

Research Article



A New Species of the Genus *Pseudostigmaeus* Wood (Acari: Prostigmata: Stigmaeidae) from Pakistan

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Abstract | Mites of the family Stigmaeidae are well known as predators against phytophagous mites, lepidopterous eggs and bodies of small soft insects. A random survey was conducted to explore the predatory mite fauna from Punjab, Pakistan. The holotype female (male unknown) of the new mite species *Pseudostigmaeus sorghumus* sp. nov was collected from city Dera Ghazi Khan on *Sorghum bicolor* (L.) and described. Fifteen paratypes were also collected from same collection data and seven were from Muzaffargarh.

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Introduction

Stigmaeidae is considered as major family within Raphignathoidea and comprise a large cosmopolitan of near about 500 species grouped into 32 valid genera (Dogaan et al., 2011; Khanjaani et al., 2012a) including the genus *Ueckermann* in 2008. Stigmaeid mites naturally minute, often red to yellow orange arachnids, that occur in many habitat and giving an important slice of the soil texture, leaf litter and aerial plant parts. Stigmaeids are proved to be a large cluster of predators that feed on variety of arthropod pest, ectoparasites of flies and also pollen feeders (Summers, 1966; Meyer and Ueckerman, 1987; Walter et al., 2009). Stigmaeid mites are considered as efficient feeders against the tetranychid, tenuipalpid and eriophyid mites (Santos and Laing, 1985). Stigmaeid mites are well known predators against the phytophagous mites, soft small insect bodies and feeding on a variety of arthropods (Swift, 1987; Akyol and Koc, 2007; Khanjani et al., 2010). The total eight species of

genus *Pseudostigmaeus* were introduced from world (*Pseudostigmaeus* wood as type specimen) including one from Pakistan i.e., *Pseudostigmaeus jhangensis*. All specimens were deposited in the Acarology Research Laboratory, Department of Entomology, University of Agriculture, Faisalabad, Pakistan.

Diagnosis

Wood (1967) created the genus *Pseudostigmaeus*, distinguishing it by the presence of 3 pairs of setae on median propodosomal plate, the presence of intercoxal plates and 1-2 setae on coxa II. Body soft and weakly reticulated, chelicerae separated, Palptibia with 2 simple setae, main claw sometimes with 1 accessory claw, palptarsus bearing 4 setae, 1 soledion, 1 spine and 1 trifid eupathidium. Dorsal setae 11-13 pairs (sometimes vi absent as in this new species). Dorsum covered by 1 propodosomal shield and 1 pair of small suranal shield. Propodosoma 1 pair of eyes. Mostly genital area provided with a single genital pore, 3 pairs of anogenital setae and 3 pairs of paraproctal setae. Mites of this genus often collected from living

plants or soil leaf litter. The mites of this genus were recorded from New Zealand, China, Ireland, South Africa and Pakistan, respectively. A new species has been collected by the author from Punjab, Pakistan and described here in this manuscript which is compared with *Pseudostigmaeus capensis* Meyer and *P. ueckermanni* Ueckermann for differences.

Materials and Methods

Mite of the genus *Pseudostigmaeus* (Acari: Prostigmata: Stigmaeidae) were collected by (Bilal Saeed Khan) from *Sorghum bicolor* (L.) through sieve collection method. The slides were equipped by using the solution of Hoyer's and drawn with the help of eye piece / microscope. The species have been identified with the help of the accessible keys and text. Grandjean's system of terminology (Grandjean, 1944) with modifications/additions made by (Summers, 1960; Gonzalez, 1965) were used. All measurements are in micrometers (μm). The abbreviations used in this manuscript as:

ve (*be*): pre-ocular dorsal setae; *sci* (*ce*): post ocular dorsal setae; *c1* (*a*): dorsocentral dorsal setae (I); *d1* (*b*): dorsocentral dorsal setae (II); *e1* (*c*): mediozonal setae; *h1* (*e*): central suranal setae; *c2* (*he*): humeral setae; *d2* (*la*): dorsolateral dorsal setae; *f1* (*Ii*): intercalary dorsal setae; *e2* (*Im*): lateral zonal setae; *ag1*, *ag2*, *ag3*: agenital setae; *ps1*, *ps2*, *ps3*: paraproctal setae; *he*: humeral seta (ventrally visible); *vi* (*ae*): vertical dorsal setae (absent in this new species). Notes: i. Kethley (1990) has given dorsal setal nomenclature and shield designations respectively. ii. Oldsetal abbreviations are given in brackets.

Results and Discussion

Wood 1967 erected the genus *Pseudostigmaeus* based on type species as *P. collyerae* Wood and *P. striatus* Wood at the same time. Meyer and Ryke (1969) described *P. capensis* Meyer from South Africa and redefined the genus with a new diagnosis. But later, *P. capensis* removed and designated as the genotype of a new genus *Parastigmaeus* Kuznetsov (Kuznetsov and Petrov, 1984). Wood (1970) described 1 species (*Pseudostigmaeus longisetis*) Campbell Island from moss. Later Wood provided a key to species from New Zealand in 1971. Momen (1987) described *Pseudostigmaeus arboricolus* from apple tree in Ireland. A new species *P. ueckermanni* (1987) was collected from China.

Description of *Pseudostigmaeus sorghumus* sp. nov

Female: (Dorsum) Body long slender pear shape 435 μm (without gnathosoma), 230 μm wide, chelicerae length 92 μm , stylets 42 μm long. Palptarsus slightly longer than main claw. palptarsus well developed and reaches past the tibial claw. The setae disposed on the palpal segment provided femur 2, genu 2, tibia 2, tarsus with 4 minute setae and provided with trifid sensillum. Base of the chelicerae are not fused together. Peritreme obvious having the length of 73 μm , eyes 1 pair large in size (Figure 1). Post-ocular body absent. Propodosomal shield having rounded corners. The 1st pair of propodosomal seta *ve* is not located on anterior margin of propodosomal plate. The 2nd pair of propodosomal seta *sci* situated immediately in front of eyes. The 3rd pair of propodosomal seta *sce* shorter in length than the seta *sci* and not present on the propodosomal plate. Humeral seta *he* absent dorsally. Metapodal shield completely invisible and whole area covered with straight and vertical striations. Dorsal idiosomal setae provided with tiny platelets except *f1*; seta *f1* present. 5 pairs of setae on hysterosoma shorter in length than the setae *h1* and *h2*. The respective distances between *ve-ve* 33, *sci-sci* 68, *sce-sce* 145, *c1-c1* 85, *d1-d1* 93, *e1-e1* 50, *f1-f1* 85, *c1-d1* 82, *d1-e1* 60, *e1-f1* 37, *d2-d2* 180, *e2-e2* 155. The length of dorsal setae *ve* 17, *sci* 23, *sce* 15, *he* 17; seta *h1* 16, *d1* 15, *e1* 15, *d2* 15, *e2* 13, *f1* 18, *h2* 20, *h1* 28 and *f1* 18.

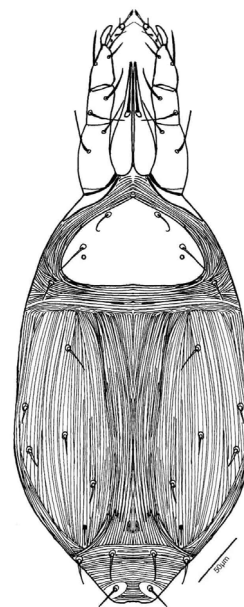


Figure 1: *Pseudostigmaeus sorghumus* sp. nov. dorsal surface of female.

Venter: Ventral gnathosoma provided 3 pairs of setae, 3rd pair of seta longest. In 5 pairs of idiosomal setae, 1st pair much longer than others and this 1st pair present

between coxae I and II. Humeral seta *he* present ventrally. 3 pairs of anogenital setae (*ag1*, *ag2*, *ag3*) smooth while regarding paraproctal setae, the 2nd and 3rd one is barbed except Ist pair (Figure 2).

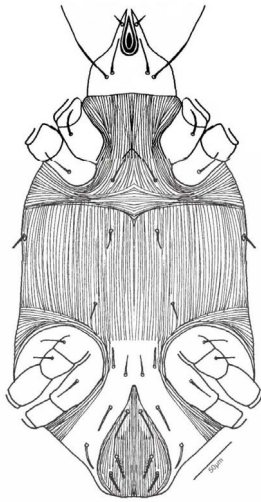


Figure 2: *Pseudostigmaeus sorghumus* sp. nov. ventral surface of female.

Legs: Chaetotaxy of legs I-IV as (Figure 3): coxae 2-1-1-1; trochanters 0-0-1-1; femora 4-4-2-2; genua 3-1-0-0; tibiae 3-4-3-4 and tarsi 10-6-5-5.

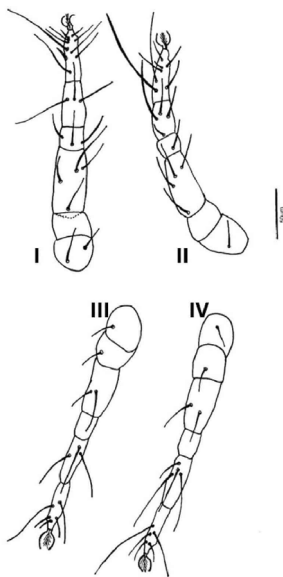


Figure 3: *Pseudostigmaeus sorghumus* sp. nov. legs I-IV of female.

Etymology: This new species refers to the crop name from where it was collected.

Adult male: Unknown.

Type: Holotype, female collected from Dera Ghazi Khan on *Sorghum bicolor* by (Bilal Saeed Khan). 15 paratype females, 8 same collection data and 7 from date palm in Muzaffargarh. All specimens were deposited

in Acarology Research Laboratory, Department of Entomology, University of Agriculture, Faisalabad.

Remarks: This new species closely related with *P. capensis* but separated it due to following points:

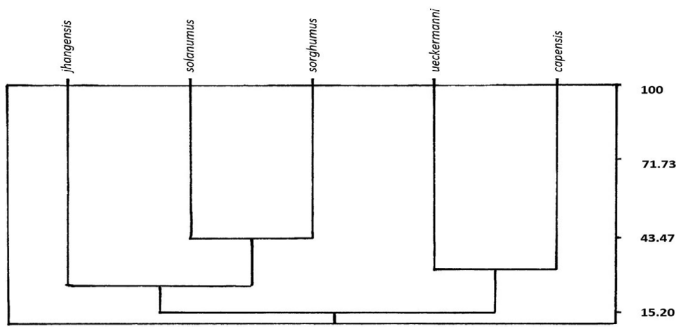
1. Postocular body present in *P. capensis* while absent in this sp. nov.
2. 1st pair of seta *ve* is not located on anterior margin of propodosomal plate in this sp. nov. while *ve* present very anteriorly in *P. capensis*.
3. *sce* shorter than seta *sci* in this n.sp. but *sce* longer in *P. capensis*.
4. Humeral seta *he* absent dorsally in this n.sp. while present in *Pseudostigmaeus capensis*.
5. *fl* present in this n.sp. while absent in *P. capensis*.
6. 3 pairs of anogenital setae in this n.sp. while 4 in *P. capensis*.

Note: Dendrogram of 5 species of the genus *P.* from Punjab, Pakistan is also given in manuscript.

Key to genus *Pseudostigmaeus* form Punjab, Pakistan (Females)

1. Tridentate spine absent on tarsalpeg; palptibia with 1 seta; palp tarsalpeg equal with main claw; dotted striations on propodosomal shield; 11-pairs dorsal setae.....*jhangensis*
2. Tridentate spine present; palptibia with more than 1 seta; palp tarsalpeg longer than main claw; propodosomal shield without dotted striations; 12-13 pairs dorsal setae..... 2
3. Propodosomal shield incompletely visible; metapodal shield visible; ventral idiosoma partially striated; anogenital setae serrate.....*solanumus* (n.sp) (Figures 1 and 2)
4. Propodosomal shield completely visible; metapodal shield not visible; ventral idiosoma completely striated; anogenital setae not serrate.....3
5. Dorsal setae smooth; humeral seta ventrally present; anogenital plate not rounded in shape; smooth paragenital setae; barbed anogenital setae; 3 setae on tibia-I*sorghumus* sp.nov.
6. Dorsal setae not smooth; humeral seta ventrally absent; anogenital plate rounded in shape; paragenital setae not smooth; anogenital setae not barbed; more than 3 setae on tibia-I.....4
7. Palpgenu with 2 setae; postocular body absent; seta *fl* present; 4 pairs of anogenital setae; ventral idiosoma provided with 5 setae.....*ueckermanni* Fan and Liu
8. Palpgenu without setae; postocular body present;

seta *fl* absent; 3 pairs of anogenital setae; ventral idiosoma provided with 6 setae.....*capensis* (Meyer)



Note: Dendrogram of 5 species of the genus *Pseudostigmaeus* from Punjab, Pakistan.

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Author's Contribution

Bilal Saeed Khan: Principal and Corresponding author. Wrote the abstract and introduction. Did methodology of work and data collection.

Muhammad Afzal: P.I of whole research work project. Plan the idea of research work.

Muhamma Asif Qayyoom: Development of key formation and character data entry. Technical inputs.

Imran Ali: Write up of key characters and analysis and improve discussions.

Abdul Ghaffar: Revised study if genus and literature help with results/conclusion.

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