

## ON SOME COLLECTION OF COLLEMBOLA (APTERYGOTA : INSECTA) FROM UTTARANCHAL, INDIA

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### INTRODUCTION

A faunistic survey was undertaken during the month October–November, 2000 to ascertain the anthropogenic impact on type localities of a number of species described by Mitra (1966 a,b, 1967, 1973 a,b,c, 1974 a,b, 1975, 1992, 1993), from this region more than three decades ago along with making general collections. Topotypes of the most of the species could be collected in spite of drastic habitat changes along with the change of the vegetation of some type localities even after nearly three decades. This indicates the great resilience of Collembola even though such intrinsic habitat changes have taken place over years.

Altogether 12 species were collected representing 9 genera and 2 families. Out of 12 species, five species are represented by topotypes which are marked with asterix.

### SYSTEMATIC ACCOUNT

Order COLLEMBOLA

Suborder ARTHROPLEONA

#### Key to the Super families of ARTHROPLEONA

- First thoracic segment dorsally distinct with dorsal setae .... PODUROIDEA, Womersley, 1933.  
First thoracic segment without dorsal setae and frequently more or less reduced or hidden dorsally by mesothoracic segment ..... ENTOMOBRYOIDEA, Womersley, 1933.

#### Key to the families of ENTOMOBRYOIDEA

1. Hind coxae usually with trochanteral. Abdomen IV appreciably longer than abdomen III. Scales present or absent, often ciliated. Furcula well developed. .... ENTOMOBRYIDAE, Tomosvary, 1882.
2. Hind coxae without trochanteral organ. Abdomen III and IV usually subequal; the abdomen IV never more than one and half times as long as the abdomen III, the other posterior abdominal segments often fused, scales usually not present ..... ISOTOMIDAE, Börner, 1993.

### Key to the subfamilies of ENTOMOBRYIDAE

1. Dentes dorsally crenulated and curving upwards basally in the line with manubrium ..... Entomobryinae, Schaeffer, 1896
- Dentes not crenulated, straight and usually forming a basal angle with manubrium ..... 2
2. Serrated or coarsely ciliated dental spine is absent ..... 3
- Serrated or coarsely ciliated dental spine present on the basal portion of the dentes only .... Tomocerinae, Schaeffer, 1896
3. Eyes and pigment present; dentes without dorsal scale and with apical lobe ..... Paronellinae, Börner, 1913

### Family ENTOMOBRYIDAE

#### Subfamily ENTOMOBRYINAE, Schaeffer, 1896

Dentes crenulated dorsally. Mucrone fulcate with basal spine. Short and hook-like. Body with hairs or scales or both. The chaetotaxy of head and trunk and eye numbers are useful in identifying the members of this family.

#### Genus *Lepidocyrtus* Bourlet, 1839

The genus represented by single species.

#### 1. *Lepidocyrtus (Acrocyrtus) heterolepis* Yosii, 1959

1959. *Lepidocyrtus (Acrocyrtus) heterolepis* Yosii, *Contr. Biol. Lab. Kyoto. Univ.*, **10** : 33.

*Material examined* : Lacchiwala Forest Range, Dehradun distt., 28.10.2000, Coll. S. K. Mitra, 23 exs.

*Diagnostic characters* : Length upto 1.6 mm. Antennae uniformly bluish pigmented. A transverse stripe along the fore margin of head. Eyes black. Ant. segment ratio as 15 : 30 : 48 : Th. II is slightly protruded over the Head. Th. II, III as 75 : 25. Abd. III : IV as 3 : 12. Manubrium : dens as 24 : 18. Mucro bidentate, two teeth subequal and with a basal spine.

*Distribution* : INDIA : Uttaranchal, Manipur, SINGAPORE, MALAY

#### Genus *Homidia* Börner, 1906

The genus represented by single species.

#### 2. *Homidia cingula* Börner, 1906

*Material examined* : Herbertpur, Alt. 2500', Dehradun distt., 30.10.2000, Coll. S. K. Mitra, 22 exs.

*Diagnostic characters* : Back ground yellowish. Blue black pigment forming transverse band on the III-rd and IV-th abdominal segments. Body not compressed. Dental spine '33' in numbers. Apical mucronal tooth smaller than anteapical.

*Distribution* : INDIA : Uttaranchal, Manipur, Sikkim.

#### Subfamily TOMOCERINAE

Fourth antennal segment shorter than the third this character easily separates this subfamily from all other Entomobryids.

#### Genus *Tomocerus* Nicolet, 1842

The genus represented by single species.

#### 3. *Tomocerus (s. str.) mitrai* Prabhuo, 1980

1980. *Tomocerus (S. str.) mitrai* Prabhuo and Murlidharan, *Entomort.*, 5(3) : 207-210.

*Material examined* : Khirsu, coniferous forest floor, Pauri Garhwal Distt., 6.11.2001, Coll. S. K. Mitra, 26 exs.; Jwalpa Devi, Pauri Garhwal Distt., 5.11.2001, Coll. S. K. Mitra, 32 exs.

*Diagnostic characters* : Ground colour yellowish-white with blue pigment towards lateral margin of thorax and Ant. II–III. Ocellar field deep blue. Body clothed with brownish blunt scales with prominent striation and finely ciliated setae. Dentes with scales on ventral side, towards the distal half two rows of unilaterally plumose setae 8–10 in a rows. Ocelli 6 + 6, unguis of usual type with 5 to 6 teeth. Dental spine brown in color, finely striated longitudinally in a single row as 3, 1.5, 1. Mucro elongated 4 intermittent teeth on outer lamella and two basal teeth. Outer basal tooth of mucro with a comer toothlet.

*Distribution* : INDIA : Uttaranchal, Arunachal Pradesh, Sikkim, Himachal Pradesh.

#### Subfamily PARONELLINAE Börner, 1913.

This subfamily can be distinguished from other Entomobryids by the rigid and short dentes, presence of dental scale appendage on the terminal part of dentes. The mucrones is majority cases are plump, lobed into several teeth and is different in shape from the members of subfamily Entomobryinae.

#### Key to genera of subfamily PARONELLINAE from Uttaranchal

1. Body covered with scales ..... 2
- Body not covered with scales ..... 3
2. Dental scale appendage and 4 + 4 frontal spines present, antennal segments without thick outstanding brush setae ..... *Callyntrura* Börner

- Dental scale appendage and 4 + 4 frontal spines absent, antennal segments with thick outstanding brush setae ..... *Dicranocentroides* Schött.
3. Mucro well developed, stout, bidantate or tridentate, dental scale appendage equal or subequal to mucronal length ..... 4
- Mucro vestigial in the form of a hook, dental scale appendage highly enlarged ..... *Yosiia* Mitra
4. Mucro with 2 apical teeth; ventral tube anteriorly on anterior face with 5 + 5 macrochaetae; 1 + 1 frontal spines reduced ..... *Pseudosalina* Mitra
- Mucro with 3 apical teeth; ventral tube anteriorly on anterior face with 4 + 4 macrochaetae; 1 + 1 frontal spines well developed ..... *Salina* MacGillivray

#### Genus *Pseudosalina*, Mitra 1966

The genus represented by three species.

##### \*4. *Pseudosalina nigrocephala* (Mitra, 1966)

1966. *Salina nigrocephala* Mitra, *Indian J. Ent.* **28** : 70-72.

1973. *Pseudosalina nigrocephala* Mitra, *Rev. Ecol. Biol. Sol.*, **10** : 359-377.

*Material examined* : Sahasradhara Hills, Dehradun distt., Uttarakhand, Coll. S. K. Mitra, 26.10.2000, 22 exs. (*Topotypes*)

*Diagnostic characters* : Ground colour pale green in spirit, general surface of body clothed with slender acuminate setae; each ocellar field contains 8 ocelli, arranged in two longitudinal parallel rows. Relative length index of Ths. II : III = 18 : 9. Relative length index of Abds. I : II : III : IV : V : VI = 9 : 14 : 4 : 40 : 9 : 5; ventral tube well developed. Relative length index of manubrium : mucrodens = 50 : 59 : mucro stout, with two prominent leg like teeth, dental scale appendage well developed; dental spines absent. Body length (excluding appendages) : 1.6–2 mm.

*Distribution* : INDIA : Uttarakhand (Dehradun distt.).

##### \*5. *Pseudosalina multiformis*, Mitra, 1973

1966. *Pseudosalina multiformis* Mitra, *Rev. Ecol. Biol. Soc.*, **10**(3) : 359-377.

*Material examined* : Sahasradhara Hills, Dehradun distt., Uttarakhand, Coll. S. K. Mitra, 26.10.2000, 15 exs. (*Topotypes*).

*Diagnostic character* : General ground colour of head and body varies from white to pale yellow, darker patches present on Ths. II, III and anteriorly as Abd. I; body clothed with micro and macrochaetae; microchaetae acuminate and form the general clothing of the body; 8 + 8 ocelli in dark pigmented ocellar fields; relative length index of Ants I : II : III : IV = 13 : 8 : 7 : 18;

Relative length index of Ths. II : III = 26 : 17; Relative length index of Abds. I : II : III : IV : V : VI = 14 : 21 : 8 : 75 : 7; relative length index of manubrium : mucroden = 59 : 66; mucro bidentate; dental scale appendage faintly striated. Body length (excluding appendages) : 1.29–2 mm.

*Distribution* : INDIA ; Uttaranchal (Dehradun distt.).

**\*6. *Pseudosalina christianseni* Mitra, 1973**

1973. *Pseudosalina christianseni* Mitra, *Rev. Ecol. Biol. Soc.* 10(3) : 359-377.

*Material examined* : Rajaji National Park, Saharanpur distt., Uttaranchal, Coll. S. K. Mitra, 16 exs. (*Topotypes*).

*Diagnostic characters* : Ground colour of head and body pale yellow; violet to blue black patches present on III, Abd. I and Abd. II. General surface of body uniformly clothed with ciliated microchaetal interspersed with flexed, obliquely truncated, ciliated macrochaetae on vertex. 2 dark ocellas fields, containing 8 ocelli; relative length index of Ants. I : II : III : IV = 40 : 43 : 41 : 55; Th. I reduced; relative length index of Ths. II : III = 34 : 30; Relative length index of Abds. I : II : III : IV : V : VI = 12 : 17 : 10 : 57 : 11 : 7; ventral tube moderately long. Manubrium : mucrodens = 49 : 62; mucro broad with two teeth and a ridge like thickening on inner lateral surface; dental scale appendage simple, with a basal plate and apically striated. Length (excluding appendages) : 0.6–1.1 mm.

*Distribution* : INDIA : Uttaranchal (Saharanpur distt.).

Genus *Yosii* Mitra, 1967.

**\*7. *Yosii dehradunia* Mitra 1967**

1967. *Yosii dehradunia* Mitra, *Proc. Zool. Soc, Calcutta*, 20 : 43-47.

*Material examined* : Motichur Forest Range, Hardwar Distt. 3900', 8.11..2000, Coll. S. K. Mitra, 18 exs.; Rajaji National Park, Dehradun Distt., Uttaranchal, 27.X.2000, Coll. S. K. Mitra, 12 exs. (*Topotypes*).

*Diagnostic characters* : Ground colour pale yellow, dusted with blue pigment all over the body. Clothed with slender acuminate setae. Dens crenulated, mucro falsiform, some time perceptible in the form of a booklet, not demarcated from dens. Dental appendage highly enlarged. Pear shaped head, 8 + 8 ocelli. Ant. III and IV faintly annulated, relative length index of Ants. I : II : III : IV = 32 : 46 : 48 : 70. Th. I reduced, the relative length index of Th. II : III = 23 : 11. Each tibiotarsus with two large tibio-tarsal lobes. The relative length index of Abd. I : II : III : IV : V : VI = 6 : 15 : 4 : 67 : 9 : 6. Ventral tube short. Body length 1.14 mm.

*Distribution* : INDIA : Uttaranchal, Sikkim, Tripura (West Distt.), West Bengal.

Genus *Callyntrura* Börner, 1906

Two species are recorded from present survey.

\*8. *Callyntrura variabilis* Mitra, 1974

1974. *Callyntrura (callyntrura) variabilis* Mitra, *Rev. Ecol. Biol. Soc.*, **11**(3) : 397-439.

*Material examined* : Nepalifarm, Dehradun distt. Uttaranchal, 29.10.2000. Coll. S. K. Mitra, 16 exs., Golatappar Forest Block, Dehradun distt. 30.X.2000, Coll. S. K. Mitra, 22 exs. (*Topotypes*).

*Diagnostic characters* : General ground colour of body yellow to brown with variable dark blue-black patches; body clothed VI = 17 : 24 : 8 : with scales and flexed setae; 8 + 8 ocelli in pigmented ocellar fields; relative length index of Ants. I : II : III : IV = 18 : 17 : 11 : 27; relative length index of ths. II : III = 42 : 25; legs all similar; relative length index of Abds. I : II : III : IV : V : VI = 17 : 24 : 8 : 94 : 10 : 4; relative length index of manubrium : microdens = 23 : 29.5; micro with 6 teeth; dental scale appendage absent. Body length (excluding appendages) : 2 mm.

*Distribution* : India : Uttaranchal (Dehradun distt).

9. *Callyntrura (Handschinphysa) lineata* (Parona) 1892 *sensu* Mitra, 1973

1892. *Entomobrya lineata* Parona. *Ann. Soc. Hal. Milano* **34** : 132-135.

1912. *Paronella borneri* Imms. *Proc. Zool. Soc. London* pp. 80-125.

1912. *Paronella phanolepis* : Imms, *Proc. Zool. Soc. London*, pp. 80-125.

1957. *Handschinphysa lineata* Salmon, *Acta. Zool. Cracov* **11**(14) : 313-362.

1973. *Callyntrura (Handschinphysa) lineata* Mitra, *Rev. Ecol. Biol. Sol.*, **11** : 397-439.

*Material examined* : Sahasradhara Hills, Dehradun distt., Uttaranchal, 26.10.2000, Coll. S. K. Mitra, 13 exs.; Tehri, Tehri Garhwal distt., 2700', 02.11.2000, Coll. S. K. Mitra 8 exs.

*Diagnostic characters* : Pale to deep yellow with deep blue-black ocellar fields; antennae little longer than body. And ratio as 75 : 80 : 85 : 55 : 125. Manubrium to dens to mucro as 105 : 130 : 718; mucro with two apical teeth, two plate-like teeth and a spine-like tooth on the posterior face and one or two lateral teeth. Body length upto 3.75 mm.

*Distribution* : INDIA : Uttaranchal, Manipur, Sikkim.

Genus *Salina* MacGillivray 1894

The genus is represented only single species.

10. *Salina indica* (Imms 1912)

1912. *Cremastocephalus indicus* Imms, *Proc. Zool. Soc. London*, : 80-125.

1957. *Salina indica* Salmon, *Acta. Zool. Cracov.*, **11**(14) : 313-362 (In part).

1973. *Salina indica* Mitra, *Oriental Insects.*, **7**(2) : 159-202.

*Material examined* : Lacchiwala forest Range, 2500', Dehradun distt., Uttaranchal, 28.10.2000, Coll. S. K. Mitra, 15 exs.

*Diagnostic characters* : Ground colour yellowish, overlaid irregularly by violet pigment which usually follows a lateral edges of the terga. Ocelli on black fields 8 + 8. General clothing of short to medium length ciliated setae with some long, stout, lightly flexed ciliated setae at the apex of mesotergum & along the dorsal surface of the thorax. Apex of dens with scale like appendage. Mucro bearing three plain teeth.

*Distribution* : INDIA : Uttaranchal, Manipur, Sikkim, Tripura, West Bengal, U.P.

### Genus *Dicranocentroides* (Imms, 1912)

#### 11. *Dicranocentroides flavescens* Yosii, 1966

1966. *Dicranocentroides fasciculatus* f.n. *flavescens* Yosii, *Res. Kyoto. Um. Sci. Exped. Karakoram and Hindukush*, 1955, 8 : 333-405.

*Material examined* : Herbertpur, 2500', Dehradun distt. 30.10.2000, Coll. S. K. Mitra, 14 exs.

*Diagnostic characters* : A dark patch characteristic of the species present on vertex in between two ocellar fields. Dark patches absent on body. Ocelli 8 + 8. Relative length index of Ant. I : II : III : IV = 15 : 17 : 12 : 19. Relative length of Th. II : III = 14 : 8.5. Legs all similar, unguiculus lanceolate, acuminate with 2 external teeth. Relative length index of Abds I : II : III : IV : V : VI = 5 : 6 : 4 : 39 : 5.5 : 2. Ventral tube long with a row of macrochaetal anteriorly. Relative length of manubrium : mucrodens = 28 : 38, dentes armed with two closely opposed rows of spines on inner margin; mucro large, parallel sided with 6 teeth. Body length 2–3.5 mm.

*Distribution* : INDIA : Sikkim, Tripura (West Distt.), Uttaranchal, West Bengal, Maharashtra, U.P.

### Family ISOTOMIDAE Börner, 1913

#### Subfamily ISOTOMINAE, Schaeffer, 1896

Head prognathus, tracheae absent. Antennae inserted in front half of head. P.AO. usually present, always simple, mucrones short.

### Genus *Isotomurus* Börner, 1906

#### 12. *Isotomurus balteatus* (Reuter, 1876)

1876. *Isotomurus balteatus* Reuter, *Med. Soc. Fauna. Et. Flora. Fenn.*, 1 : 82.

1963. *Isotomurus balteatus* : Yosii, *Contr. Biol. Lab. Kyoto. Univ.*, 15 : 4.

*Material examined* : Sahasradhara Hills, Deradun distt., Uttaranchal, 26.X.2000, Coll. S. K. Mitra, 12 exs., Nepali farm, Dehradun Distt., 29.X.2000. Coll. S. K. Mitra, 10 exs.

*Diagnostic character* : Colour with a violettish black pigment which form distinct transverse band on the anterior margin of tergites. Ant. Ratio = 10 : 15 : 16 : 26; ant. IV with two short subapical sense rods. P.A.O. as large as anterior ocellus. Ocelli 8 + 8. Furcula reaches forward to the ventral tube furculor segments related as 5 : 12 : 1. Dens distinctly annulated on dorsal side; mucro with a small apical, 2 large subapical and a large external lateral teeth.

*Distribution* : INDIA : Uttaranchal, Manipur, Tripura, Arunachal Pradesh, Kerala.

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### REFERENCE

- Baijal, H. N. 1955. Two new species of Collembola. *Agra, Univ. Journ. Sci. Res.*, **4** : 175-177.
- Choudhuri, D. K. 1963. Revision of Bagnail's work on the genus *Onychurus* (Collembola) *Proc. Nat. Acad. Sci. India*, **33** : 329-341.
- Carpenter, G. H. 1924. Collembola of Siju Caves. Garo Hills, Assam. *Rec. Indian Mus Cal* : 285-289.
- Denis, J. R. 1936. Yale North India Expedition. Report on Collembola. *Mem. Conn. Acad. Arts and Sci.*, **10** : 261-282.
- Imms, A. D. 1912. On some Collembola from India, Burma and Ceylon with a catalogue of oriental species of order. *Proc. Zool. Soc. London.*, : 80-125.
- Mitra, S. K. 1966a. On some Indian Collembola with the description of a new species of *Xenylla* (Collembola : Hypogastruridae). *Sci. and Cult., Calcutta*, **32** : 210-211.
- Mitra, S. K. 1966b. Two new species of *Salina MacGillivary* (Collembola : Entomobryidae : Paronellinae)
- Mitra, S. K. 1967. A new genus and species of Indian Springtail (Insecta : Collembola : Paronellinae). *Proc. Zool. Soc. Cal.*, **20** : 43-47.
- Mitra, S. K. 1973a. A revision of *Salina MacGillivary*, 1894 (Collembola : Entomobryidae : Paronellinae) from India. *Oriental Insects., Delhi*, **7(2)** : 159-202.
- Mitra, S. K. 1973b. Some observations on the post embryonic morphological differentiation including chaetotaxy in *Callyntrura (Handschinphysa) lineata* (Parona, 1892). *Zool. Anz., Leipzig.*, **191(3-4)** : 209-218.
- Mitra, S. K. 1973c. A new paronellinae genus of Indian springtail (Collembola : Entomobryidae : Paronellinae) with the descriptions of three new species. *Rev. Ecol. Biol. Sol. Paris*, **10(3)** : 359-377.



- Mitra, S. K. 1974. A critical study on some species of *Callyntruna* Börner, 1906 (Collembola : Entomobryidae : Paronellinae) from India. *Rev. Ecol. Biol. Soc. Paris*, **11**(3) : 397-439.
- Mitra, S. K. 1975. Studies on the genus *Dicranocentroides* Imms, 1912 (Collembola : Entomobryidae : Paronellinae) from India. *Rec. Zool. Surv. India*, **71** : 57-95; Mitra, S. K. 1973. A new Paronellinae of Indian Springtail (Collembola : Entomobryidae with the descriptions of three new species. *Rev. Ecol. Biol. Soc. Paris*, **10** : 359-377.
- Mitra, S. K. 1992. Fixation of the concept of *Paronella* schott. 1893 (Collembola : Entomobryidae). *Rec. zool. Surv. India*, **92** : 211-244.
- Mitra, S. K. 1993. Chaetotaxy, Phylogeny and biogeography of Paronellinae (Collembola : Entomobryidae). *Rec. zool. Surv. India, Occ. Paper No. 154*.
- Mukherjee, D. 1932. Description of a new species of Collembola and its anatomy. *Rec. Ind. Mus.* **34** : 47-49.
- Prabhoo, N. R. 1971. Bark and moss inhabiting Collembola of South India. *Bull. Ent.* **12**(2) : 41-47.
- Ritter, W. 1911. New Thysanuren and Collembolen aus Ceylon and Bombay. *Gesa. Melt. Von Dr. Uzel. Wien. Ann. Nat. Hist. Hofmus.*, **24** : 379-398.
- Salmon, J. T. 1957. Some Paronellinae (Collembola) from India. *Acta. Zool. Cracov.*, **11**(14) : 313-363.
- Salmon, J. T. 1964. An index to the Collembola. *Bull. Roy. Soc. N.Z.*, **7**(2) : 145-644.
- Schott, H. 1925. Collembola from Mount Murud and Mount Dulit in Northern Sarawak. *Sarawak Mus. Journ.*, **3** : 107-127.
- South, A. 1961. The taxonomy of the British species of Entomobrya. *Trans. R. Ent. Soc., London*, **113**(13) : 387-416.
- Stach, J. 1964. Materials to the knowledge of Chinese Collembolan. Fauna. *Acta. Zool. Cracov.* **9**(1) : 1-26.
- Stach, J. 1965. On some Collembola of North Vietnam. *Acta. Zool. Cracov.*, **10** : 345-372.
- Yosii, R. 1959. Studies on the Collembolan Fauna of Malay and Singapore with special ref. To genera; *Lobella*, *Lepidocyrtus* and *Callyntrura*. *Contr. Biol. Las. Kyoto Univ.*, **10** : 1-65.
- Yosii, R. 1966a. On some Collembola from afganisthan, India and Ceylon, collected by Kuphe Expedition, 1960. *Res. Kyoto. Univ. Exped. Karakoram and Hindukush 1955.* **8** : 333-405.
- Yosii, R. 1966b. Collembola of Himalaya, *J. Coll. Arts and Sci. Chiba Univ.*, **4**(4) : 461-531.