Biological Forum – An International Journal **6**(2): 197-202(2014)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

New Records of Collembola (Hexapoda) from Hazaribagh National Park, Jharkhand, India

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(Received 08 August 2014, Accepted 27 September 2014)

ABSTRACTS: The present study is based on a survey conducted in Hazaribagh National Park, district Hazaribagh, Jharkhand during November-December, 2012.A total of 8 species of Collembola belonging to 4 families have been recorded from different habitats and localities of Hazaribagh National Park and all are new records from this area.

Key words: Collembola, Hazaribagh National Park, Jharkhand, New records

INTRODUCTION

The collembolans commonly called "spring-tails" are small, entognathous, wingless hexapods possessing a spring-like forked jumping organ, the furcula underneath the fourth abdominal segment. They are minute in size less than 6 mm in length and antennae primarily with 4 segments. The presence of antennae and absence of cerci distinguish them from the other entognathous hexapods. The collembolans have very diverse distribution occurring in all Zoo-geographical regions of the world inhabiting a wide range of ecological niche and climate. They are prevalent in almost all kind of situations, in mosses, under stones, caves, in ant and termite nests, surface of lakes and ponds even in the intertidal zone. The greatest diversity and density are seen in soil rich organic matter. The first Indian species of collembolan from Malabar hill regions was described by Ritter (1910, 1911).Thereafter, Imms(1912), Carpenter(1917 and 1924), Handschin (1925, 29), Bonet(1930), Mukherjee(1932), Brown(1932), Denis(1936), Baijal(1955,58), Salmon(1956, 1957 and 1970),Choudhuri and Roy(1965),Yosii(1966), Prabhoo(1971a,b), Mitra(1966,67, 74,75), Hazra(1995) and Mandal(2002-tilldate) contributed to the knowledge of Indian Collembola.

Approximately 8,143 species and subspecies belonging to 764 genera in 19 families of Collembola are known from all over the world (Bellinger, Christiansen and Janssens, 1996–2014), out of which 301 species and subspecies of Collembola under 109 genera belonging to 19 families are reported from India (Mandal, 2010). As a part of Annual Plan of Research Work 2012-2015, of Apterygota section of Zoological Survey of India, Kolkata, the studies conducted in the different districts of the Jharkhand and present paper is based on a collection of collembolan from Hazaribagh National Park, district Hazaribagh, Jharkhand. The Collembolan fauna of this region is totally unexplored and present account will form a basis for future research on this group from the area.

MATERIAL AND METHODS

The study area, Hazaribagh National Park, located 19 km from Hazaribagh and about 135 km from Ranchi in Jharkhand state of India. It is situated between latitude 24°8'20.4" N and 85°21'57.6"E longitudes. In field a white enamel tray and aspirator were used for collection. An amount of alcohol was used in the tray or the large petridish during beating the bushes, mosses or forest litters for collections of collembolans in order to induce the insects to jump on these objects. Thereafter, they were picked up with fine brush and preserved in 70% alcohol. Preserved specimens were cleared in Marc Andre 1 medium. Dark specimens were kept in Potasium hydroxide (KOH) for softening the chitin. Hoyer's mounting medium was used for slide-mounting of the specimens. Identification of specimens is done using a phase contrast compound microscope following methodology adopted by Christiansen and Bellinger, 1998.

RESULTS

The detail of identified species from Hazaribagh National Park, Jharkhand are provided below:

Systematic Account:

I. Family Hypogastruridae Borner, 1906

1.Genus *Ceratophysella* Borner in Brohmer, 1932

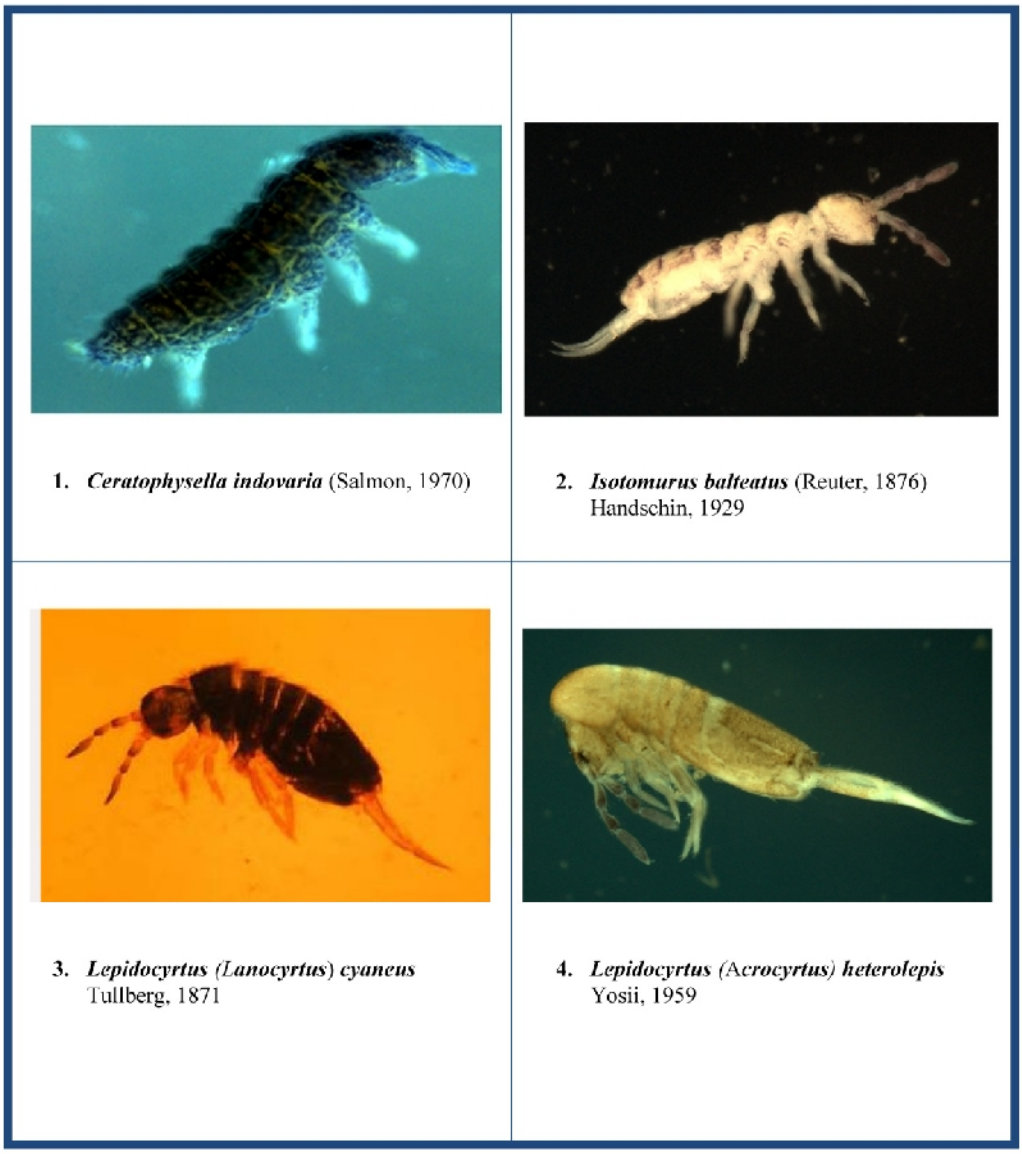
Type species: *Podura armata* Nicolet, 1842

Diagnosis: This genus is characterized by the spoon-shaped mucro, elongate lobes of the postantennalorgan, lamellate unguiculus, and sensory seta of thoracic segment.

1.*Ceratophysella indovaria* (Salmon, 1970) (Fig. 1, plate-I)

1970. *Hypogastrura indovaria* Salmon, *Trans, Biol. Sci*, **12** (13):149

Material examined: Hazaribagh district, Paddy field near Koila village, Hazaribagh National Park, 25.xi. 2012, coll. G.P. Mandal, 2exs.



1. ***Ceratophysella indovaria*** (Salmon, 1970)

2. ***Isotomurus balteatus*** (Reuter, 1876) Handschin, 1929

3. ***Lepidocyrtus (Lanocyrtus) cyaneus*** Tullberg, 1871

4. ***Lepidocyrtus (Acrocyrtus) heterolepis*** Yosii, 1959

PLATE- I

Diagnosis: Dark brown in colour, ocelli on black fields. Body with sparse to heavy short and long curved simple setae. Antennae shorter than head, ratio 19:20, segment IV without sensory knob, but with 7-9 short, stout, bent sense rods, numerous long stout simple setae. P.A.O. very irregular, consisting of 4-12 indistinct disconnected lobes with or without central boss. Body length 0.8 mm. Legs with claw and finely granulate unguiculus, long tenent hair never clavate. The dens with a double row setae down anterior face, each row with four setae; mucro finely granulate and spoon shaped with two distinct lamellae.

Distribution: INDIA: Jharkhand, Sikkim, Arunachal, Assam, Manipur, Mizoram and West Bengal (Salmon, 1970; Mandal and Hazra, 2009).

Remarks: There are 134 species under the genus ***Ceratophysella*** from world and in India 5 species are recorded.

II. Family Isotomidae Schaffer, 1896

Subfamily Isotominae Schaffer, 1896

2. Genus *Isotomurus* Börner, 1903

1903.*Isotomurus* Borner, *Ges. Naturwiss Freunde Berlin* 1903:129-182.

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

Type species: *Podura palustris* Muller, 1776

Diagnosis: Isotomids with bothriotricha, a quadridentatemucro with a small apical tooth, and no patch of extra blunt setae on the third antennal segment.

2. *Isotomurus balteatus* (Reuter, 1876) (Fig. 2, Plate-I)

1876. *Isotoma balteatus* Reuter, *Med. Soc. Fauna et. Flora. Fenn.*,**1**: 82.

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

2009. *Isotomurus balteatus* (Reuter) Mandal and Hazra, *Records of the Zool. Surv. Ind. Occasional Paper* no. 298. pp 1-206.

Material examined: Hazaribagh district, Lodha Dam surrounding, Rajderva Range, Hazaribagh National Park, 25.xi. 2012, coll. G.P.Mandal, 12 exs.

Diagnosis: Colour with a deep violet pigment appearing black which form distinct transverse band on the anterior margin of tergities. Antennal ratio is 10:15:16:26. Ant. IV with short sub apical sense rods. P.A.O as large as anterior ocellus. Ocelli 8+8.Furcula large.Dens distinctly annulated with dorsal side; mucro with a small apical, 2 large subapical and large external lateral teeth.

Distribution: INDIA: Jharkhand, Arunachal, Manipur, Orissa, Tripura and West Bengal (Mandal and Hazra, 2009), COSMOPOLITAN.

Remarks: There are 70 species under the genus ***Isotomurus*** from world and in India 3 species are recorded.

III. Family Entomobryidae Schaffer, 1896

Subfamily Entomobryinae Schaffer, 1896

3. Genus *Lepidocyrtus* Bourlet, 1839

1839. ***Lepidocyrtus*** Bourlet, *Mem. Soc. Agric.Arts. Sci. Douai*: 89-166.

Type species: *Lepidocyrtus curvicollis* Bourlet, 1839

Diagnosis: Body with scales; Head with 8 + 8 eyes; Mucrobidentate; Dental spines absent; Antennae and legs scaled.

Subgenus *Lanocyrtus* Yoshii and Yayuk, 1989

3. *Lepidocyrtus (Lanocyrtus*) *cyaneus* Tullberg, 1871 (Fig. 3, Plate-I)

1869. *Lepidocyrtus cyaneus* Tullberg, *W. Sch. Bokt. Uppsala*. 21pp**.**

1959**.** *Lepidocyrtus cyaneus* Yosii, *Contr. Biol. Lab. Kyoto. Univ.*,**10**: 25.

2009. *Lepidocyrtus cyaneus* Mandal and Hazra, *Records ofthe Zool. Surv. Ind. Occasional Paper* no. 298. pp 1-206.

Material examined: Hazaribagh district, Chaltanullah, Rajderva Range, Hazaribagh National Park, 26.xi. 2012, coll. G.P. Mandal, 8 exs.

Diagnosis: Mesothorax slightly protruded over the head. Thoracic segments II: III as 5:3.Legs coloured on the proximal half of coxae. Abdominal segments .III/IV as 4:13.Furcula with manubrium: dens as 10:9. Manubrium ventrally scaled with 2+2 serrated terminal setae. Dental lobe without appendix.Body length 1.0 mm.

Distribution: INDIA (Jharkhand, Arunachal and Manipur) Mandal and Hazra, 2009; MALAYSIA, SINGAPUR and VIETNAM (Yosii, 1959).

Remarks: There are **26** species under the genus ***Lepidocyrtus*** and subgenus ***Lanocyrtus*** from world and in India 4 species are recorded.

Subgenus *Acrocyrtus*Yosii, 1959

4. *Lepidocyrtus (Acrocyrtus) heterolepis* Yosii, 1959 (Fig. 4, Plate-I)

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

2009. *Lepidocyrtus (Acrocyrtus) heterolepis* Mandal and Hazra, *Records of the Zool. Surv. Ind. Occasional Paper* no. 298. pp 1-206.

Material examined: Hazaribagh district, Chaltanullah, Dam no.1, Rajderva Range, Hazaribagh National Park, 26.xi. 2012, coll. G.P. Mandal, 16exs.

Diagnosis: Body uniformly with bluish tinge. Ant. /Head as 12:7. Eyes black 8+8. Head with a transverse stripe along the fore margin; frontal area and ventral side of the head dark. Antennae uniformly bluish pigmented. Thoracic segments I and II little protruded, segments. II, III as 75:25. Legs with unguis with usual teeth and unguiculuslanceolate. Manubrium: Dens as 24:18. Dentes shorter than manubrum, mucrobidentate, two teeth subequal and with a basal spine. Body legnth 1.6mm.

Distribution: INDIA (Jharkhand, Arunachal and Manipur), SINGAPUR AND MALAYSIA

Remarks: There are **21** species under the genus ***Lepidocyrtus*** and subgenus ***Acrocyrtus*** from world and in India 3 species are recorded.

Subfamily Seirinae Sensu Deharverg, L.2004

4. **Genus *Seira*** Lubbock, 1869

1869. ***Seira*** Lubbock, *Trans. Linn. Soc. London*, **27**: 277-297

Type species: *Degeeria domestica* Nicolet, 1842

Diagnosis: Falcate mucro and thin brownish scales on the body, furcula, first three antennal segments, and legs.

5. *Seiraindica* (Ritter, 1911) Yosii, 1966 (Fig. 5, Plate-II)

1911. *Callistocyrtus indicus* Ritter, *Naturhist. Hofmus. Wien.*, **24**: 379-398

1930. *Pseudosira indica* Bonet, *Eos*, **6**:249-273

1936. *Lepidocyrtus unifasciatus* Denis, *Mem. Conn. Acad. Arts and Sci***., 10**: 261-282

1966. *Seiraindica* Yosii, *Kyoto Univ. Sci. Exp*.1955, **8**: 333-405.

Material examined: Hazaribagh district, Auradhanullah, Rajderva Range, Hazaribagh National Park, 26.xi. 2012, 22exs.

5. ***Seira indica*** (Ritter, 1911) Yosii, 1966

6. ***Callyntrura lineata*** (Parona, 1892) Yosii, 1961

7. ***Callyntrura vestita*** (Handschin, 1925) Yosii, 1982

8. ***Yosiia dehradunia*** Mitra, 1967

PLATE- II

Diagnosis: Body length 1.8 mm. Eyes 8+8. Body colour brownish with bluish pigments with yellowish brown pigments covering abdominal segments II, III, some spots of head and thoracic segment .II. Antennae scaled dorsally, segments III and IV faintly annulated; ratio of antennal segments I-IV: 7:9:9:45. Furcula well developed. Manubrium dorsally with many ciliated setae. Dentes dorsally crenulated. Mucrofalciform.

Distribution: INDIA: Jharkhand,Arunachal, Assam, Nagaland and Maharashtra (Mandaland Hazra, 2009; Ritter, 1911; Yosii, 1966).

Remarks: There are **205** species under the genus ***Seira*** from world and in India 12 species are recorded.

IV. Family Paronellidae Borner, 1913

Subfamily Paronellinae Borner, 1913 sensu Soto-Adams *et. al.*, 2008

5. Genus *Callyntrura* Borner, 1906

1906. *Callyntrura* Borner, *Mitt. Naturhist. Mus. Hamburg* **23**: 147-188.

Type species: *Paronella anopla* Borner, 1906

Diagnosis: Body with scales; vertex with macrochaetae; eyes 8+8; antennae 4-segmented; prelabral setae feathered; manubrium without spines; mucro not falcate and with more than 3 teeth.

6. *Callyntrura lineata* (Parona, 1892) (Fig. 6, Plate-II)1892. *Entomobrya lineate* Parona,. *Atti. Soc. Ital., Milano,* **34**: 132-135.
1912. *Paronella borneri* Imms, *Proc. Zool. Soc. London*, pp.80-125, new synonymy.
1912. *Paronella phanolepis*Imms,. ibid, pp. 80-125, new synonymy 1957.
Handschinphysa lineata Salmon, *Acta. Zool. Cracov.,***11**(14): 313-362.
1974. *Callyntrura (Handschinphysa) lineata* Mitra, *Rev. Ecol. Biol. Sol.***11**(3):397-439.
Material examined: Hazaribagh district, Lodha Dam surrounding, Rajderva Range, Hazaribagh National Park, 25.xi. 2012, coll. G.P. Mandal, 6exs.
Diagnosis: Body pale yellow with variable purple to blue black pigment. Head, body and appendages clothed with setae and pseudo scales; Head pear shaped, frontal spines 4+4 present; ocelli, 8+8. Head /Ant I =28/27; ratio of length of antennal segments I-IV 28:28:18:48; Relative length index of thoracic segments II: III: 52:22; unguis elongate, little curved, unguis with paired inner and 2 distal unpaired teeth; unguiculuslanceolate; tenent hair clavate; Manubrium: mucrodens 110:148; dentes stout; mucro plump with 6-9 teeth. Body length 2.5 – 4 mm.
Distribution: INDIA: Jharkhand, Himachal Pradesh, Manipur, Tripura and Uttarakhand (Mandal and Hazra, 2009; Mitra, 1974).
7.*Callyntrura vestita* (Handschin, 1925) (Fig. 7, Plate-II)
1925. *Microphysa vestita* Handschin, *Treubia*, **6**: 225-270; 1928, *Treubia*, **10**:225-270
1957. *Handschinphysa vestita* Salmon, *Acta. Zool. Cracov.,* **11** (14): 313-362
1974. *Callyntrura (Handschinphysa) vestita*Mitra, *Rev. Ecol. Biol. Sol.,***11**(3): 397-439
Material examined: Hazaribagh district, Dumrinullah, Rajderva Range, Hazaribagh National Park, 26.xi. 2012, coll. G.P. Mandal, 16exs.
Diagnosis: Unique in colour pattern and usually without any variation; body green in fresh, pale yellow in spirit. Body clothed with flexed macrochaetae, acuminate, nonflexed setae and scales. Headpear shaped with 4+4 dark frontal spines; ocelli 8+8. Antennae subequal or little longer than body, ratio of length of antennal segments I-IV 43:40:27:60. Relative length index of thoracic segments II: III 63:31; unguis straight, little curved apically with inner, paired basal teeth reduced, single unpaired tooth small; external baso-lateral teeth large; unguiculilanceolate. Relative length index of abdominal segments I: II: III: IV: V: VI 18:31:14:172:22:9; Manubrium: mucrodens :45:53; mucro usually with 6 teeth, dental scale appendages small. Body length 2-2.5 mm.
Distribution: INDIA: Jharkhand, Maharashtra, Assam, Manipur, Meghalaya, Nagaland (Mandal and Hazra, 2009; Mitra, 1974); INDONESIA (Salmon, 1957).
Remarks: There are 99 species under the genus ***Callyntrura*** from world and in India 16 species are recorded.
6.Genus: *Yosiia* Mitra, 1967
1967.*Yosiia* Mitra, *Proc.Zool. Soc., Calcutta*, **20**: 43-47.
Type species: *Yosiia dehradunia* Mitra, 1967
Diagnosis: Scales absent; dens crenulated; mucro vestigial; dental scale appendages greatly enlarged, dorsal in relation to dens and with longitudinal striations.
8.*Yosiia dehradunia* Mitra, 1967 (Fig. 8, Plate-II)
Material examined: Hazaribagh district, Bagjobra, Rajderva Range, Hazaribagh National Park, 26.xi. 2012, coll. G.P. Mandal, 24exs.
Diagnosis: Pale yellow with dust of blue pigment over the body and a pair of dark blue-black patches one on each side on abdominal segments III and IV. Scales absent; head and body clothed with setae. Head pear-shaped; ocelli 8+8 in pigmented ocellar fields each group of 8 ocelli arranged in two longitudinal parallel rows. Thoracic segment I reduced; the relative length index of segments II: III= 23:11. Relative length index of abdominal segments I:II :III: IV :V:VI = 6:15:4:67:9:6; dens and manubrium subequal, dens crenulated; mucro vestigial; dental scale appendages greatly enlarged.
Distribution: INDIA: Jharkhand, Uttarakhand and Uttar Pradesh (Mitra, 1967).
Remarks: Single species under the genus ***Yosiia*** from India as well as world is recorded.

ACKNOWLEDGEMENTS

The author is grateful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata for providing necessary facilities to conduct the study, equipments and laboratory facilities. The author is also thankful to Dr. Kailash Chandra, Scientist-F, for his kind encouragement.

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