Rec. zool. Surv. India : **106**(Part–2) : 105-119, 2006

TWO NEW SPECIES OF THE FAMILY SCHELORIBATIDAE (ACARINA : ORIBATIDA) FROM TRIPURA, INDIA

A. K. SANYAL, SUSMITA SAHA* AND S. CHAKRABORTY**

Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

INTRODUCTION

The family Scheloribatidae includes the pterogasterine mites. Members of this family were previously placed under family Oribatulidae by most authors (Baker and Wharton, 1952; Woolley, 1961; Balogh, 1961, 1965, 1972; Hammer, 1971, 1973). Balogh (1972) in his book "The Oribatid genera of the world" included 59 genera, including genus Scheloribates under Oribatulidae. Grandjean (1933, 1954) mentioned that Scheloribatidae and Oribatulidae are to be separated on the basis mainly of presence of only one anal setae in the larval stages of Oribatulidae and absence of any anal seta in the larva of Scheloribatidae. Grandjean (1954) included six genera *viz.*, *Scheloribates, Hemileius, Dometorina, Siculobata, Liebstadia* and *Eporibatula* under Scheloribatidae. Most workers, however, considered that *Scheloribates* and other related genera belong to the family Oribatulidae.

Balogh and Balogh (1984) in the review of the superfamily Oribatuloidea, suggested many modification and erected many new families under this superfamily. In this work he (1984) mentioned Scheloribatidae as a new family and erected five new subfamilies under this family. Balogh and Balogh (1990) also maintained that Scheloribatidae is a separate family. However, Grandjean (1933) had first mentioned Scheloribatidae as a new family and the present workers feel that Grandjean (1933) should be considered as the author of family Scheloribatidae.

Important contribuitions to the study of the mites of the family Scheloribatidae (many of which were previously placed under family Oribatulidae) have been made by Jacot (1929), Thor (1929), Pletzen (1963), van der Hammen (1952), Coetzer (1968), Mahunka (1975), Corpuz-Raros (1980) etc.

* *236, G. T. Road, Mahesh, Hooghly-712 202, West Bengal*

** *Department of Zoology, University of Kalyani-741 235, West Bengal*

Luxton (1982), Mahunka (1988a, 1988b), Ayyildiz and Luxton (1989), Norton and Kethley (1989), Lee and Pajak (1990) and Balogh and Balogh (1990) contributed 8 more new genera under the family Scheloribatidae. Thus the family Scheloribatidae till now possess 35 genera.

In India, the family is represented by only 3 genera *viz.*, *Scheloribates* Berlese, 1908; *Euscheloribates* Kunst, 1958 and *Hammerobates* Balogh, 1970. The genus *Scheloribates* was first reported from India by Baker (1945), the genus *Euscheloribates* by Sanyal (1981) and the genus *Hammerobates* by Sanyal (1992). The family Scheloribatidae is presented here with two genera *viz.*, *Scheloribates* and *Fijibates* from the South District of Tripura.

The measurement of the specimens are given in micron (μm). The type specimens are deposited in the National Zoological Collection, Zoological Survey of India, Kolkata.

Key to the genera of the family Scheloribatidae

1(2). Rostral setae placed apart; dorsosejugal suture distinct ..... *Scheloribates* Berlese, 1908

2(1). Rostral setae near each other; dorsosejugal suture in distinct..... *Fijibates* Hammer, 1971

Genus ***Scheloribates*** Berlese

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

1929. *Storkania* Jacot, *Trans Am. Microsc. Soc.*, **48** : 429.

1934. *Paraschelobates* Jacot, *Bull Bishop Mus., Honolulu*, **114** : 225.

1934. *Protoschelobates* Jacot, Ibid, **121** : 40.

1934. *Styloribate*s Jacot, Ibid, **121** : 61.

1936. *Propeschelobates* Jacot, *Am. Midl. Nat.*, **17** : 547.

Type-species : *Oribates latipes* Berlese, 1886, not *Zetes latipes* C.L. Koch, 1844 (*Oribates latipes* Berlese, 1886 is a junior synonym of *Zetes pallidulus* C.L. Koch, 1841) (In : Balogh and Balogh, 1984 : 287).

Berlese (1908) first established the genus. His generic diagnosis was insufficient and inadequate. Jacot (1929) elaborated the diagnostic characters *viz.* presence of triangular pteromorph, sometimes slightly decurved; complete lengthwise attachment of lamellae with prodorsum. Later he (1934) further differentiated the genus by the presence of well developed rostro-lamellar ridge and the absence of cusps at the apex of lamella. Willmann (1931) while pointing out that the nature of pteromorph is extremely variable within the genus, recognized the presence of well developed rostro-lamellar ridge and tapering lamellae without cusps as of generic importance. Balogh (1961) considered the number of genital setae and the absence of rostral apophyses as important characters of the genus. Pletzen (1963) reviewed the characters of the genus very nicely.

The genus is reported by a large number of species which have been described and reported from the various parts of the world by several workers like Berlese (1908-1920), Sellnick (1928-1959), Jacot (1934a, 1934b, 1936a, 1936b, 1937), Willmann (1931a, 1931b, 1951), Wharton (1940), Baschkirova (1941), Baker (1945), Buitendijk (1945), Sengbusch (1951), Anantharaman (1951), van der Hammen (1952), Hammer (1952, 1958, 1961, 1962a, 1962b, 1967, 1968, 1971, 1973, 1977), Evans (1952), Michelcic (1956, 1957, 1963, 1964, 1965, 1968), Schweizer (1956), Haarlov (1957), Balogh (1958, 1959, 1962a, 1962b), Sellnick (1959), Wooley (1961), Csiszar and Jelava (1962), Pletzen (1963, 1965), Wallwork (1964, 1966), Aoki (1965, 1966, 1967, 1984), Bulanova-Zachvatkina (1967), Coetzer (1969), Perez-Inigo (1968), Kurcheva (1971) Vasiliu and Magda (1973), Feider *et al.* (1973), Balogh and Mahunka (1974, 1977), Hafeez-Kardar (1976, 1988), Mahunka (1977a, 1977b, 1982, 1983, 1985, 1987, 1988a, 1988b, 1991), Aoki *et al.* (1977), Dhali *et al.* (1980), Calugar and Vasiliu (1983), Balogh and Balogh (1984), Bayoumi and Al-Khalifa (1985), Lan *et al.* (1986), Minguez *et al.* (1986), Perez-Inigo and Baggio (1986), Fujita and Fujikawa (1987), Subbotina (1987), Morell (1987, 1990), Perez-Inigo, Jr. *et al.* (1987), Jeleva and Vu (1987), Marshall *et al.* (1987), Katsumata (1988), Ayyildiz (1988), Hafez *et al.* (1989), Lee and Pajak (1990), Weigmann and Wunderle (1990), Wunderle *et al.* (1990), Kahwash *et al.* (1991), Makhmudova (1991), Sanyal (1988, 1992), Wu Hongji (1994).

Balogh (1965, 1972) considered 5 genera *viz.*, *Storkania* Jacot, 1929, *Styloribates* Jacot, 1934, *Propeschelobates* Jacot, 1936, *Paraschelobates* Jacot, 1934 and Protoschelobates Jacot, 1934 as the synonyms of the genus *Scheloribates*. But later on, Lee and Pajak (1990) removed the former 3 genera from the synonym list and simultaneously added 2 other genera, *Neoscheloribates* Hammer, 1973 and *Semischeloribates* Hammer, 1973 as new synonyms of the genus *Scheloribates*.

Lee and Pajak (1988, 1990), Balogh and Balogh (1990) and Grobler (1991) transferred some species of the genus *Scheloribates* to other genera under the same family. Bayoumi and Al-Khalifa (1985), Ayyildiz (1988), Luxton (1989) and Balogh and Balogh (1990) provided key to the species to the genus *Scheloribates* from Saudi Arabia, Turkey, Great Britain and Neotropical region respectively. Balogh and Balogh (1992) provided a key of the genus *Scheloribates* in their book 'The Oribatid Genera of the World (vols. I & II)'

The genus *Scheloribates* is well represented in India and has been previously reported by Baker (1945) from Uttar Pradesh. Later on, Anantharaman (1951), Banerjee (1974), Narsapur (1975, 1976), Choudhuri and Banerjee (1975, 1977), Hafeez-Kardar (1976, 1988), Chakrabarti *et al.* (1977), Bhattacharya (1979), Chakrabarti and Roy Talukdar (1979), Chakrabarti *et al.* (1979), Bhattacharya and Joy (1980), Bhattacharya *et al.* (1980), Dhali *et al.* (1980), Mishra *et al.* (1980), Joy and Bhattachayra (1981), Banerjee and Roy (1981), Ghatak and Roy (1981), Chakrabarti amd Mondal (1981, 1983), Gupta and Paul (1965, 1989), Sanyal (1988, 1992, 2000), Sanyal and Das (1989), Sanyal and Sarkar (1983), Sarkar (1984, 1990), Bhattacharya *et al.* (1985), Bhattacharya and Halder (1984), Chakraborty and Bhattacharya (1992), Bhattacharya and Chakraborty (1995) have

also reported and contributed number of species and subspecies under the genus from different parts of India.

Generic Diagnosis : Anteriorly attenuated lamellae without cusps; rostro-lamellar ridge present or absent; rostral apophyses present or absent; pteromorphae variable, never auriculate, may or may not be slightly decurved; areae porosae generally reduced to sacculi, sometimes represented by slit like pores; 10 pairs of notogastral setae; sacculi 4 pairs on notogaster, genital plates far removed from anal plates, with 4-5 pairs of genital setae; apodemata IV relatively short or long, abutting the genital field; femur II generally with a ventral keel; legs monodactylous or tridactylous, rarely bidactylous.

Distribution : INDIA : Tripura (North, West, South Districts), Andhra Pradesh, Assam, Kerala Maharashtra, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Antarctica, Argentina, Australia, Brazil, Bangladesh, Cuba, China, Canada, Campbell Islands, Cape Verde Islands, Egypt, Eua and Upolu Islands, East Malyasia, Fiji Islands, Great Britain, Georgia, Hungary, Hawiian Islands, Kazakhstan, Midway Islands, New Zealand, Russia, Saudi Arabia, Spain, Sub-Antarctic Islands, South Africa, Tahiti, Tonga Tapu, Turkey, Tanzania, Turkmania, Ukraine, Uzbekistan.

Scheloribates samirani sp. nov.

(Figs. 1-4)

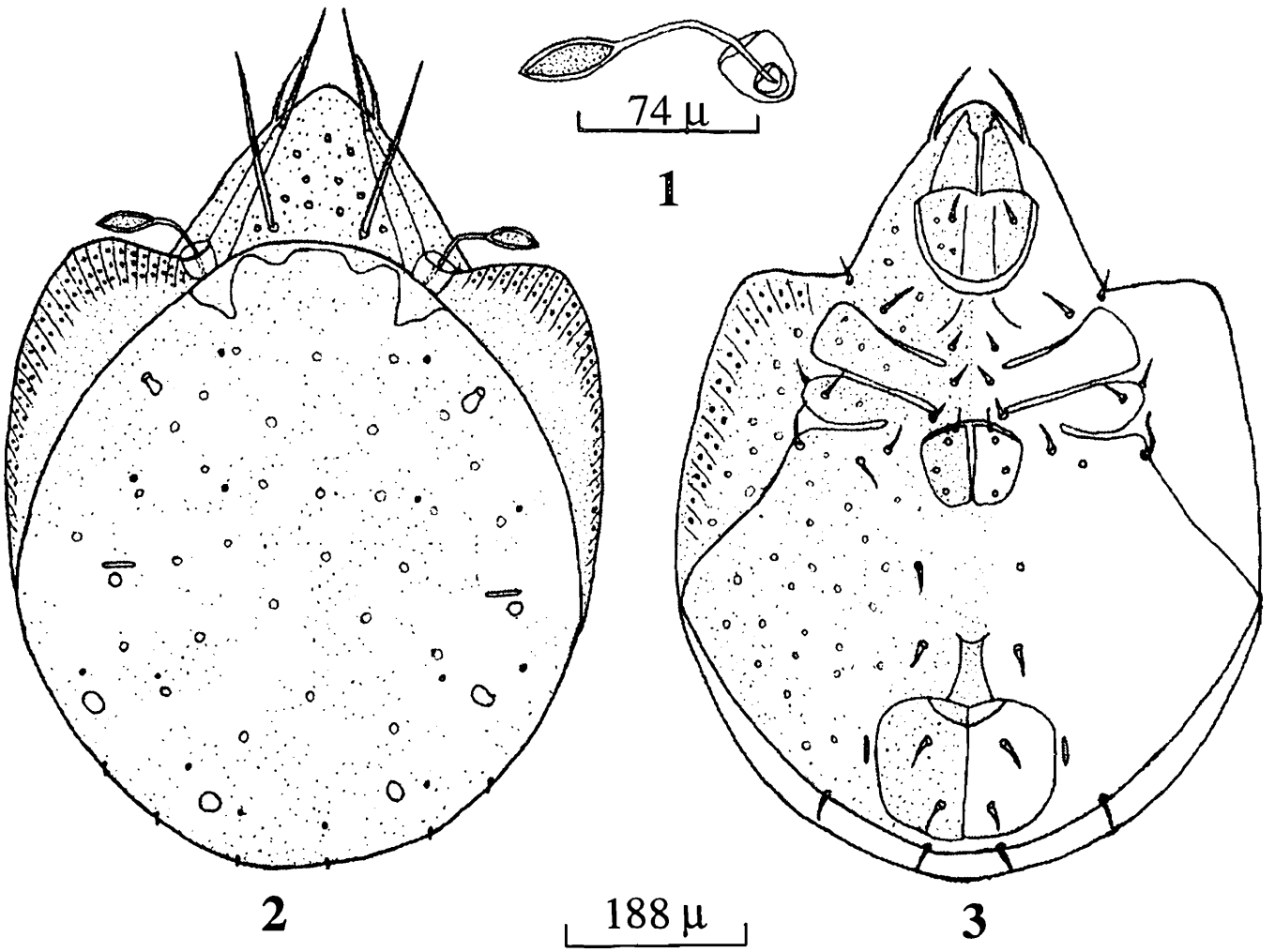
Colour : Yellowish brown.

Measurements (in μm) : Length of the body : 714-730; width of body : 536-545.

Prodorsum : Rostrum conical; rostral setae moderately long (78-80), thin, rough, curved inward, placed on lateral margin of rostrum, reach beyond tip of rostrum by half their length; lamellar setae long (115-120), thin, slightly rough, extend beyond tip of rostral setae, longer than their mutual distance (92); interlamellar setae longest (155-160) among prodorsal setae, more than double their mutual distance (74-80), smooth, thin; pseudostigmatic organ directed outward, forming obtuse angle, become straight with slender clavate head, pointed at tip, inside faintly granular, stalk (63) almost twice as long as head (33); prodorsum foveolated and with fine punctations.

Notogaster : Anterior border of notogaster form a broad, even arch with angular shoulder, pteromorphae broad, rounded, anterior and lateral margins of pteromorphae striated with granules and punctations, notogastral setae not visible; sacculi 4 pairs, rounded; notogaster punctated and with foveolae.

Epimeral Region : Sternal plate ill-developed; apodemata IV absent; epimeral region punctated and with foveolae; epimeral setal formula 3-1-3-3, epimeral setae thin, smooth.



Figs. 1-3. : *Scheloribates samirani* sp. nov.
1. Sensillus; 2. Dorsal view; 3. Ventral view.

Ano-genital Region : Genital plates rectangular (length : 78, width : 81) with 4 pairs of genital setae; genital plates punctated; anal plates broader than long (length : 141, width : 161) with 2 pairs of setae, punctated; adanal setae 3 pairs, ad_1 placed posteriorly, ad_2 placed postero-lateraly and ad_3 placed antero-medially; ventral plates foveolated and punctated.

Legs : Tridactylous, punctated and with foveolae. Leg chaetotaxy : I : 0-4-2-4+1-16+1-3; II : 0-2-3-4+1-12-3; III : 1-3-2-4-10-3; IV : 0-2-1-4-9-3.

Material examined : HOLOTYPE : Adult female, India : Tripura : Garjanmura (Udaipur), 10.vii.1991, from litter and soil below Sal tree, coll. S. Saha. PARATYPES : 6 adult females, India : Tripura : Chandrapur (Udaipur), 10.vii.1991, from litter and soil below banana plant, coll. S. Saha; 4 adult females, Ampinagar (Amarpur), 15.xii.1991, from soil and litter of mixed type vegetation, coll. S. Saha.

Distribution : INDIA : Tripura (South District).

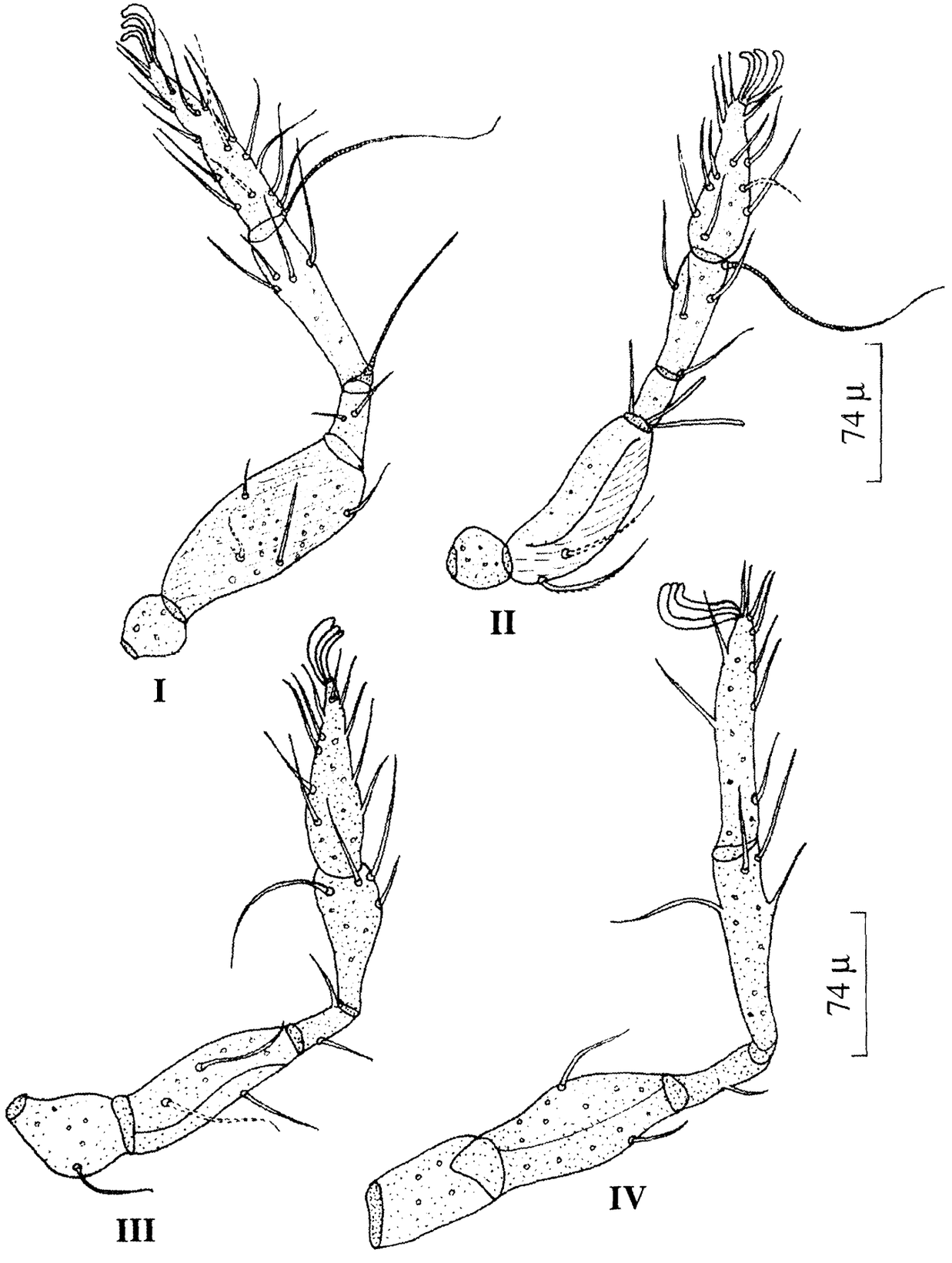


Fig. 4. : Legs (I-IV) of *Scheloribates samirani* sp. nov.

Remarks : The new species agrees well with *Scheloribates luteomarginatus* Hammer, 1958 in the shape of body and shape of prodorsal setae. But lthe present species differs markedly from the later species by the presence of rough rostral and lamellar setae; smooth and clavate-shaped with pointed head of sensillus, striated pteromorphae with foveolae and punctation and scattered foveolae alongwith fine punctation on dorsal and ventral surface of the body. Hence the species is described as new to science.

The new species has been dedicated to Dr. Samiran Chakrabarti, teacher of the second author.

Genus ***Fijibates*** Hammer

1971. *Fijibates* Hammer, *Biol. Skr. Dan. Vid. Selsk.*, **16**(6) : 48.

Type-species : *Fijibates rostratus* Hammer, 1971.

Hammer (1971) erected the genus *Fijibates* with *F. rostratus* from Java, Fiji Islands. Later Corpuz-Raros (1980) described another new species, *F. anterostratus* from Philippines. Till now only 2 species are known from the world. Balogh and Balogh (1992) in the book 'The Oribatid Mites Genera of the World (vols. I & II)' included genus *Fijibates* with 2 species under the family Scheloribatidae Grandjean, 1953.

The genus *Fijibates* is reported here for the second time from India. It was reported first from the state by Sanyal (2000).

Generic Diagnosis : Rather small, oval species; rostrum entire and rostral setae arising dorsally; prolamellar ridges absent; lamella without cuspis; sensillus short to moderately long, clavate; dorsosejugal suture incomplete or very faint medially; pteromorphae immovable; notogastral setae 10 pairs, sacculi 4 pairs; epimeral apodemes short to moderately long but not reaching frame of genital field; genital setae 4 pairs, aggenital setae 1 pair, anal setae 2 pairs and adanal setae 3 pairs; legs monodactylous.

Distribution : INDIA : Tripura (South District).

Elsewhere : Fiji Islands, Philippines.

Fijibates rostropilosus sp. nov.

(Figs. 5-7)

Colour : Light brown.

Measurements : (in μm) : Length of the body : 399-420; width of the body : 296-310.

Prodorsum : Rostrum acutely rounded on dorsal side on which rostral setae situated; rostral setae moderately long (41), almost contiguous basally, arising on cresent-shaped tubercles, densely pilose tappered distally to a fine point; prolamellar ridges absent; a faint transverse line present

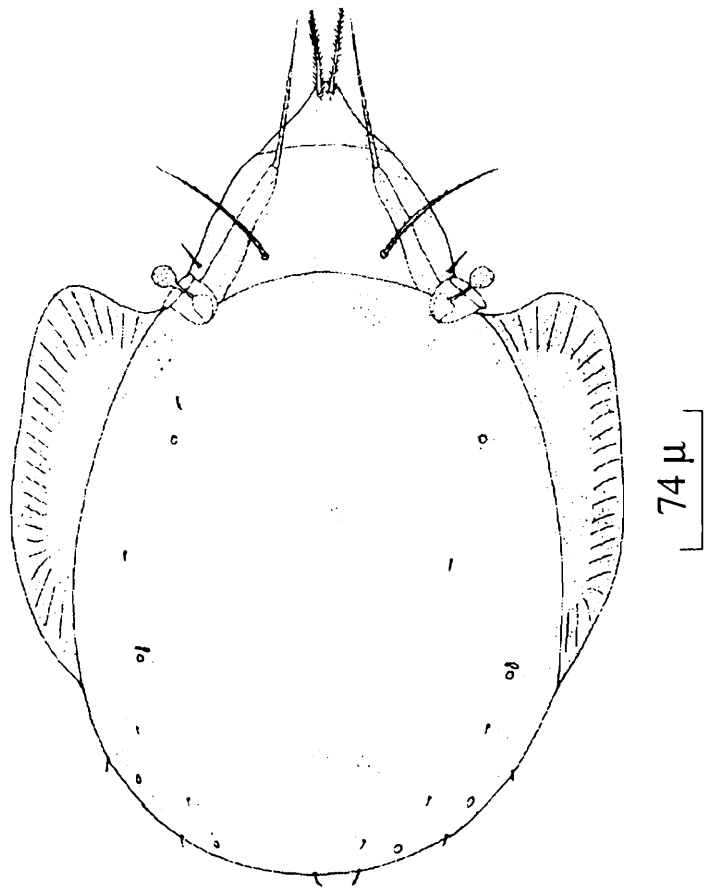


Fig. 5. : *Fijibates rostropilosus* sp. nov., Dorsal view.

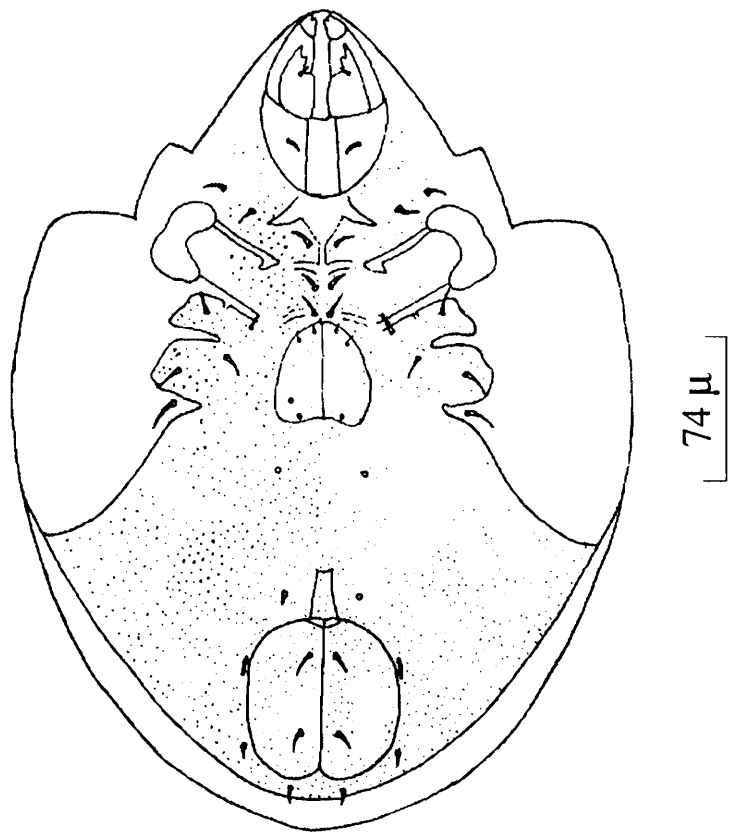


Fig. 6. : *Fijibates rostropilosus* sp. nov., Ventral view.

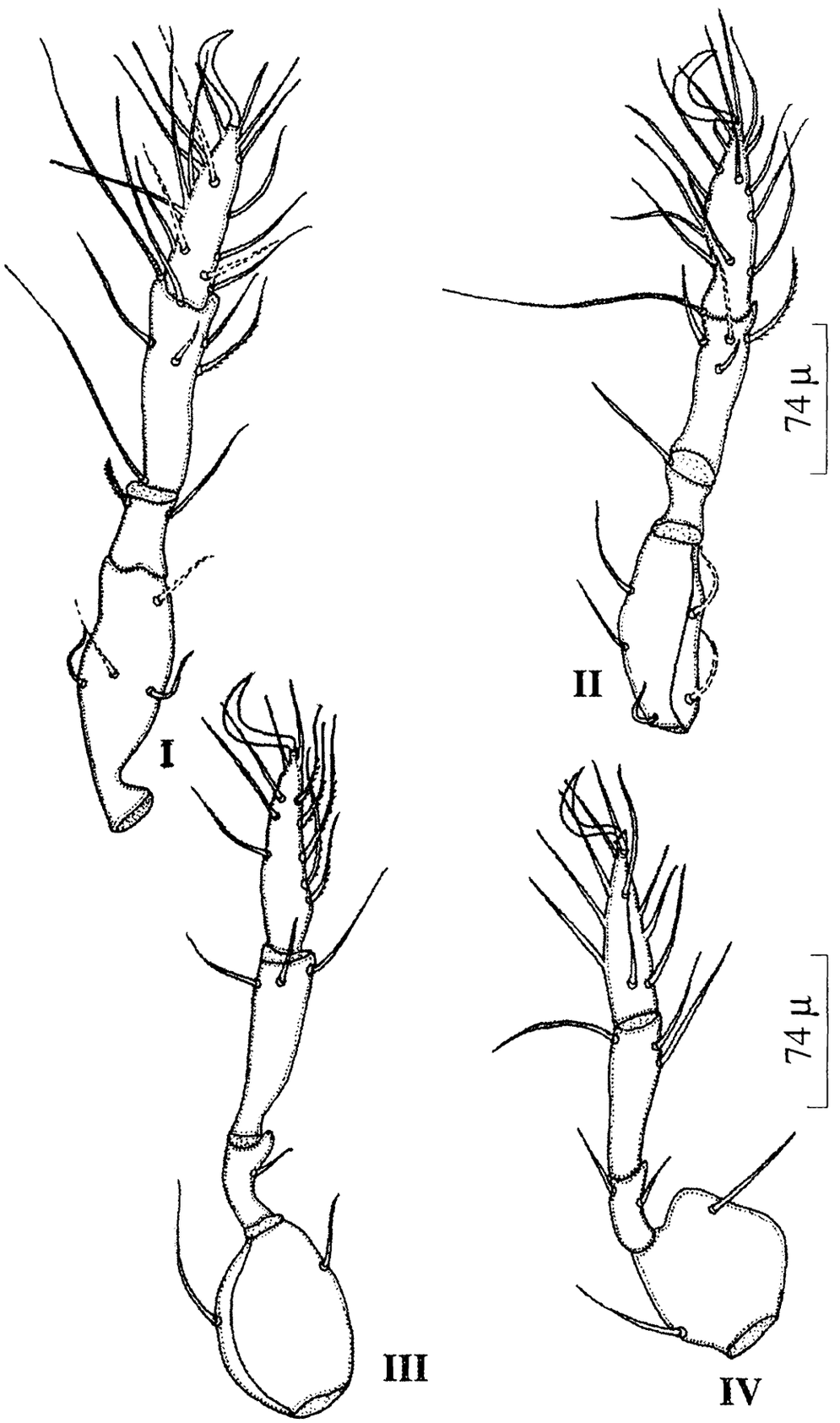


Fig. 7. : Legs (I-IV) of *Fijibates rostropilosus* sp. nov.

just above apices of lamellae; lamellae long, almost touching transverse lines; lamellar setae long (81), almost twice of rostral setae, thick with pointed tip, minutely barbed; interlamellar setae long (78), thick with pointed tip, rough; exobothridial setae short, thin with pointed tip; sensillus with short stem (15) and rounded; head (15 in diameter) with granules inside, prodorsum finely punctated.

Notogaster : Dorsosejugal suture complete; pteromorphae immovable with striation and punctation; notogaster punctated with 10 pairs short, thin setae; sacculi 4 pairs, small.

Epimeral Region : Epimeral apodemes II and *sj* long, III moderately long but not reaching frame of genital field; epimeral chaetotaxy 3-1-3-3; epimeral region punctated.

Ano-genital Region **:** Genital plates trapezoidal (length : 52, width : 48) and punctated with 4 pairs of minute setae; anal plates separated from genital plates by 133; anal plates almost oval (length : 74, width : 84) punctated with 2 pairs of setae; fissure *iad* parallel to anal field; 3 pairs of adanal and 1 pair of aggenital setae; ventral plate punctated.

Legs : Monodactylous. Leg chaetotaxy : I : 4-1+1-5+1-16+1; II : 5-1-4+1-16-1; III : 2-2-3-10-1; IV : 2-1-3-10-1.

Material examined : HOLOTYPE : Adult female, India : Tripura : Baisabari (Udaipur), 10.viii.1991, from litter and soil of paddy field, coll. S. Saha. PARATYPES : 3 adult females, data same as for holotype.

Distribution : INDIA : Tripura (South District).

Remarks : The new species resembles *F. anterostratus* Corpuz-Raros, 1980 in the position of rostral setae, same nature of lamellar and interlamellar setae, similar structure of sensillus and ventral character, but can be separated from *F. anterostratus* by the presence of snout-like rostrum, densely pilose rostral setae, long lamellae, having complete dorsosejugal suture, striation on pteromorphae and presence of punctation on body.

SUMMARY

Two new species *viz.*, *Scheloribates samirani* and *Fijibates rostropilosus* of the family Scheloribatidae are described here along with illustrations from Tripura, India.

ACKNOWLEDGEMENTS

The authors are thankful to the Director, Zoological Survey of India, Kolkata and Head of the Department of Zoology, University of Kalyani, Nadia, West Bengal, for laboratory facilities.

REFERENCES

Anantharaman, M. 1951. The development of Moniezia, the large tapeworm of domestic Ruminants. *Sci. Cult.*, **17**(4) : 155-157.

Ayyildiz, N. 1988. Three new *Scheloribates* Berlese species (Acari, Oribatulidae) for the Turkish fauna. *Tuirk. Ent. Derg.*, **12**(5) : 171-177.

Ayyildiz, N. and Luxton. M. 1989. New and unrecorded oribatid mits (Acari) from Turkey. *Zool. Anz.*, **222** (5-6) : 294-300.

Baker, E.W. 1945. *Scheloribates chauhani*, a new species of oribatid mites from India (Acarina : Ceratozetidae). *J. Wash. Acad. Sci.*, **35** : 386-388.

Baker, E.W. and Wharton, G.W. 1952. An introduction to Acarology. *The Macmillan Co.*, New York, pp. 1-465.

Balogh, J. 1961. Identification keys of world oribatid (Acari) families and genera. *Acta zool. Hung.*,**7**(3-4) : 243-344.

Balogh, J. 1965. A synopsis of the world oribatid (Acari) genera. *Acta zool. Hung.*, **11**(1-2) : 5-99.

Balogh, J. 1972. The oribatid genera of the world. *Akad. Kiado, Budapest, Hungary*. pp. 1-359.

Balogh, J. and Balogh. P. 1984. A review of the Oribatuloidea Thor, 1929 (Acari, Oribatei). *Acta zool. Hung.*, **30**(3-4) : 257-313.

Balogh, J. and Balogh, P. 1990. Oribtid mites of the Neotrolpical region 2, *Soil Mites of the World*, (Eds. R.A. Norton and P. Balogh), **3** : 1-333.

Balogh, J. and Balogh, P. 1992. The Oribatid Mites genera of the World vol I and II. *Hungarian National History Museum, Budapest.* pp. 1-375.

Banerjee, S. 1974. Qualitative composition and seasonal fluctuation of Oribatei (Acarina) in Burdwan soil, West Bengal (India). *Acta Arachnol.*, **25**(2) : 68-72.

Banerjee, S. and Roy, S. 1981. Acarine community of a forest ecosystem in Burdwan. *In* : *Contributions to Acarology in India* (Ed. G.P. Channa Basavanna) : 28-32.

Bayoumi, B.M. and A1-Khalifa, M.S.1985. Three new oribatid mites (Acari : Oribatei) from Saudi Arabia. *Bull. Soc. Amis. Sci. Lett. Poznan* (Sci. Biol.), **25** : 1985 (1986) : 119-126.

Berlese, A. 1908. Elenco di generi e specie nuovi di Acari. *Redia*, **5** : 1-15.

Bhattacharya. T. 1979. Climate, soil and soil inhabiting arthropods of Santiniketan and adjacent areas. *Visva–Bharati J. Res., Sci.*, **3**(2) : 12-23.

Bhattacharya. T. and Joy, V.C. 1980. Changes in the abundance of soil inhabiting Acari of a paddy field in response to the application of two herbicides. *In : Pesticide Residues in the Environment in India, Bangalore, 1980.* (Eds. C.A. Edwards., G.K. Veeresh and H.R. Krueger), *UAS Tech., series* No. **32** : 505-513.

Bhattacharya. T., Joy, V.C. and Joy S.1980. Soil inhabiting cryptostigmata (acari) of the rice field ecosystem in relation to agro-technical measures. *Tropical Ecology and Development* : 981-987.

Bhattacharya. T. and Chakrabarti. P. 1995. Community structure of soil Oribatida of a young Rubber plantation and an adjacent wasteland in Tripura (India) – *In : Advances in Ecology and Environmental Science*, (Eds. Mishra *et al.*) : 65-77.

Bhattacharya. T. and Halder, G. 1984. New records of soil Oribatid mite from Tripura. *Entomon*, **9**(4) : 293-294.

Bhattacharya. T., Halder, G. and Saha, R.K. 1985. Soil microarthropods of a rubber plantation and a natural forest. *Environ. Ecol.*, **3**(2) : 143-147.

Chakrabarti, D.K., Chanda, B.K. and James, M.M. 1979. On a collection of oribatid mites (Acari) from Darjeeling, West Bengal. *Acar. Newsletter, India*, **8** : 4.

Chakrabarti, D.K., and Mondal, B.K. 1981. Taxonomic investigation on the oribatid fauna (Acari) of forest and tea soil in Darjeeling, West Bengal, India. *Sci. Cult.* **47**(5) : 181-184.

Chakrabarti, D.K., and Mondal, B.K. 1983. On a collection of oribatid fauna (Acari : Oribatei) from Darjeeling District, India. *Indian J. Acar.*, **8** : 40-43.

Chakrabarti, D.K., and Ray Talukdar, A. 1979. A new species of *Malaconothrus* and few new records from other genus of soil Oribatid mites (Acari) from the district of Cachar, Assam. *Sci. Cult.*, **45**(2) : 79-81.

Chakrabarti, P., and Bhattacharyya, T. 1992. Soil Microarthropods of a rubber plantation and an adjacent wasteland in Tripura, India. *Proc. zool. Soc., Calcutta*, **45**(2) : 163-172.

Choudhuri, D.K. and Banerjee, S. 1975. Qualitative and quantitative composition of Acari and collembola in relation to soil organic matter Microbes complex. *Orient. Insects*, **9**(3) : 313-316.

Choudhuri, D.K. and Banerjee, S. 1977. Soil factors and soil oribatid mites under conditions of West Bengal. *The University of Burdwan Publication*, pp. 1-88.

Coetzer, A. 1968. New Oribatulidae Thor, 1929 (Oribatei, Acari) from South Africa, new combinations and a key to the genera of the family. *Mem. Inst. Invest. Cient. Mocamb.*, **9**(A) : 15-126.

Corpuz-Raros, L.A. 1980. Philippine Oribatei (Acarina) v. The genus *Scheloribates* Berlese and related genera (Oribatulidae) Kalikasan. *Philipp. J. Biol.*, **9**(23) : 169-245.

Dhali, S.G., Bhaduri A.K. and Raychaudhuri, D.N. 1980. Taxonomic investigation of soil oribatid mites (Acari) of Sikkim Himalayas. *Indian J. Acar.*, **5**(1-2) 1980 (1981) : 50-55.

Ghatak, T.K. and Roy, S. 1981. Acarine fauna of a cultivated field of Hooghly district, West Bengal. *In : Contributions to Acarology in India* (Ed. G.P. Channa Basavanna) : 24-28.

Grandjean, F. 1933. Etude sur Le development des Oribates. *Bull. Soc. zool. Fr.*, **58**(1) : 30-61.

Grandjean, F. 1954. Essai de classification des Oribates (Acariens). *Bull. Soc. zool. Fr.*, **78** : 421-446.

Grobler, L. 1991. A new *Brasilobates* Perez-Inigo and Baggio, 1980 from South Africa (Acari : Oribatei : Oribatuloidea : Xylobatidae). *Navors. Nas. Mus., Bloemfontein,* **7**(5) : 73-76.

Gupta, S.K. and Paul, K. 1985. Some mites associated with bird's nests in West Bengal, with description of eleven new species. *Bull. zool. Surv. India*, **7**(1) : 1-23.

Gupta, S.K. and Paul, K. 1989. Nest associated acarines of birds of India. *In : Progress in Acarology* (Eds. Channa Basavanna and C.A. Viraktamath), **2** : 315-321.

Hafeez-Karder, M.A. 1976. Four new species of *Scheloribates* (Oribatei : Oribatulidae) from India. *Indian J. Acar.*, **1**(1/2) : 38-42.

Hafeez-Karder, M.A. 1988. Three new species of Oribatei (Acari : Cryptostigmata) from Saudi Arabia. *In : Progress in Acarology* (Eds. G.P. Channa Basavanna and C.A. Viraktamath) **1** : 291-294.

Hammen, L. van der 1952. The oribate (Acari) of the Netherlands, *Zool. Verh., Leiden,* **17** : 1-139.

Hammer, M. 1958. Investigations on the oribatid fauna of the Andes Mountains. I. The Argentina and Bolivia. *Biol. Skr. Dan. Vid.Selsk.* **10**(1) : 1-129.

Hammer, M. 1971. On some oribatids from Viti Levu, the Fiji Islands. *Biol. Skr. Dan. Vid. Selsk.*, **16**(6) : 1-60.

Hammer, M. 1973. Oribatid from Tongatapu and Eua, the Tonga Islands, and from Upolu, Western Samoa. *Biol. Skr. Dan. Vid. Selsk.*, **20**(3) : 1-70.

Jacot, A.P. 1929. Genera of pterogasterine Oribatidae (Acarina), *Trans. Am. Microsc. Soc.*, **48**(4) : 416-430.

Jacot, A.P. 1934. Some Hawaiian Oribatoidea (Acarina). *Bull. Bishop. Mus., Honolulu,* **121** : 1-99.

Joy, S. and Bhattacharya, T. 1981. Cryptostigmatid population of a banana plantation in relation to some edaphic factors. *In : Progress in Soil Biology and Ecology in India* (Ed. G.K. Veeresh). *UAS Tech. series* No. **37** : 100-107.

Lee, D.C. and Pajak, G.A. 1988. *Setobates* (Acarida : Cryptostigmata : Scheloribatidae) from South Australian soils. *Trans. R. Soc. S. Aust.*, **112**(1-2) : 21-27.

Lee, D.C. and Pajak, G.A. 1990. *Scheloribates* Berlese and *Megascheloribates* gen. nov. from Southern Australia, with comments on *Scheloribates* (Acarida : Cryptostigmata : Oripodidea). *Invertebr. Taxon.*, **4**(2) : 205-246.

Luxton, M. 1982. Some new species of mites from New Zealand peat soils. *N.Z.J. Zool.*, **9**(3) : 325-332.

Luxton, M. 1989. Oribatid mites (Acari : Crytostigmata) from Orkney. *Naturalist* (Leeda), **114**, No. 990 : 85-91.

Mahunka, S. 1975. New and interesting mites from the Geneva Museum, XIII : New oribatid species (Acari) from Senegal. *Bull. Inst. Fondom. Afr. Noire. ser. A. Sci. Nat.*, **37**(2) 288-296.

Mahunka, S. 1988. New and interesting mites from the Geneva Museum, 52. Oribatid from Sabha (East Malaysia). 3. (Acari : Oribatida). *Revue Suisse Zool.*, **95**(3) : 817-888.

Mahunka, S. 1988b. The oribatid fauna of Tanzania (Acari), II, *Annls Hist. Nat. Mus. Natl. Hung.*, **80** : 189-213.

Mishra, S., Bhaduri, A.K. and Raychaudhuri, D.N. 1980. New records of soil oribatid mites (Acari, Oribatei) from Orissa, India. *Sci. Cult.*, **46**(6) : 225-227.

Narsapur, V.S. 1975. A note on the Indian species of *Scheloribates, Indian J. Ent.*, **37**(1).

Narsapur, V.S. 1976. Laboratory infections of *Scheloribates* spp. (oribatid mites) with *Moniezia expansa and M. benedeni. J. Helminth.*, **50** : 153-56.

Norton, R.A. and Kithley, J.B. 1989. Berlese's North American oribatid mites : historical notes, recombinations, synonymies and type designations. *Redia*, **72**(2) : 420-499.

Pletzen, R. van. 1963. Studies on the South African Oribatei (Acarina). I. Family Oribatulidae, genus : *Scheloribates. Acarologia*, **5** : 690-703.

Sanyal, A.K. 1981. Ecology of soil oribatid mites in an uncultivated field of gangetic delta of West Bengal in relation to soil pH and salinity. *Progress in soil Biology and Ecology in India, Bangalore* (Ed. G.K. Veeresh), *UAS Tech. Series No.* **37** : 107-112.

Sanyal, A.K. 1988. Two new species of the genus *Scheloribates* (Acarina : Oribatei) from Bhutan. *Rec.zool.Surv.India*, **85**(2) : 237-243.

Sanyal, A.K. 1992. Oribatid mites (Acari). *Fauna of West Bengal, State Fauna Series 3, Part-3 (Arachnida and Acari).* (Ed, Director, Zoological Survey of India) : 213-256.

Sanyal, A.K. 2000. Oribatid mites (Acari : Oribatei). *State Fauna Series 7 : Fauna of Tripura, Part II*, 33-112.

Sanyal, A.K. and Das, T.K. 1989. Oribatid mite (Acari : Cryptostigmata) associated with pine apple (*Ananas comosus*) root at Kalyani, West Bengal. *Environment & Ecology*, **7**(4) : 971-972.

Sanyal, A.K. and Sarkar B.J.1983. One qualitative composition and seasonal fluctuation of oribatid mites in saline soil in West Bengal. *Indian J. Acar.*, **8** : 31-39.

Sarkar, Sadhana 1984. Notes on Zoogeographic affinity of the oribatid mites of Tripura, India. *Proceedings Oriental Entomology Symposium, Trivandrum*, 49-54.

Sarkar, Sadhana 1990. Studies on microarthropod community in one undisturbed habitat of Tripura (India) with special reference to oribatid mites. *Rev. Ecol. Biol. Sol.*, **27**(3) : 307-329.

Thor, S. 1929. Uberdie phylogenie und systematic der Acarina, mit Beitragen zur ersten Entwickluggeschichte. Einzlner Gruppen, *Nytt. Mag. Naturvid.*, **67** : 145-210.

Willmann, C.C. 1931. Moosmilben oder Oribatiden (Cryptostigmata) *In. Dahl. Die. Tierw Deutschl.*, **22** : 79-200.

Wooley, T.A. 1961. Redescriptions of Ewing's Oribatid mites, XI. Family Oribatulidae (Acarina : Oribatei). *Trans. Am. Microsc. Soc.*, **80**(1) : 1-15.