae on anterior half of dorsum; Most of dorsal shield setae and all marginal setae slightly serrated. Genital shield extended beyond the coxa-IV and approaching to the middle of coxa-II.

Description of Female (n = 5)

Dorsal shield 625 (620–695) long and 321 (320–334) wide at level of coxa-II. Dorsum hypertricous with more than 100 setae and ornamented with hexagonal or pentagonal patterns. Verticle setae "j1" (22–23) simple and needle like, setae on anterior half of dorsal shield 12–19, on posterior half 24–26.; semicircular shields present around the bases of all setae on posterior half and few setae on anterior half of dorsum; Anterior marginal setae simple and without pits while central and posterior marginal with pits. All marginal setae slightly serrated near tips. Dorsal shield surrounded by row of small semicircular shields while dorsal and marginal shield fused.
Genital shield almost tongues shaped, with sharp edge anteriorly, flat posteriorly, smooth entirely, 200 (194–202) long and 150 (149–152) wide located at the level of coxa II to extended posteriorly of coxa IV. Five pairs of sternal setae (*St1*, *St2*, *St3*, *St4*, *St5*) surrounding the genital shield, all sternal setae simple, equal in size (25–26). Sternal setae *St1* located anterior to the genital shield at the level of coxa II, St2 and St3 located anterior to the coxa III and IV respectively while *St4* and *St5* behind the genital shield. All Ventral setae simple; semicircular shields present around the bases of all setae except sternal setae without semicircular pits. Adanal setae are different in length and not association with pits contrary with the other ventral setae. Pedofossae IV reticulated with horizontal lines.

Peritremes (Fig. 2) short reaching up to coxa III and having sharp curved projection, 130 (129–134) in length.

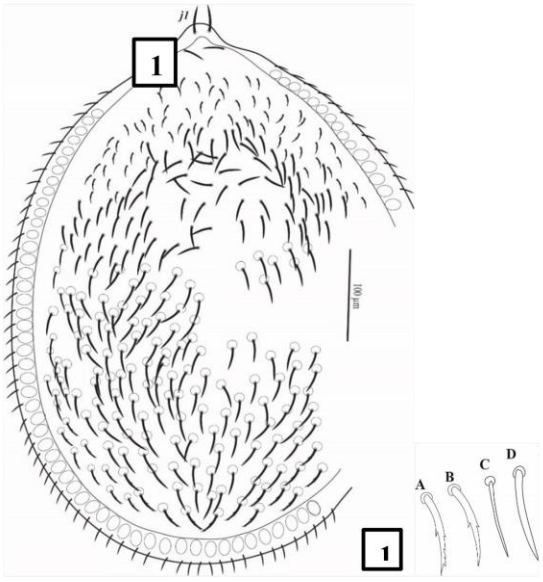

Fig. 1: *Trichouropoda pseudoovalis* spp. nov., female, dorsal view and types of setae

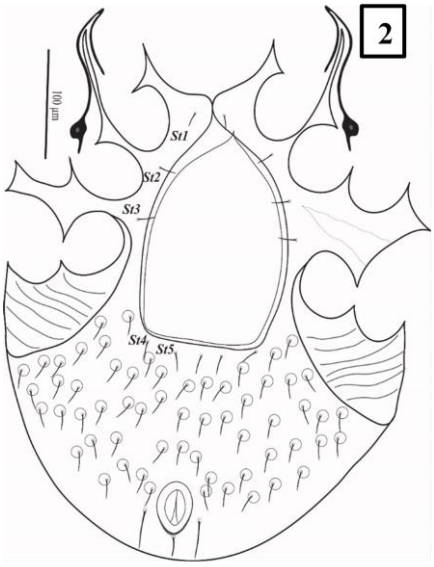

Fig. 2: *Trichouropoda pseudoovalis* spp. nov., female, ventral view

Tritosternum (Fig. 3a) with narrow base and marginally pilose laciniae which apically divided into two short branches. Chelicerae (Fig. 3b) with sclerotised node on the internal base, four (4) teeth on the moveable digit while fixed digit with two teeth. Gnathosoma (Fig. 3c) having *h4* fringed like (like horn of deer) and smaller than all other hypostomal setae, *h3* fringed and longer than other setae while only hypostomal setae *h1* simple and longer than internal malae. Corniculi with dentate with two teeth and lower to the internal malae. Epistome wide and marginally apically serrated, laciniae-like. Gnathosomal palp trochanter with two long and serrated other setae

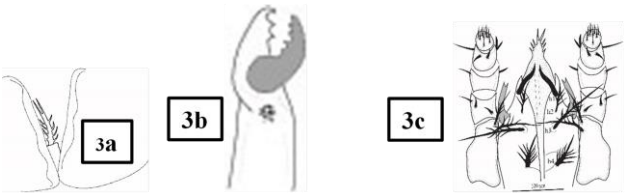

Fig. 3: *Trichouropoda pseudoovalis* spp. nov., female; (**a**) Tritosternum, (**b**) Chelicera, (**c**) Gnathosoma with palp

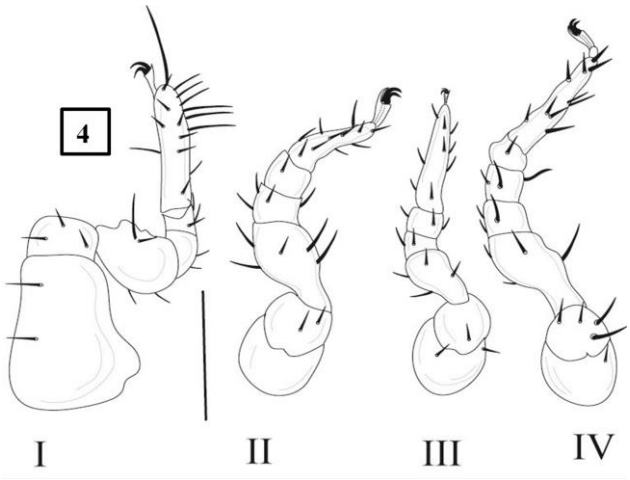

Fig. 4: *Trichouropoda pseudoovalis* spp. nov., female, legs (Scale 100 μm)

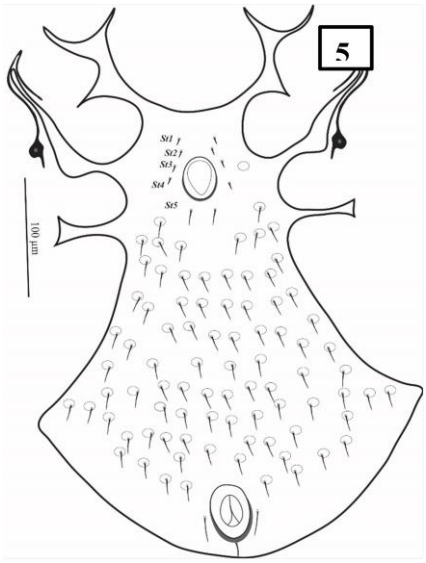

Fig. 5: *Trichouropoda pseudoovalis* spp. nov., male, ventral view

smooth and simple setae on the tarsus.

All legs (Fig. 4) having claw and relatively shorter than dorsal shield. Legs with simple setae. Tarsus I claw larger than others while tarsus III claw smaller in size. Length of legs: leg-I 257 (256–259); leg-II 242 (241–243), leg III 237 (2236–2238) and leg-IV 267 (265–269).

Description of Male (n= 5)

Dorsum similar as in female. Ventral shield having sternal setae around genital shield. All sternal setae without semicircular pits, *St1* to *St4* located at level of coxa II to anterior to coxa IV with length of 18(17–20), while *St5* located behind the genital shield double than other sternal setae. Genital shield rounded and present between coxa-II and coxa-III. All ventral setae other than sternal setae having circular pits and same in size. Gnathosoma having similar type of setae both in male and female.

Etymology

This species having half dorsal and ventral shield with circular pit setae belong to *Trichouropoda ovalis* group, so the name is given "pseudoovalis" mean half semicircular pits.

Type Material

Holotype female and seven paratypes (5♀ and 2 ♂), Kotmor, Taunsa Sharif, Dera Ghazi Khan, 30°49'59.99" N, 70°42'0.86" E, 12 December 2014; 12 female paratypes, Kot Chutta, Dera Ghazi Khan; 29°49'21.17" N, 70°36'47.74" E, 12 December 2014 and 04 July 2015; 17 paratypes (15♀ and 2 ♂), Jampur road, Dera Ghazi Khan; 29°56'55.71" N, 70°40'32.5" E, 04 July 2015; two females, Indus mor, Dera Ghazi Khan, 29°08'22.5" N, 70°41'47.57" E, 12 December 2014; all collected from poultry manure by M.A. Qayyoum.

Remarks

Trichouropoda pseudoovalis spp. nov., belongs to *ovalis* species group of *Trichouropoda.* The *ovalis* species group is characterised by having circular small shields on the dorsal shield as well as on venter and oval shaped body. Anterior setae without pits as most of *T. ovalis* group members except *T. arjunai* Kontschán (2012) having pits while anterior setae slightly serrated in *Trichouropoda pseudoovalis* spp. nov. and all other groups having simple except *T. szabadi* Kontschán and Starý (2013) with apically pilose. Posterior setae (Epigynial shield marginal) serrated (4 or more than 4) while smooth most of the *T. ovalis* group except *T. szabadi* Kontschán and Starý (2013) (distally pilose without pits) and *T. turcicaovalis* Bal and Özkan (2006) (4 serrated without pits). Peritreme; short, single sharp curved projection and without U-shape in the identified species and *T. arjunai* Kontschán (2012) (with three curved) while in all other species of *T. ovalis* group without sharp curved projections and having U-shape. *Trichouropoda pseudoovalis* spp. nov. is also different as compare to other species based on habitat specific, said species found from poultry manure while most of the members of *Trichouropoda ovalis* group identified from soil.

Key of the *Trichouropoda ovalis* group (Female)

1. Operculum (Genital shield) with ornamentations ---------- 2
- Operculum without ornamentations ---------- 21
2. Operculum having denticles with scattered setae ---------- ***T. karawaiewi***
- Operculum without denticles ---------- 3
3. Pits on operculum vary in size ---------- ***T. beckwithi***
- Pits on operculum equal in size ---------- 4
4. Operculum having few circular pits ---------- 5
- Operculum having many circular pits ---------- 9
5. Operculum wider than long; pedofossae with reticulations ---------- 6
- Operculum longer than wider; pedofossae with or without reticulations ---------- 7
6. Dorsal seta j1 smooth; with or without posterior setae of dorsum having pits ---------- ***T. wilkinsoni***
- Dorsal seta j1 pilose; with posterior setae of dorsum having pits ---------- ***T. orszaghi***
7. Ventral setae *Jv1* and *Jv2* shorter ---------- ***T. mexicoovalis***
- Ventral setae *Jv1* and *Jv2* not shorter ---------- 8
8. Anteriorly operculum rounded in shape ---------- ***T. pinicola***

Anteriorly operculum denticulate in shape ---------- ***T. rafalskii***

9. Ventrally and dorsally having two pairs of *x* setae present ---------- 10
- Ventrally and dorsally having many *x* setae present - 13
10. Pedofossae and metapodalia smooth ---------- 11
- Pedofossae and metapodalia ornamented ---------- 12
11. All dorsal setae smooth and needle like ---------- ***T. curtipilis***
- All dorsal setae spatulate or leaf like ---------- ***T. portugalensis***
12. Extra setae *x1* and *x2* needle like ---------- ***T. spatulifera***
- Extra setae *x1* and *x2* not needle like ---------- ***T. polyctenaphila***
13. Anteriorly operculum slender and narrow ---------- 18
- Anteriorly operculum not slender and narrow ---------- 14
14. Whole operculum having circular pits ---------- 16
- Half operculum with circular pits ---------- 15
15. Posteriorly dorsal setae with big circular pits ---------- ***Trichouropoda pseudoovalis* spp. nov.**
- Posteriorly dorsal setae with or without circular pits --- ***T. turcicaovalis***
16. Dorsal seta j1 pilose ---------- ***T. svatoni***
- Dorsal setae j1 smooth ---------- 17
17. Few circular pits on dorsal shield ---------- ***T. ovalis***
- Many circular pits on dorsal shield ---------- ***T. canadaovalis***
18. Idiosoma larger than 1000 μm in length ---------- 19
- Idiosoma smaller than 1000 μm in length ---------- 20
19. Metapodal shield with few circular pits ---------- ***T. alveola***
- Metapodal shield with many circular pits ---------- ***T. ontarioovalis***
20. Metapodal shield without pits ---------- ***T. bellatula***
- Metapodal shield with pits ---------- ***T. asionis***
21. Ventral setae *Jv1* and *Jv2* closer to each other ---------- ***T. ovalispatulifera***
- Ventral setae *Jv1*in front of *Jv2* ---------- 22
22. Ventral shield without circular pits near x-region ---------- ***T. hirsuta***
- Ventral shield with circular pits near x-region ---------- 23
23. All dorsal setae needle shaped ---------- ***T. columbiaovalis***
- All dorsal setae not needle shaped ---------- ***T. callosa***.

Discussion

Because of poultry manure extraction and cardboards traps, the members of genus *Trichouropoda* were explored for the first time from Pakistan. From the mentioned taxonomic studies, *T. orbicularis* (Koch, 1839) was more diverse than other members of sub-order Uropodina from Pakistan (Table 1) while among the others. *T. pseudoovalis* found as new species based on morphological character within *T. ovalis* group.

Conclusion

As a result of this study we concluded the description of a new species along with list of new records from Pakistan

Table 1: List of genus *Trichouropoda* members from Pakistan

Species Name	♀	♂	DN	PN	Total (examined specimens)
Trichouropoda orbicularis	√	√	√	√	123
***Trichouropda pseudoovalis* spp. nov.**	√	√	X	X	40
Trichouropoda adjucti	X	X	√	X	9
Trichouropoda australis	X	X	√	√	12
Trichouropoda fallex (Vitzthum, 1926)	X	X	√	X	5
Trichouropoda ovalis (Koch, 1839)	X	X	√	X	21
Trichouropoda polytricha (Vitzthum, 1923)	X	X	√	X	13

Note**:** All members of genus *Trichouropoda*, first time identified from Pakistan

which were found as poultry manure-inhabiting mite fauna. So it is need of time for the future taxonomic work, for exploration of new fauna in different habitats from Pakistan.

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References

Bal, D.A. and M. Özkan, 2006. *Trichouropoda turcicaovalis* sp. nov., a new uropodine mite (Acari: Mesostigmata: Trematuridae) from Turkey. *Zootaxa, 1132*(1): 31–49.

Berlese, A., 1916. Centuria seconda di Acari nuovi. *Redia,* 12: 125–177

Berlese, A., 1917. Intorno agli Uropodidae. *Redia*, 13: 7–16

Halliday, R.B., 2016. Catalogue of families and their type genera in the mite suborder Uropodina (Acari: Mesostigmata). *Zootaxa*, 4061: 347–366

Halliday, R.B., M. Kamran and M.H. Bashir, 2018. Checklist of the mites of Pakistan. *Zootaxa*, 4464.1: 1–178

Hirschmann, W. and I. Zirngiebl-Nicol, 1961. Gangsystem der Parasitiformes. Teil 4. Die Gattung *Trichouropoda* Berlese 1916 nov. comb. Die Cheliceren und das System der Uropodiden (Schriftenreihe für Vergleichende Milbenkunde). *Acarologie,* 4: 1-41

Hirschmann, W., 1972. Gangsystematik der Parasitiformes. Teil 161. Die Gattungen Baloghjkaszabia und Kaszabjbaloghia nova genera (Uropodini, Uropodinae) (Schriftenreihe für Vergleichende Milbenkunde). *Acarologie*, 19: 103–105

Koch, C.L., 1839. *Deutschlands Crustaceen, Myriapoden und Arachniden: Ein Beitrag zur Deutschen Fauna Herrich-Schäffer Regensberg.* Germany

Kontschán, J. and J. Starý, 2013. Two new Uropodina species from Ethiopia (Acari: Mesostigmata). Afr. Invertebr., 54: 49–57.

Kontschán, J., 2012. New Uropodina mites from India (Acari: Mesostigmata). Zootaxa, 3518: 25–44.

Mašán, P., 1999. Description of the deutonymph of *Trichocylliba comata* (Acarina, Mesostigmata, Uropodina). *Biologia*, 54: 525–527

Mašán, P., 2001. Mites of the cohort Uropodina (Acarina, Mesostigmata) in Slovakia. *Annot. Zool. Bot.*, 223: 1–320

Qayyoum, M.A. and B.S. Khan, 2017. Poultry manure-inhabiting mites (Mesostigmata: Acari). *Antenna,* 41: 6–10

Vitzthum, H., 1923. Acarologische Beobachtungen (7Reihe). *Arch. Naturgesch.*, 2: 97–181

Vitzthum, H., 1926. Acari als Commensalen von Ipiden (Abteilung für Systematik, Geographie und Biologie der Tiere). *Zool. Jahrb.*, 52: 407–503

Wiśniewski, J. and W. Hirschmann, 1988. Gangsystematik der Parasitiformes. Teil 499. Zwei neue Nenteria-Arten aus Neuguinea und Uruguay (Trichouropodini, Uropodinae). *Acarologia*, 29: 19–34

Wiśniewski, J., 1998. Stand der Uropodiden-Forschung bis Ende 1993. *Acarologia*, 39: 227–231

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