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DESCRIPTIONS OF FOUR NEW SPECIES OF THE GENUS PARASEIULUS MUMA (ACARINA: PHYTOSEIIDAE) FROM PAKISTAN

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PARASEIULUS

SUMMARY: Four new species of the genus Paraseiulus: P. ajmali, P. sarcina, P. palitans and P. effundo are described from Pakistan.

The genus Paraseiulus Muma is an important genus of the tribe Paraseiulini of the family Phytoseiidae. It was erected by Muma (1961) who designated Seiulus soleiger Ribaga as its type species. This genus includes predatory mites of economic importance which are considered to play an important role in controlling harmful mites and small insects. Some taxonomic research work on these mites of the genus Paraseiulus has been done in Pakistan, CHAUDHRI et al. (1974) and PARVEZ et al. (1994) described six new species. The present paper includes descriptions of 4 new species thus making a total of 10 species described from Pakistan. A comprehensive key for these 10 species is also included.

The setal nomenclature followed in this manuscript is that of ROWELL et al. (1978), modified by DENMARK (1992) & KOLODOCHKA and DENMARK (1996).

Genus Paraseiulus Muma

Diagnosis: The 39 known species in this tribe are among the most setose in the subfamily Typhlodrominae, indeed in the entire Phytoseiidae. The all have podosoma 1 setal pattern P 13A combined with a variety of opisthosoma and caudoventral patterns. They are characterised above all by the presence of seta z6 on the adult female (This seta is variable on males in the genus Paraseiulus). In addition setae z3, s6, J2, S2, S4, S5, R1, JV4 and ZV3 are present. Setae J1, Z1, Z3, JV2 and JV3 present/absent. In general, dorsal setae short to medium in length; idiosoma well sclerotised, female ventrianal shield well developed. The most highly adapted forms are in the genus Paraseiulus, the only group in the family that lack seta JV2 and with the female ventrianal shield of characteristic shape (CHANT & McMURTRY 1994).

Key to Paraseiulus Muma in Pakistan

(Females)

1. Dorsal shield oval.................. P. sursum Parvez et al.
   — Dorsal shield with concave area or areas marginally. 2
2. Dorsal shield with one concave area, near seta R1...... 3
   — Dorsal shield with more than 1 concave areas marginally.......................... 6
3. Leg IV with macroseta on basitarsus....................... 4
   — Leg IV without macroseta on basitarsus

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4. Peritreme with recurved tip .......... P. operantis Chaudhri et al.
— Peritreme with straight tip ............... 5

5. Movable cheliceral digit with one tooth .......... P. aditus Parvez et al.
— Movable cheliceral digit with 2 teeth .......... P. maritius Parvez et al.

6. Movable cheliceral digit with 1 tooth, fixed digit with 2 teeth .......... P. meritus Parvez et al.
— Movable cheliceral digit with 2 teeth, fixed digit with more than 2 teeth .......... 7

7. Peritreme extending post seta jl, no macroseta on basitarsus .......... P. paltians n. sp.
— Peritreme reaching to seta jl, macroseta only on basitarsus .......... 8

8. Fixed cheliceral digit with 5 teeth .......... P. ajmali n. sp.
— Fixed cheliceral digit with less than 5 teeth .......... 9

9. Dorsal shield with 2 concave and 1 convex areas; fixed cheliceral digit with 3 teeth .......... P. sarcina n. sp.
— Dorsal shield with 3 concave and 1 convex area; cheliceral fixed digit with 4 teeth .......... P. efluendo n. sp.

1. Paraseiulus ajmali, new species
(Figs. 1, A-F)

FEMALE: Dorsal shield completely reticulated; I concave area near seta z 3, 2 concave areas near R1; 386 μm long, 185 μm wide; 19 pairs of setae and one pair of rounded, visible pores (Fig. 1-A). Chelicera 26 μm long; movable digit with 2 teeth, fixed digit with 5 subapical teeth (Fig. 1-B). All dorsal shield setae less than distance to seta next in line, smooth and simple. Dorsal shield setae: j1 26 μm, j3 18 μm, j4 = j5 = 16 μm, j2 18 μm, j5 5 μm; z2 16 μm, z3 = z4 = 10 μm, z5 16 μm, z6 18 μm, Z4 26 μm, Z5 32 μm, s4 = s6 = 101 μm, S4 = S5 = 20 μm; r3 = R1 26 μm (both on membrane). Seta Z4 posterior to seta S4 at a distance of 24 μm (Fig. 1-C). Peritreme reaching seta j1, with straight tip. Peritremal shield base ribbon-like, slightly flared at starting point (Fig. 1-D). Sternal shield smooth, posterior margin convex medially, concave laterally; anterior margin convex; 78 μm long, 65 μm wide; 3 pairs of setae (2 on shield, 1 on membrane); seta St1 larger than distance between seta St1 & St2 (Fig. 1-C). Metasternal setae 1 pair, each on a separate platelet. Genital shield smooth, 65 μm wide, one pair of setae. Genital and ventrianal shields 26 μm apart with a membranous fold in between. Genital shield width less than ventrianal shield width. Ventrianal shield smooth, 110 μm long, 72 μm wide at ZV2 level and 74 μm at anus level with lateral margins constricted to form a waist, then flaring to form shield opposite anus; 4 pairs of preanal setae and one pair of elliptical pores (Fig. 1-C). Four pairs of setae, including 1 pair JV5 29 μm long, on membrane surrounding ventrianal shield (Fig. 1-C). One pairs of metapodal platelets on each side, both tubular; primary 33 μm long; secondary pair 12 μm long (Fig. 1-C). Leg IV with macroseta on basitarsus only, 31 μm long (Fig. 1-F). Spermatheca: cervix tubular flared at both ends, anteriorly rounded, posteriorly pyriform; atrium undifferentiated (Fig. 1-F).

MALE: Not came in collection.

TYPE: Holotype female, collected 1 km. W. Rawalakot, 4500' (Azad Kashmir) from rose (Rosa indica), 19 Sept., 1992 (PARVEZ and CHAUDHRI), deposited in Acarology Research Laboratory, Department of Agri. Entomology, University of Agriculture, Faisalabad, Pakistan.

REMARKS: Paraseiulus ajmali is related to Paraseiulus sarcina, new species, but the following characters separate them:
1 — Fixed digit of chelicera with 3 teeth in sarcina; 5 teeth in ajmali.
2 — Genital shield wider than ventrianal shield width in sarcina; narrower in ajmali.
3 — Shape of spermatheca different.
4 — Dorsal shield without pores in sarcina; 1 pair pores present in ajmali.

2. Paraseiulus sarcina, new species
(Figs. 2-A-F)

FEMALE: Dorsal shield completely reticulated; 2 concave and 1 convex areas near seta R1; 378 μm long, 192 μm wide; 19 pairs of setae (Fig. 2-A). Chelicera 27 μm long; movable digit with 2 teeth; fixed digit with 3 subapical teeth (Fig. 2-B). All setae of dorsal shield smooth, simple and shorter than distance to next seta in line. Dorsal shield setae: j1 20 μm, j3 18 μm, j4 = j5 = j6 = 16 μm, j2 17 μm, j5 5 μm; z2 = z3 = z4 = z5 = z6 = 16 μm, Z4 20 μm, Z5 31 μm, s4
FIG. 1: Paraseiulus ajmalii n. sp. A. — Dorsal view; B. — Chelicera; C. — Sternal, genital and ventrianal shields; D. — Peritremal shield base; E. — Spermatheca; F. — Leg IV.

s6 = 17 μm, S2 14 μm, S4 16 μm, SS 19 μm; r3 20 μm, R1 19 μm. Seta Z4 posterior to seta S6, 15 μm, and 19 μm apart from S4 and S5, respectively. Peritreme reaching to seta j1, tip straight. Peritremal shield base ribbon-like, slightly flared posteriorly (Fig. 2-D). Sternal shield smooth, 78 μm long, 62 μm wide; convex anteriorly; concave laterally, 3 pairs setae (2 pairs on shield, one pair on membrane); seta St1 is smaller than the distance between the bases of seta St1 & St2 (Fig. 2-C). Metasternal setae 1 pair, each seta on separate platelet. Genital shield smooth 65 μm wide, 1 pair of setae. Genital and ventrianal shields 24 μm apart with a membranous fold inbetween. Genital shield wider than ventrianal shield. Ventrianal shield, smooth, 95 μm long, 52 μm at maximum width; vase-shaped, 4 pairs of pre-anal setae and one pair of elliptical pores (Fig. 2-C). Four pairs of setae, including setae JV5 29 μm long, on membrane surrounding ventrianal shield. Metapodal platelets one pair on each side, primary tubular, 30 μm long; secondary crescent-shaped, 12 μm long (Fig. 2-C). Leg IV with one macroseta only on basitarsus (Fig. 2-F). Spermatheca cervix tubular, slightly flared; atrium founded; vesicle oval (Fig. 2-E).
FIG. 2: *Paraseiulus sarcina* n.sp. A. — Dorsal view; B. — Chelicera; C. — Sternal, genital and ventrianal shields; D. — Peritremal shield base; E. — Spermatheca; F. — Leg IV.
**MALE**: Not came in collection.

**TYPE**: Holotype female, collected 1 Km. E. Murree 6500' *Pinus* sp., on Oct. 1, 1992 (PARVEZ and CHAUDHRI); paratypes I female, same collection data, six females, from Nathia Gali (9000'), Sept. 12, 1993, from *Pinus* spp. All deposited in Acarology Research Laboratory, Department of Agri. Entomology, University of Agriculture, Faisalabad, Pakistan.

**REMARKS**: *Paraseiulus sarcina*, new species can be separated from the closely related *P. ajmali*, new species, by the following characters:

1. Cheliceral fixed digit with 5 teeth in *ajmali*; 3 teeth in *sarcina*.
2. Genital shield not wider than ventrianal shield in *ajmali*, wider than ventrianal shield in *sarcina*.
3. Shape of spermatheca different.
4. Dorsal shield with I pair of pores in *ajmali*; pores absent in *sarcina*.

3. *Paraseiulus palitans*, new species

(Figs. 3-A-F)

**FEMALE**: Dorsal shield completely reticulated, 3 concave areas laterally 1 each near setae *Z2*, *r3* and *R1*; 390 µm long, 208 µm wide; 19 pairs of setae (Fig. 3-A). Chelicera 10 µm long; movable digit with 2 teeth; fixed digit with 4 subapical teeth (Fig. 3-B). Dorsal shield setae simple, smooth, shorter than distance to next seta in line. Dorsal shield setae: *J1* 18 µm, *J3* 13 µm, *J4* = *J5* = *J6* 10 µm, *J2* 15 µm, *J5* 5 µm; *Z2* = *Z3* = *Z4* = *Z5* = *Z6* = 13 µm, *Z4* 19 µm, *Z5* 39 µm, *S4* = *S6* = 13 µm, *S2* = *S4* 20 µm, *S5* 19 µm; *r3* = *R1* 13 µm. (both on membrane) (Fig. 3-A). Seta *Z4* in line with setae *S4*; 20 µm and 18 µm apart from *S4* and *S5*, respectively. Peritreme reaching beyond seta *J1*, tip directed slightly downwards. Peritremal shield base concave, bulges laterally and slightly narrowing posteriorly (Fig. 3-D). Sternal shield smooth, 89 µm long, 60 µm wide, wavy posteriorly, convex anteriorly; 2 pairs of setae on shield 3 pairs on membrane, *St1* greater that the distance between the bases of *St1* & *St2* (Fig. 3-C). Metasternal setae one pair, each seta on a separate platelet. Genital shield smooth, 65 µm wide, one pair of setae. Genital and ventrianal shields with a membranous fold between. Genital and ventrianal shields equal in width. Ventrianal shield smooth, oblong; 90 µm long, 60 µm wide; lateral margins with a constriction near preanal seta III; rounded anteriorly and posteriorly; 4 pairs of preanal setae and I pair of elliptical pores (Fig. 3-C). Four pairs of setae, including 1 pair *JV5* 39 µm long on membrane surrounding ventrianal shield. Metapodal platelets I pair on each side; primary 31 µm long; secondary 13 µm long (Fig. 3-C). Leg IV without macroseta on basitarsus (Fig. 3-F). Spermatheca: cervix filament-like slightly flared anteriorly and posteriorly; atrium triangular (Fig. 3-E).

**MALE**: Not came in collection.

**TYPE**: Holotype female, 1 Km. N. Murree 65 00' from pomegranate (*Punica granatum*), 21 Oct. 1991 (PARVEZ and CHAUDHRI). Paratypes 2 females, same collection data; eight females, Kalam 9000' (Swat Valley), 12 May. 1992 from *Pinus wallichiana*. All specimens deposited in Acarology Research Laboratory, Department of Agri. Entomology, University of Agriculture, Faisalabad, Pakistan.

**REMARKS**: *Paraseiulus palitans*, new species can be separated from *Paraseiulus effundo*, new species, by the following characters:

1. Seta *Z4* reaching base of seta *S5* in *effundo*, short of distance in *palitans*.
2. Genital shield not wider than ventrianal shield in *effundo*, wider in *palitans*.
3. Peritreme with straight tip in *effundo*; directed slightly downwards in *palitans*.
4. Cervix horseshoe shaped with undifferentiated atrium in *effundo* but cervix is filament like, slightly flared at both ends with triangular atrium, in *palitans*.
5. Shape of spermatheca different.
6. Leg IV macroseta present on basitarsus in *effundo*; absent in *palitans*.

4. *Paraseiulus effundo*, n. sp.

(Figs. 4-A-F)

**FEMALE**: Dorsal shield completely reticulated, forming hood anteriorly; I slightly concave area near *Z2*, 2 concave and one convex areas near *R1*; 384 µm long, 189 µm wide; 19 pairs of setae, pores absent (Fig. 4-A). Chelicera 24 µm long; movable digit with 2 teeth, fixed digit with 4 subapical teeth (Fig. 4-B).
FIG. 3. *Paraseius palitans* n.sp. A. — Dorsal view; B. — Chelicera; C. — Sternal, genital and ventrianal shields; D. — Peritremal shield base; E. — Spermatheca; F. — Leg IV.
All dorsal shield setae smooth, simple, not reaching seta next in line, except Z4 just reaching base of seta S5. Dorsal shield setae: J1 = J3 18 μm, J4 = J5 = J6 = 13 μm, J2 17 μm, J5 5 μm; z2 = z3 = z4 = 18 μm, z5 = z6 = 14 μm, Z4 18 μm, Z5 52 μm, s4 = s6 = S2 = S4 = S5 = 18 μm; r3 22 μm, R1 20 μm. (both on membrane). Seta Z4 posterior to seta S4 10 μm and 14 μm apart from S4 and S5, respectively; (Fig. 4-A). Peritreme just reaching seta J1, tip straight. Peritremal shield base wedge-shaped pointing posteriorly (Fig. 4-D). Sternal shield smooth, 83 μm long, 65 μm wide, and convex anteriorly; 3 pairs of setae (2 on shield, 1 on membrane); seta St1 is greater than the distance between the bases of seta St1 & St2 (Fig. 4-C). Metasternal setae one pair, each on a separate minute platelet. Genital shield smooth, 76 μm wide, one pair of setae. Genital and ventrianal shields 23 μm apart with a membranous fold inbetween. Genital and ventrianal shields almost equal in width. Ventrianal shield smooth, ends slightly pointed anteriorly; 110 μm long, 78 μm wide at the broadest point;
lateral margins constricted, forming a waist, then flaring to make shield widest opposite anus; 4 pairs of preanal setae and one pair of elliptical pores (Fig. 4-C). Four pairs of setae, including JV5, 30 μm long, on membrane surrounding ventrianal shield. Metapodal platelets I pair on each side; primary triangular, 36 μm long; secondary 13 μm long (Fig. 4-C). Leg IV with macroseta on basitarsus, 22 μm long (Fig. 4-F). Spermatheca horse-shoe shaped (Fig. 4-E).

**MALE:** Not came in collection.

**TYPE:** Holotype female, 1 Km. E. Murree (7000'), from *Pinus sp.*, 1 Oct. 1992 (PARVEZ and CHAUDHRI). Paratypes 3 females, same collection data. Two females, collected Kuldanna, 6500' (Murree Hills), 3 Oct. 1992 from *Prunus domestica*. All specimens deposited in Acarology Research Laboratory, Department of Agri. Entomology, University of Agriculture, Faisalabad, Pakistan.

**REMARKS:** *Paraseiulus effundo*, new species is closely related to *Paraseiulus palitans*, n. sp. but differs in the characters listed in remarks under that species.

**REFERENCES**


