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Studies on the Soil Oribatid Mite (Acari: Oribatida) Fauna of Western Vidarbha, Maharashtra, India

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Abstract: *The present work deals with a collection of soil oribatid mites from some selected habitat of five districts of Vidarbha Region of the Maharashtra state.15 species under 12 genera belonging to 10 families of soil oribatid mites were found from the present investigation.*

Keywords: *Maharashtra, Vidarbha region, Soil Oribatid mites.*

1. INTRODUCTION

The oribatid mites are one of the richest soil arthropodan groups both as to the number of species and individuals. By their very numbers, they play an important role in the decomposition of organic substances in the soil. They are also apparently suitable as biological indicators [1].

When compared the state Maharashtra is so far known to comprise only 4 Oribatid species belonging to 3 genera and 2 families as against 2186 species belonging to 643 genera & 207 families reported from India. Narsapur made the first record of Oribatid mite from Maharashtra from the soils of the state [2]. Later Sanyal studied soil mites of Maharashtra and published one paper containing description of two new species [3]. No work has been done on soil oribatid mites after that. Later Acharya and Basu made extensive studies on this group of mites and published several papers [4,5,6,7].

Vidarbha is the eastern region of the Indian state of Maharashtra, Comprising Nagpur Division and Amravati Division. As a part of the departmental Maharashtra state survey programme, five districts of western part of Vidarbha region namely Nagpur, Gondia, Wardha, Bhandara and Chandrapur were covered by the staffs of the Acarology section. This paper presents brief characterization along with distribution for soil oribatid mites of the above mentioned districts of western part of Vidarbha.

2. MATERIAL AND METHODS

The survey was done in the five districts of western vidarbha region i.e Nagpur, Wardha, Gondia, Bhandara and Chandrapur.

For taxonomic studies of oribatid mites, litter, soil and humus samples from all possible habitats were collected. The samples collected by shovel from upper 10 cm soil profile were kept in polythene bags. The samples were extracted by using modified Tullgren funnels and extracted mite specimens were collected in glass tubes containing 70% alcohol.

The body of most of the oribatid mite is heavily sclerotized and opaque. The extracted material were made ready for taxonomic study following the usual procedure of keeping the specimen in solution of 90% alcohol and lactic acid (v/v) as advocated by Balogh [8]. For microscopic observations, Balogh's method of temporary mounting in lactic acid was followed [8]. After necessary microscopic observations the specimen was transferred in small glass vials containing 90% alcohol. The vials were then properly labelled and stored.

The specimens were studied under Nikon Eclipse, 50i microscope. In this study, the classification proposed by Balogh (1972) has been followed.

All specimens are deposited in the National Zoological Collections of Zoological Survey of India, Hqs.

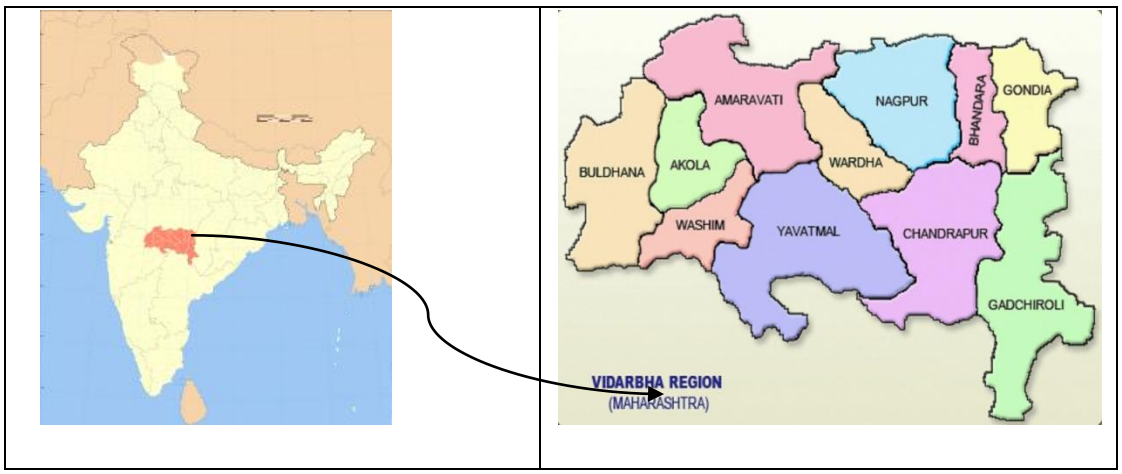

Fig1. *Map of India with Vidarbha region marked in red and different districts of Vidarbha*

3. RESULTS

Observations reveal **15** species under **12** genera belonging to **10** families of soil oribatid mites from the present investigation.

1. Family: PHTHIRACARIDAE Perty, 1841

1. Genus: ***Hoplophthiracarus* Jacot, 1933**

1933. *Hoplophthiracarus* Jacot, *Journ. El. Mitch. Sci. Soc.*, **48**:239.

1. ***Notophthiracarus (Calyptophthiracarus) pavidus pavidus* (Berlese, 1913)**

***(=Hoplophthiracarus cretensis* Mahunka, 1979)**

1913. *Notophthiracarus (Calyptophthiracarus) pavidus pavidus* Berlese,. *Redia.* **9:** 77-111.

1979. *Hoplophthiracarus cretensis* Mahunka, *Revue Suisse Zool*., **86** (2): 558.

Diagnosis: All notogastral setae uniform, erect then proclinate. Setae ciliate, except basally- rostral setae ciliate, longer than entirely smooth *sl*..Stalk of sensillus long, clavately capitates, ciliate. Ano adanal plate with seta ad_3 also short, not longer than anal setae, but originating far from inner margin of plate.

***Material Examined*:** 4♀♀, Wadgaon vill., Chandrapur, 28.vii. 2014, from Kapas field, coll. S. Acharya, 5069/17/ZSIHQ; 1♀, Khambara vill., Chandrapur, 28.vii.2014, from Soil & litter, coll. S. Acharya, 5079/17/ZSIHQ;

Remarks: This species is recorded here for the first time from India.

2. Family: LOHMANIDAE Berlese, 1916

2. Genus: ***Javacarus*** Balogh, 1961

1961. *Javacarus* Balogh, *Acta.Zool.Acad.Sci.Hung*., **7**:24

2. *Javacarus kuehnelti* Balogh

1961. *Javacarus* Balogh, *Acta Zool. Acad. Sci. Hung*., **7**(1 & 2): 31.

Diagnosis: Prodorsum with small spots; rostrum sculptured; prodorsal setae lanceolate; sensillus with 7-10 secondary branches; notogaster with light spots forming a pattern; notogastral setae lanceolate without mid rib; genital setae 10 pairs.

Material Examined*:* 1♀, Sakoli vill., Bhandara, 3.viii.2014, from soil & litter, coll. S. Acharya, 5082/17/ZSIHQ; 1♀, Dikshabhumi vill., Nagpur, 24.vii.2014, from soil & litter, coll. S. Acharya, 5097/17/ZSIHQ;

Distribution: India: West Bengal (Birbhum), Maharashtra, Tripura.

3. Genus ***Popillacarus*** Kunst

1959. *Papillacarus* Kunst, *Acta Univ. Carol. Biol*., 52

3. ***Papillacarus ungulates*** Wallwork

1962. *Papillacarus ungulates* Wallwork, *Acarologia*, **4**(3): 457-487

Diagnosis: Rostral tectum very thin, forming an incomplete covering over the mouth parts; Lateral margin of prodorsal shield have an angular contour; rostral setae inserted close together on each side of the mid line. The prodorsal setae are conspicuously barbed; notogaster truncate anteriorly.

Material examined: 1♀, Chandrapur, Kosara vill., 28.vii.2014, from sugarcane field, coll. S. Acharya, 5077/17/ZSIHQ.

***Distribution*:** India: Uttar Pradesh (Aligarh).

3. Family TRHYPOCHTHONIDAE Willman, 1931

4. Genus: *Allonothrus* Van der Hammen, 1953

1953. *Allonothrus* Hammen, *Proc. Acad. Sci. Amst.*, **56C**: 244.

4. ***Allonothrus russeolus russeolus* Wallwork, 1960**

1960. *Allonothrus russeolus* Wallwork *Acarologia*, **2**(4): 571

Diagnosis: Prodorsum with minute punctuations; lateral prodorsal ridges strongly curved, central ridges fused anteriorly; rostral setae pointed, burbed; an interrupted transverse ridge behind the interlamellar setae; other dorsal setae fan-shaped; notogaster with circular or polygonal areolae surrounded by reddish-brown ridges; genital setae 13 pairs.

Material Examined: 1♂,Narsala vill., Nagpur, 23.vii.2014, from Soil & Litter, coll. S. Acharya,5076/17/ZSIHQ; 1♂,Khambara vill., Chandrapur, 28.vii.2014, from soil & litter, coll. S. Acharya,5081/17/ZSIHQ; 3♂♂, Bhadrawati vill., Chandrapur, 28.vii.2014, from soya bin field, coll. S. Acharya,5081/17/ZSIHQ;

Distribution: India: West Bengal, Assam.

4. Family GYMNODAMAEIDAE Grandjean, 1954

5. Genus ***Gymnodamaeus*** Kulczynski, 1902 *(=Plesiodamaeus* Grandjean, 1954)

1954.*Plesiodamaeus* Grandjean, *Bull.Soc.zool.France*,**78**: 421-446.

5. ***Gymnodamaeus glaber*** (Mihelčič, 1957) **(=*Plesiodamaeus glaber* Mihelčič, 1957)**

1957.*Plesiodamaeus glaber* Mihelcic, *Zool. Anz*.,**159**: 41-68.

Diagnosis: The body coloration is pale. The cerotegument is granular, the rostrum rounded. The rostral hairs arise closely in front of the lamellar hairs .The rostrum is strongly sloping anteriad; The propodosoma is smooth, except in front of the pseudostigmatic organ where 3-5 pale, irregularly shaped spots occur; The hysterosoma is oblong and surrounded by a narrow edge; it is smooth except for a few pale spots at the edge of the depressed median field.

Material Examined: Thane, Majiwara,1♀, 16.ix.2013, from Soil & litter, 4993/17/ZSIHQ; Ratnagiri, Ratnagiri Fort, 2♀♀, 25.ix.2013, from soil & litter, coll. S. Acharya,4992/17/ZSIHQ; Pune, Sinhagad Fort, 1♀, 10.xii. 2013, from soil, coll. D.N Adagale, 4957/17/ ZSIHQ; Bhandara, Tumsar vill., 1♀ , 3.viii. 2014, from cow dung, coll. S. Acharya, 5088/17/ZSIHQ.

***Remarks*:** The species is recorded for the first time to India.

5. Family: EREMULIDAE Grandjean, 1965

6. Genus ***Eremulus*** Berlese, 1908

1908. *Eremulus* Berlese, *Redia*, **5**:10

6. ***Eremulus avenifer*** Berlese

1913. *Eremulus avenifer* Berlese, *Redia*, **9**: 96

1983. *Eremulus avenifer, Chakrabarti and mondal, Indian J. Acar.*,**8** (1): 40.

Diagnosis: Prodorsum with four longitudinal ridges, inner ridge or lamellae connected at anterior end by translamella; sensillus bristles like with minute setae throughout; two or three rows of many distinct pores arranged transversely on the anterior margin of notogaster; notogastral setae 11 pairs, unilaterally barbed; genital setae 6 pairs.

Material Examined: 1♀, 1♂, Devaki vill., Gondia, 31.vii. 2104, from kapas field, coll. S. Acharya, 5067/17/ZSIHQ; 1♀, Wadgaon vill., Chandrapur, 28.vii.2014, from Kapas field, coll.S. Acharya, 5071/17/ZSIHQ;

Distribution: India: West Bengal, Nagaland. Elsewhere: Indonesia, Japan, Vietnam.

7. ***Eremulus flagellifer*** Berlese

1908. *Eremulus flagellifer* Berlese, *Redia,* **5**: 10.

1981. *Eremulus flagellifer,* Bhattacharya, Joy and Joy, *J. Soil. Biol. Ecol*., **1**:32

Diagnosis: Four distinct constulae on prodorsum; rostral and lamellar setae long, simple, interlamellar setae small, simple, originating near each other, notogastral setae 11 pairs, fine, sometimes flagellate apices; genital setae 6 pairs.

Material Examined: 1♀, Wadgaon, Chandrapur, 28.vii.2014, from kapas field, coll. S. Acharya, 5072/17/ZSIHQ; 1♀, Tumsar vill., Bhandara, 3.viii.2014, from kapas field, coll. S. Acharya, 5073/17/ZSIHQ; 1♀,Chimur vill., Chandrapur, 28.vii.2014, from kapas field, coll. S. Acharya, 5075/17/ZSIHQ.

Distribution: India: West Bengal.

6. Family: SCHELORIBATIDAE Jacot, 1935

7. Genus *Scheloribates* Berlese, 1908

1908. *Scheloribates* Berlese, *Redia*, **5**: 2.

8. ***Scheloribates curvialatus*** Hammer, 1961

1961. *Scheloribates curvialatus* Hammer, *Biol. Skr. Dan Vid. Selsk*., **21**(4):35.

Diagnosis: Prodorsal setae feathered; lamellar setae very thick, long, situated on a tooth; sensillus evenly thicker towards the tip like rounded club, set with fine scales; notogastral setae not discernible; genital setae 4 pairs.

Material Examined: 1♀, Khambara vill., Chandrapur, 28.vii.2014, from soil & litter, coll. S. Acharya; 5084/17/ZSIHQ; 1♀, Dikshabhumi, Nagpur, 24.vii.2014, from soil & litter, coll. S. Acharya; 5098/17/ZSIHQ; 1♀, Dikshabhumi, Nagpur, 24.vii.2014, from soil and litter, coll. S. Acharya; 5099/17/ZSIHQ.

Distribution*:* West Bengal, Himachal Pradesh, Uttar Pradesh.

9. *Scheloribates huancayensis* Hammer, 1961

1961. *Scheloribates huancayensis* Hammer, *Biol. Skr. Dan Vid. Selsk*., **21**(4):35.

Diagnosis: Prodorsal setae feathered; lamellar setae very thick, long, situated on a tooth; sensillus evenly thicker towards the tip like rounded club, set with fine scales; notogastral setae not discernible; genital setae 4 pairs.

Material Examined: 1♀, Warud vill., Wardha, 26.vii.2014, from corn field, 5065/17/ ZSIHQ; 1♀, Dhakani vill., Gondia, 31.vii.2014, from corn field, 5066/17/ ZSIHQ; 1♀, 2♂♂, Bharatwada vill., Nagpur, 23.vii.2014, from corn field, 5070/17/ZSIHQ; 1♀, Birchi vill., Gondia, 31.vii.2014, from jawar field, 5092/17/ ZSIHQ.

Distribution: West Bengal,Assam, Himachal Pradesh.

7. Family: HAPLOZETIDAE

8. Genus: ***Peloribates*** Berlese

1908. *Peloribates* Berlese, *Redia,* **5**: 3.

10. ***Peloribates longisetosus*** (Willman, 1930)

1930. *Peloribates longisetosus* (Willman), *Zool. Anz. Leipzig*, **88**(9-10): 239-246.

Diagnosis: Legs monodactyle, or tridactyle, five pairs of genital setae. 14 pairs of notogastral setae. Dorsosejugal suture a simple curve. Notogastral setae equally thick throughout and rather stiff.

Material Examined*:* 1♀, Ambavan vill., Gondia, 31.vii.2014, from soil & litter, coll. S. Acharya, 5083/17/ZSIHQ.

Distribution: India: Himachal Pradesh, Uttar Pradesh.

11. ***Peloribates grandis*** (Willman)

1930. ***Peloribates grandis*** (Willman), *Zool. Anz*., **88**: 239-246

Diagnosis: Large species; notogastral setae short, setiform. L: 705-780µm; W: 555-600 µm.

Material examined: Bhandara, Tumsar vill.,1♀, 3.viii.2014, from soil & litter, 5087/17/ZSIHQ; Chandrapur, Khambara vill., 1♀, 28.vii.2014, from soil & litter, coll. S. Acharya, 5078/17/ZSIHQ.

Remarks: This species is first time recorded from India.

9. Genus: ***Protoribates*** Berlese

1908. *Protoribates* Berlese , *Redia*, **5**:1-15.

12. ***Protoribates (P.) magnus*** **(Aoki , 1982) (=*Xylobates magnus* Aoki, 1982)**

1982. *Xylobates magnus* Aoki, *Bull. Inst.Sci.Tech.Yokohama Natn.Univ*.**8**:173-188.

Diagnosis: Bothridium bearing a scale-like appendage posterolaterally. Sensillus bending toward posterolateral direction and bearing a lanceolate head which has one arched border and the other almost straight border (Fig. 4 B); except for the proximal part the organ set with barbs become longer toward the tip ;the barbs arranged in two rows on the head. Genital as well as anal opening nearly as long as wide; interspace between them subequal in length to anal opening. Genital opening small, about l/2.5 of anal opening. Genital plate set with 5 setae.

Material Examined: 1♀, Khambara vill., Chandrapur, 28.vii.2014, from soil & litter, coll. S. Acharya, 5080/17/ZSIHQ; 1♀, Tiroda vill., Bhandara, 3.viii.2014, from soil & litter, coll. S. Acharya, 5093/17/ZSIHQ; 1♀, Dikshabhumi vill., Nagpur, 28.vii.2014, from soil & litter, coll. S. Acharya, 5096/17/ZSIHQ; 1♀, Maganwada vill., Wardha, 26.vii.2014, from soil & litter, coll. S. Acharya, 5100/17/ZSIHQ.

Distribution: Himachal Pradesh.

8. Family: OPPIIDAE Grandjean,1951

10. Genus ***Oppia*** Koch, 1836

1836. *Oppia* Koch,*Deutschlands crustaceen, Myriapoden und Arachniden,* 1-9.

13. ***Lasiobelba kuehnelti (*Csiszar , 1961)(= *Oppia kuehnelti* Csiszar , 1961)**

1961.*Oppia kuehnelti* Csiszar, *Acta zool. Hung*.,**7**: 345-366.

Diagnosis: Sensillus elongated, slightly fusiform apically; interlamellar hairs long, lamellar and rostral hairs short, arched forward; notogaster broadly ovate, widely margined anteriorly; 10 pairs of notogastral hairs; 5 pairs of genital hairs; all ventral hairs are minute and ciliate.

Material Examined: 1♂, Khambara vill., Chandrapur, 28.vii. 2014, from soil & litter, Coll. S. Acharya, 5086/17.

***Distribution*:** India: West Bengal, Assam, Kerala, Tripura, Sikkim, Manipur, Gujarat, Arunachal Pradesh, Mizoram.

9. Family ORIBATELLIDAE Jacot, 1925

11. Genus *Lamellobates* Hammer,1958

1958. *Lamellabates* Hammer, *Biol. Skr. Dan. Vid. Selsk*., **10**(1): 100.

14. ***Lamellabates palustris*** Hammer, 1958

1958. *Lamellobates palustris* Hammer, *Biol. Skr. Dan. Vid. Selsk*., **10**(1): 100.

Diagnosis: Inner cuspides of lamellae rounded, outer lamellar cuspides tapering into a short and sharp point; lamellar setae equally very thick throughout, rough; interlamellar setae long, rough; sensillus club –shaped, tip pointed, beset with short setae; notogastral setae 9 pairs; genital setae 6 pairs.

Material Examined: 1♀, Devaki vill., Gondia, 31.vii. 2014, from kapas field, coll. S. Acharya, 5068/17/ZSIHQ; 1♀, Chimur vill., Chandrapur, 28.vii. 2014, from kapas field, coll. S. Acharya, 5091/17/ZSIHQ .

Distribution : India: West Bengal , Bihar , Tripura, Uttar Pradesh.

10. Family GALUMNIDAE Jacot, 1925

12. Genus *Galumna (Galumna*) Heyden

1826. *Galumna (Galumna*) Heyden, *Isis Oken*, **18**: 611.

15. ***Galumna* sp.**

***Remarks*:** The unidentified species was reported by Acharya and Basu (2014) from Maharashtra.

Discussion: As no work has been done on this group from this area particular, this work is significant in respect of exploring the soil oribatid mites diversity from different soil habitats of five districts of vidarbha for the first time. The present investigation reveals **15** species under **12** genera belonging to **10** families of soil oribatid mites of which **3** species are new records to India.

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