

DIVERSITY AND SPECIES RICHNESS OF SOIL ORIBATID MITES(ACARI:ORIBATIDA) IN DUDHWA NATIONAL PARK, U. P., INDIA

Shelley Acharya and Paramita Basu

Zoological Survey of India, M-Block, New Alipore, Kolkata - 700 053, India.
email : acharya.shelley@gmail.com, paramitabasu1@gmail.com

(Accepted 6 December 2013)

ABSTRACT – The present work deals with a collection of soil oribatid mites from some selected habitat of the forest floor. 14 species under 13 genera belonging to 10 families of soil oribatid mites were found from the present investigation.

Key words : Oribatid mites, diversity, National Park

INTRODUCTION

The oribatid mites are a group of mites which live in the soil. They live in the top layer of the soil, leaf litter or other debris. They can also be found on mosses, lichens and other low plants.

Oribatid mites are of considerable importance due to their direct and indirect effect on man and animal. These mites play a vital role to promote soil fertility through humification of organic matter. Some of the oribatid species are known to transmit various helminth diseases to domestic animals. Some of these mites feed on higher plants. A few of the oribatids are also used as biological control agent.

Dudhwa national Park is a park in the terai of Uttar Pradesh. This sanctuary is rich in many way in respect of flora and fauna. A perusal of existing literature shows that soil oribatid faunal resources of this sanctuary has not been documented yet. Hence, an attempt has been made to evaluate the diversity and richness of soil oribatids of this sanctuary.

Information on the group from Uttar Pradesh

Baker (1945) first described one new species of oribatid mite named *Scheloribateschauhani* from Uttar Pradesh. Later, after a long gap of about three decades Singh and Mukherjee (1971) while conducting on ecological study at Varanasi recorded *Rhysotritiaarduaardua*, *Oppia* sp. and *Scheloribates* sp. In fact serious taxonomic studies on oribatid mites in the state were initiated by M.A. HafeezKardar(1972, 1974, 1976a, 1976b)in Aligarh Muslim University.Later Niedbala (2000) described two species viz., *Oribotritiasubmolestes* and *Acrotritia (=Rhysotritia) gracile*from Uttar Pradesh.

MATERIALS AND METHODS

Study area :

Dudhwa National Park is a national park in the Terai of Uttar Pradesh, India, and covers an area of 490.3 km² (189.3 sq mi), with a buffer zone of 190 km²(73 sq m).It is situated between 28° 30' 30" N and 80° 40' 48" E. It is part of the Dudhwa Tiger Reserve.^[1] It is located on the Indo-Nepalborder in the LakhimpurKheri District, and has buffer of reserved forest areas on the northern and southern sides. It represents one of the few remaining examples of a highly diverse and productive Terai ecosystem, supporting a large number of endangered species.

For taxonomic studies of oribatid mites litter, soil and humus samples from all possible habitats from the forest floor 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 (1965). For microscopic observations, Balogh's (1965)

method of temporary mounting in lactic acid was followed. After necessary microscopic observations the specimen was transferred in small glass vials containing 90% alcohol. The vials were then properly labeled and stored.

The present work is based on a collection of oribatid mites done by the author and associates. The most important habitats like litter, soil, moss, semi decomposed cow dung and plants were thoroughly surveyed for collection of oribatid mites.

RESULT

Systematic Account:

1. Family: EUPHTHRACARIDAE Jacot, 1930
 1. Genus *Acrotritia* (= *Rhysotritia*)
 - 1.A. *brasiliانا* Mahunka
2. Family: PHTHIRACARIDAE Perty, 1841
 2. Genus *Hoplophorella*
2. *H. cucullata* Ewings, 1909
3. Family: LIACARIDAE Sellnick, 1928
 3. Genus *Liacarus*
3. *Liacarus* sp.
4. Family: OPPIIDAE Sellnick, 1937
 4. Genus *Lasiobelba*
4. *Lasiobelba remota* Aoki, 1959
5. Family: TECTOCEPHEIDAE Grandjean, 1954
 5. Genus *Tectocepheus*
5. *T. sarekensis* Tragardh, 1910
6. Family: AUSTRACHTERIIDAE Luxton, 1985
 6. Genus *Hypozetes*
6. *H. laysanensis* Aoki, 1964
7. Family: AUSTRACHTERIIDAE Luxton, 1985
 7. Genus *Lamellobates*
7. *L. palustris* Hammer, 1958
8. Family: AUSTRACHTERIIDAE Luxton, 1985
 8. Genus *Paralamellobates*
8. *P. bengalensis* Bhaduri and Raychaudhuri, 1968
7. Family: SCHELORIBATIDAE Jacot, 1935
 9. Genus *Scheloribates*
9. *S. curvialatus* Hamner, 1961
10. *S. elegans* Hammer, 1958
8. Family: PROTORIBATIDAE Balogh, 1984
 10. Genus *Setoxylobates* (*Setoxylobates*)
11. *S. (S.) foveolatus* Balogh and Mahunka, 1967
9. Family: HAPLOZETIDAE Grandjean, 1936
 11. Genus *Peloribates*
12. *P. longisetosus* (Willmann, 1930)
12. Genus *Trachyoribates* (*Rostrozetes*)
13. *T. (R.) ovulum* Berlese, 1908 (= *Rostrozetes foveolatus* Sellnick, 1925)

10. Family: GALUMNIDAE Jacot, 1925

13. Genus *Galumna* (*Galumna*)14. *G. (G.) flabelliferaorientalis* Aoki, 1965

Family: EUPHTHIRACARIDAE Jacot, 1930

1. Genus *Acrotrititia* (= *Rhysotrititia*) Jacot1923. *Acrotrititia* Jacot, *China J. Sci. Arts Sanghai*, **1**: 162.1. *Acrotritiabrasiliana* Mahunka1983. *Rhysotritiabrasiliana* Mahunka, *Folia Entomologica Hungarica*, **44**(2): 205

Diagnosis: Rostral and lamellar setae short; interlamellar setae twice as long as other prodorsal setae; sensillus setiform with few spines on its distal end; carina ramified in its distal end; notogastral setae 14 pairs; distally ciliate; genital setae 9 pairs.

Material examined: 5B&B&, Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Mirzapur, Sahjahanpur, Dudhwa).

Remarks: The species is reported here for the first time from Uttar Pradesh.

Family: PHTHIRACARIDAE Perty, 1841

2. Genus *Hoplophorella* Berlese1923. *Hoplophorella* Berlese, *Redia*, **25**:260.2. *Hoplophorellacucullata* (Ewing)

1909. *Hoplophorellacucullata* Ewing. *New American Oribatoidea*. Journ. N. Y. Ent. Soc, vol. 17, pp. 116-136, pls. 2-6

Diagnosis: Integument of abdomen pitted. Cephalothorax with a median carina extending almost its entire length. Pseudostigmata not projecting. Abdomen with a large hood at the anterior end which overhangs the posterior part of the cephalothorax; posterior end of abdomen broadly rounded. The abdomen bears dorsally on each side near the median plane a longitudinal row of six stout, short. Spatulate bristles all inclined backwards. Genital covers longer than the anal covers and when viewed from the side are seen not to project as far downwards as the latter.

Material examined:; 2 B&B&, Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Mirzapur, Pilibhit, Dudhwa).

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

Family: LIACARIDAE Sellnick, 1928

3. Genus *Liacarus* Michael1898. *Liacarus* Michael, *Das Tierreich: Oribatidae*, **4**: 40.3. *Liacarus* sp.

Material examined: Uttar Pradesh: 5 B&B&, Dudhwa National Park, 15. i. 08, from soil & litter, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Dudhwa).

Remarks: The family, genus and species is recorded here for the first time from Uttar Pradesh

Family: OPPIIDAE Sellnick, 1937

4. Genus *Lasiobellea* Aoki1959. *Lasiobellea* Aoki, *Bull. Bio. Geo. Sco. Jap.*, **21**(1):5.4. *Lasiobelleaemota* Aoki1959. *Lasiobelleaemota* Aoki, *Bull. Biogeogr. Soc. Japan*, **21** (1): 6.

Diagnosis: Prodorsum conical, smooth. Prodorsal setae long stiff, smooth. Sensillus long, extended outwards, pointed, spindle-shaped. Notogastrum smooth. Notogastral setae long, fine, smooth. 5 pairs of genital setae, 2 pairs of anal setae. Legs tridactylous.

Material examined: 10B&B&, Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Allahabad, Pilibhit, Dudhwa).

Remarks: The genus is reported here for the first time from the state of Uttar Pradesh. The species is reported here for the first time from India.

Family: TECTOCEPHEIDAE Grandjean

5. Genus *Tectocepheus* Berlese

1913. *Tectocepheus* Berlese, *Redia*, **9**:91.

5. *Tectocepheussarekensis* Tragardh

1910. *Tectocepheussarekensis* Tragardh, *Naturw. Unters. Sarekgele in Schw.-Lappland*, **4**: 567.

Diagnosis: The median and lateral borders of lamella run parallel towards the tip; prodorsum bear indistinct longitudinal furrows behind the translamella; tips of lamellae broad and round; iad directed laterally.

Material Examined: 8B&B&, Dudhwa, 04. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Shahjahanpur, Mirzapur, Saranath, Dudhwa, Pilibhit), West Bengal. *Elsewhere:* Europe (Germany, Spain), Indonesia, New Zealand.

Remarks: The species is reported here for the first time from Uttar Pradesh.

Family: AUSTRACHTERIDAE Luxton, 1985

6. Genus *Hypozetes* Balogh

1959. *Hypozetes* Balogh, *Acta Zool. Acad. Sci. Hung.*, **5**:15.

6. *Hypozeteslaysanensis* Aoki

1964. *Hypozeteslaysanensis* Aoki, *Pacific Ins.*, **6**:655

Diagnosis: Rostrum tricuspidate; rostral setae densely barbed on each side and situated on apophyses; lamellar and interlamellar setae minutely barbed; sensillus with a finely barbed club-shaped head; notogastral setae 10 pairs, minutely barbed; sacculi Sa placed closer to ti than to te.

Material examined: 11B&B&, Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Jainpur, Varanasi, Dudhwa, Pilibhit), West Bengal; *Elsewhere:* Hawaiian Island.

Remarks: The family, genus and species are reported here for the first time from the state.

7. Genus *Lamellobates* Hammer

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

7. *Lamellobatespalustris* Hammer

1958. *Lamellobatespalustris* Hammer, *Biol. Skr. Dan. Vid. Selsk.*, **19**(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: 2B&B..., Dudhwa, 04. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Mirzapur, Allahabad, Varanasi, Dudhwa, Aligarh, Pilibhit), Bihar, Tripura, West Bengal. *Elsewhere:* Fuji, Indonesia, New Zealand, Pakistan, Seychelles, South America (Argentina), Thailand, Tonga Tapu Island.

Remarks: The genus and species are reported here for the first time from Uttar Pradesh.

8. Genus *Paralamellobates* Bhaduri and Raychaudhuri

1968. *Paralamellobates* Bhaduri and Raychaudhuri, *Oriental Ins.*, **2**(2): 197.

8. *Paralamellobatesbengalensis* Bhaduri and Raychaudhuri

1968. *Paralamellobatesbengalensis* Bhaduri and Raychaudhuri, *Oriental Ins.*, **2**(2): 197.

Diagnosis: The lamellar cuspis, prodorsal and notogastral setae and sensillus similar to *L. palustris*. The main diagnostic feature of *P. bengalensis* is presence of one pair of anal setae.

Material examined: 10B&B..., Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Allahabad, Varanasi, Dudhwa, Pilibhit), Kerala, Sikkim, West Bengal. *Elsewhere:* Taiwan.

Remarks: The genus and species are recorded here for the first time from Uttar Pradesh

Family: SCHELORIBATIDAE Jacot, 1935

9. Genus *Scheloribates* Berlese

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

9. *Scheloribates curvialatus* Hammer

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: 3 B&B&, Dudhwa National Park, Chandan Chowki, grassland, 15. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Dudhwa, Sahjahanpur, Mirzapur, Allahabad, Pratapgarh, Jainpur, Varanasi), West Bengal. *Elsewhere*: South America (Peru).

Remarks: The species is recorded here for the first time from Uttar Pradesh.

10. *Scheloribates elegans* Hammer

1958. *Scheloribates elegans* Hammer, Balogh, J., *Rev. Zool. Bot. afr.*, **58**: 1-37.

Diagnosis: Anterior border of hysterosoma has in the middle a broad flat arch, regular undulating anterior border of the hysterosoma; pteromorphae rounded, outer margin with extremely fine radiating white lines; lamellar setae stiff, hairy, reach just beyond the rostrum; interlamellar setae same as lamellar but little larger; sensillus very slender, anterior outer margin set with hairs, lateral lobe of pseudostigmatic curve very large; hysterosoma with chitinous pores; notogastral setae very small; tarsi with three claws.

Material examined: 5 B&B&, Dudhwa, 15. i. 08, from soil, coll. A. K. Sanyal

Distribution: India: Uttar Pradesh (Varanasi, Sahjahanpur, Dudhwa, Aligarh, Pilibhit). *Elsewhere*: Argentina, Bolivia, Philippines.

Remarks: The species is recorded for the first time from Uttar Pradesh.

Family: PROTORIBATIDAE Balogh, 1984

10. Genus *Setoxylobates* (*Setoxylobates*) Balogh and Mahunka

1967. *Setoxylobates* (*Setoxylobates*) Balogh and Mahunka, *Acta zool. Acad. Sci. Hung.*, **23**(1-2): 59.

11. *Setoxylobates* (*Setoxylobates*) *foveolatus* Balogh and Mahunka

1967. *Setoxylobates* (*Setoxylobates*) *foveolatus* Balogh and Mahunka, *Acta zool. Acad. Sci. Hung.*, **23**(1-2): 59.

Diagnosis: Body foveolated; the whole rostral and interlamellar setae and apical half of lamellar setae weakly barbed; sensillus reclinate, apically fusiform, unilaterally barbed; 4 pairs of areae porosae; notogastral setae 14 pairs, minute; pteromorphae movable; genital setae 5 pairs; epimeral setal formula 3-1-2-2.

Material examined: 5 B&B&...Dudhwa, 04. i. 08, from soil, coll. A. K. Sanyal.

Distribution: India: Uttar Pradesh (Shahjahanpur, Dudhwa, Aligarh, Pilibhit), Tripura, West Bengal. *Elsewhere*: Vietnam.

Remarks: The family, genus and species are the new record here for first time from Uttar Pradesh.

Family: HAPLOZETIDAE Grandjean, 1936

11. Genus *Peloribates* Berlese

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

12. *Peloribates longisetosus* (Willmann)

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

Diagnosis: Notogaster only slightly longer than wide. Notogastral setae long, setae *la* as long or longer than distance *la-da*; Notogastral setae equally thick throughout and rather stiff.

Material examined: Uttar Pradesh: 1 B&, Dudhwa National Park, 15. i. 08, from soil, coll. A. K. Sanyal

Distribution: India: Uttar Pradesh (Dudhwa, Mirzapur, Allahabad, Pratapgarh, Jainpur, Varanasi). *Elsewhere*: Guatemala.

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

12. Genus *Trachyoribates* (*Rostrozetes*) Sellnick

1925. *Trachyoribates* (*Rostrozetes*) Sellnick, *Suppl. Ent. Berlin*, **11**:84.

13. *Trachyoribates* (*Rostrozetes*) *ovulum* Berlese

(= *Rostrozetesfoveolatus* Sellnick, 1925)

1908. *Trachyoribates* (*Rostrozetes*) *ovulum* Berlese, *Redia*, **5**(1): 3.

Diagnosis: Body distinctly foveolated; prodorsal setae long, thin, unilaterally finely barbed; sensillus with swollen brush-like head; notogastral setae 10 pairs, short, fine; distance between t1-ms and ms-h3 almost same; genital setae 5 pairs, minute, fine.

Material examined: 2 B&B&, Dudhwa National Park, 15. i. 08, from soil & litter, coll. A. K. Sanyal

Distribution: India: Uttar Pradesh (Dudhwa, Mirzapur).

Remarks: This is the first record for the species from Uttar Pradesh.

Family: GALUMNIDAE Jacot, 1925

13. Genus *Galumna* (*Galumna*) Heyden

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

14. *Galumna* (*Galumna*) *flabelliferaorientalis* Aoki

1965. *Galumna* (*Galumna*) *flabelliferaorientalis* Aoki, *Nat. Life Southeast Asia*, **4**:187.

Diagnosis: Rostral and interlamellar setae thin, short, lamellar setae very minute; sensillus with long broad head, anterior margin round and beset with spur-like bristles, posterior margin flat, without bristles; iad placed obliquely to the longitudinal axis of the body; areaeporosae large; gen1-gen3 placed on the anterior border of left genital plate; gen, in right genital plate not placed on the anterior border.

Material examined: 2 B&B&, Dudhwa National Park, 15. i. 08, from soil & litter, coll. A. K. Sanyal

Distribution: India: Uttar Pradesh (Dudhwa, Sahjahanpur), Kerala, West Bengal. *Elsewhere:* Thailand.

Remarks: The species is recorded here for the first time from Uttar Pradesh.

DISCUSSION

The paper deals with the Oribatid fauna collected from Dudhwa National Park, Uttar Pradesh. Altogether 14 species under 13 genera belonging to 10 families have been recorded from the National Park. The present study records 10 species, 6 genera as the first record from Uttar Pradesh. In addition, 1 family, 1 genus and 4 species are recorded from India for the first time. The important references, diagnostic features and distribution in India for the species have been incorporated.

ACKNOWLEDGEMENT

The authors are grateful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata, for providing research facilities and encouragements. Authors are also grateful to Dr. A. K. Sanyal, Emeritus Scientist, Zoological Survey of India, Kolkata, for his kind help and valuable suggestions.

REFERENCES

- Baker E W (1945) *Scheloribateschauhani*, a new species of oribatid mites from India (Acarina : Ceratozetidae). *J. Wash. Acad. Sci.* **35**, 386-388.
- Ewing H E (1910) New Acarina from India. *Trans. Acad. Sci. St. Louis* **19**, 113-121.
- Kardar M A H (1972) A new species of Lohmanniidae (Acarina : Oribatei) from India. *Oriental Insects* **6**, 61-64.
- Kardar M A H (1974) Two new species of Tectocephidae (Acarina : Oribatei) from India. *Oriental Insects* **8**, 51-54.
- Kardar M A H (1976a) Four new species of *Oppia* (Oribatei : Oppiidae) from India. *Indian J. Acarol.* **1&2**, 6-10.
- Kardar M A H (1976b) Four new species of *Scheloribates* (Oribatei : Oribatulidae) from India. *Indian J. Acarol.* **1&2**, 38-42.
- Niedbala W (2000) The ptyctimous mites fauna of the Oriental and Australian regions and their centres of origin (Acari : Oribatida). Genus. *Int. J. Invertebrate Taxonomy* (Supplement): 1- 493.c
- Singh J and Mukherjee S P (1971) Qualitative composition of soil arthropods in some fields at Varanasi (India). *Oriental Insects* **5**, 487-494.