Check List 10(6): 1565–1569, 2014

ISSN 1809-127X (available at *www.biotaxa.org/cl*)

Check List
Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

First records of four species of webspinners (Insecta: Embioptera) from Chhattisgarh, India

Kailash Chandra and Prosenjit Dawn*

Zoological Survey of India, M- Block, New Alipore, Kolkata-700053, India
* Corresponding Author. E-mail: *prosenjit.dawn@gmail.com*

ABSTRACT: The present paper deals with the first taxonomic account on webspinners (Embioptera) of Chhattisgarh, India. Out of 32 species or subspecies known from India, four species, namely *Oligotoma humbertiana* (Saussure, 1896), *Oligotoma saundersii* (Westwood, 1837) and *Oligotoma annandalei* Kapur & Kripalani, 1957 (family Oligotomidae) and *Pseudembia setosa* Ross, 1950 (family Embiidae) are reported for the first time from Chhattisgarh.

DOI: 10.15560/10.6.1565

Among the small insect orders, Embioptera is a distinct, monophyletic group with representatives distributed throughout warmer regions of the world (Miller *et al*. 2012). Less than 400 valid species of this group are currently recorded but there are as many as undocumented species (Miller 2009).

Webspinners are medium sized (5 to 25 mm) insects with a slender and campodeiform body. Mouth parts are prognathus and of the chewing type. Antennae are filiform. Protarsomere I or the foreleg basitarsi possesses a multinucleated silk gland that is responsible for these insects' ability to spin silk (Mukerji 1927). The insects make nests by spinning web tunnels over dry leaves, under barks and stones. These nests serve as protection from predators or parasites, for regulating the humidity, and for laying eggs. Males are generally winged but females are apterous (Ross 2000; Edgerly *et al*. 2002).

The work on Indian Embioptera is limited. The first record of this group from India was made by Imms (1913) who described from the Himalayas *Embia major* Imms, 1913, which was later synonymised with *Parembia valida* (Hagen, 1885). Another species, *Embia minor* Mukerji, 1927 was described from Kolkata with a brief note on its biology (Mukerji 1927). *Pseudembia paradoxa* Davis, 1939 and *Pseudembia truncata* Davis, 1939 were described from Bihar and Karnataka respectively (Davis 1939). *Metembia flava* Ross, 1943 and *Oligotoma falcis* Ross, 1943 were described from South India (Ross 1943). Later, Ross (1950) listed twelve species of Embioptera from India. Some species were also studied by Ananthakrishnan and Ananthasubramanian (1956) from South India. Kapoor and Kripalani (1957) studied fifteen species with six new species of the family Oligotomidae from India. Two species, *Oligotoma dharwariana* Bradoo, 1971 and *Aposthonia josephi* Bradoo, 1971 were described from Karnataka by Bradoo (1971). Chandra (1999) reported two species of Embioptera from South Andaman and Barren Islands in Andaman and Nicobar Islands. Recently, Ross (2007) described one new genus and species, *Oedembia dilatamenta* Ross, 2007, from Assam. Though Mitra *et al*. (1991) reported 33 species or subspecies from India, but study of the literatures decreases the number to 32. Hitherto, no work has been done on the Embioptera of Chhattisgarh state, which initiated the research presented in this paper. Four species, *Oligotoma humbertiana* (Saussure, 1896) (Figure1A), *Oligotoma saundersii* (Westwood, 1837) (Figure1B), *Oligotoma annandalei* Kapur & Kripalani, 1957 (Figure1C), and *Pseudembia setosa* Ross, 1950 (Figure 1D) are newly recorded from this state.

In connection with the project "Faunal Diversity of Protected Areas of Chhattisgarh", field surveys were conducted from June 2011 to August 2012. During the surveys, embioptera specimens were collected from different localities in Chhattisgarh (Figure 3). Most of the winged male specimens were collected in a light trap by using a high-power mercury lamp (2700 lumen). Some specimens were collected by swiping a butterfly net over leaf litter. All specimens were placed in 70% Ethanol. Specimens were examined first under a stereoscopic binocular microscope and the body form, dimensions, colour and other characteristics noted. For further study, specimens were treated with 10% KOH for varying lengths of time depending upon the sclerotization, and then cleared in distilled water. After the usual dehydration by up-gradation of alcohol, specimens were kept in clove oil and temporary slides were prepared with clove oil or alcohol. Identification of the specimens was done using keys by Kapur & Kripalani (1957) and Ross (1950). Identified specimens were deposited in National Zoological Collections, ZSI, Kolkata, India.

Photographs were taken with a Leica Stereo Zoom Microscope (Leica M205A) using the Leica Application Suit software (LAS V3.8).

Family Oligotomidae
Genus *Oligotoma* Westwood, 1837

Oligotoma humbertiana (Saussure, 1896) (Figure 1A)

Diagnostic characters: Process of left hemitergite (10LP) small, very narrow, its apex abruptly hooked to the left and minutely bifurcated [Figure2A.i]. The spine of the

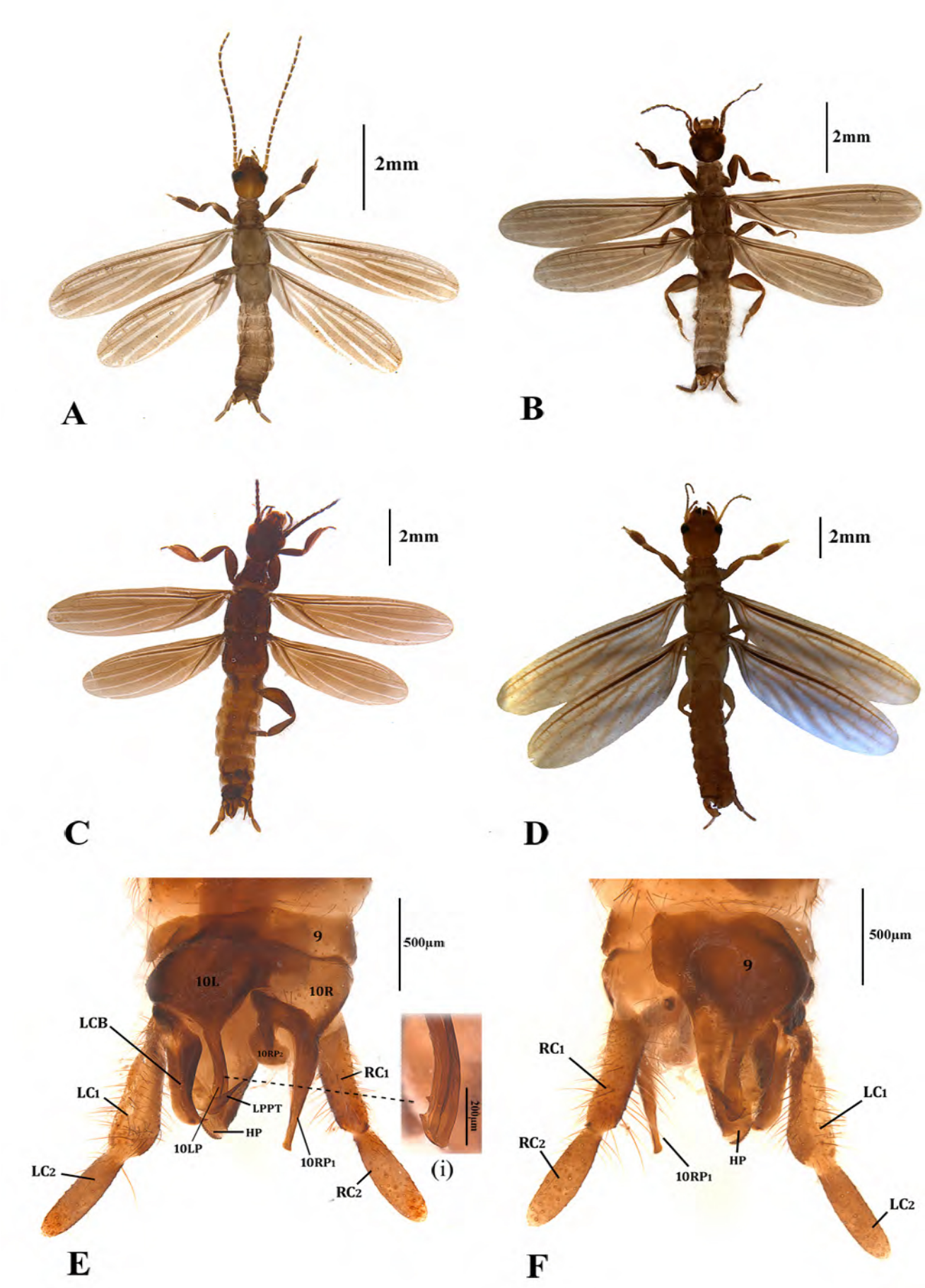

Figure 1. A. *Oligotoma humbertiana*; B. *Oligotoma saundersii*; C. *Oligotoma annandalei*; D. *Pseudembia setosa*; E. *Oligotoma annandalei,* male Terminalia dorsal view, (i) 10LP enlarged, F. *Oligotoma annandalei*, male Terminalia ventral view.

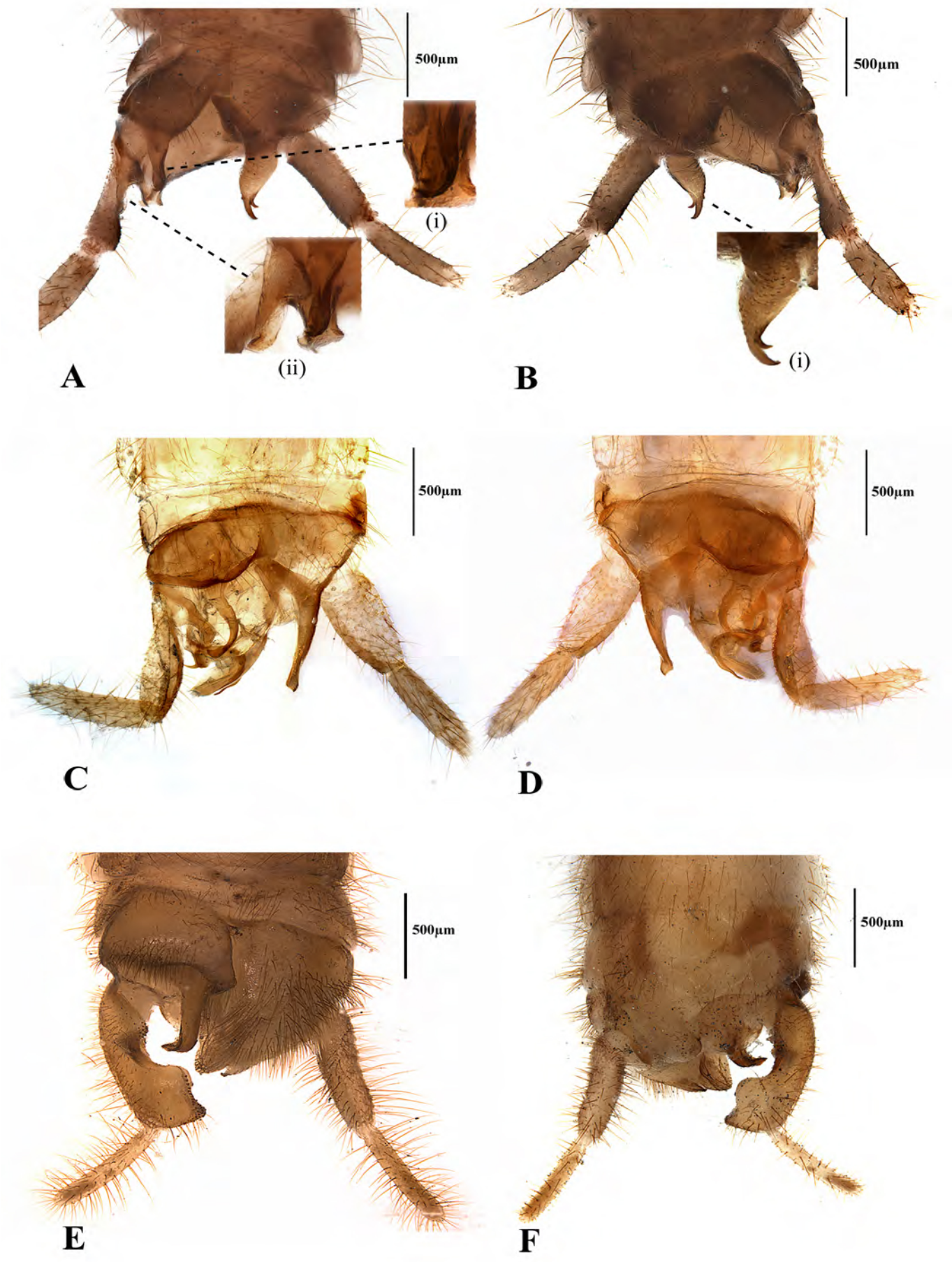

Figure 2. A–B. *Oligotoma humbertiana,* male terminalia (A) dorsal, (A.i) LCB enlarged, (A.ii) 10LP enlarged, (B) ventral, (B.i) 10RP1 enlarged; C–D. *Oligotoma saundersii*, male terminalia, (C) dorsal, (D) ventral; E–F. *Pseudembia setosa*, male terminalia, (E) dorsal, (F) ventral.

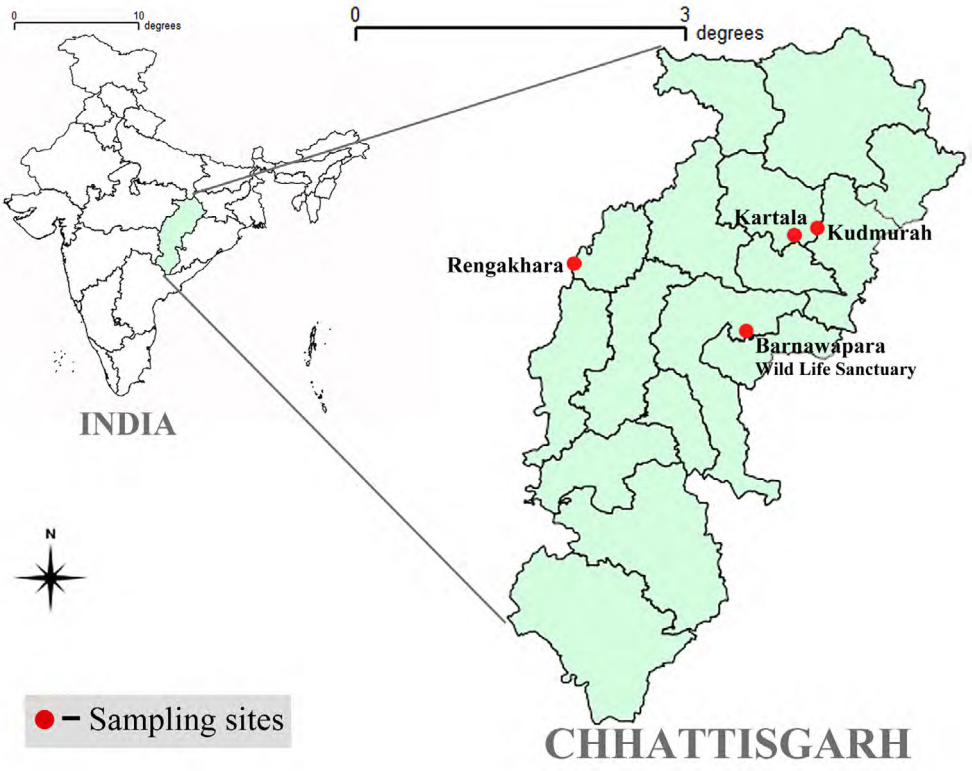

Figure 3. Map of Chhattisgarh, India, indicating the sampling sites.

left paraproct (LPPT) small, horizontal, pointed at both ends. The distinct sub-apical spine present on the outer side of the major process on the right hemitergite ($10RP_1$) [Figure 2B.i]. Left cercus basipodite (LCB) complete ring with a prominent inner lobe prolonged along inner side of left circus, as a narrow caudal process [Figure 2A.ii].

Material examined: India: Chhattisgarh: Korba: Kudmurah, 22°19′14.9″ N, 83°04′43.5″ E; 31 May 2012 (1 ♂), coll. by K. Chandra and party [Reg. No. $2/H_{13}$]; Raipur: Barnawapara Wildlife Sanctuary, 21°24′00″ N, 82°24′18.72″E, 8 September 2011 (1 ♂), coll. by Sunil Gupta and party [Reg. No. CHCAM-1299].

Distribution in India: Andaman Islands, Bihar, Chhattisgarh (Korba and Raipur), Kerala, Madhya Pradesh, Maharashtra, Orissa, Kerala, Tamil Nadu, West Bengal. *Outside of India:* East Africa, Seychelles, Ceylon, Malay Peninsula, Java, Philippine Islands, Formosa, China and Japan to America.

Oligotoma saundersii (Westwood, 1837) (Figure 1B)

Diagnostic characters: Process of right hemitergite ($10RP_1$) without a sub-apical spine, 10LP broad spatulate, with curved sides. Left circus basipodite (LCB) well developed, curved outwards, ending obtusely. LPPT spine broad, sickle shaped. A slender, heavily chitinized spine arises sub-terminally from the margin of the ninth sternite, with two minute teeth at its base and the spine curves to the right under the end of the sternite projecting upwards and backwards terminally (Figure 2C–D).

Material examined: India: Chhattisgarh: Raipur: Barnawapara Wildlife Sanctuary, 21°24′00″ N, 82°24′18.72″ E, 06 November 2011 (1 ♂), coll. by Sunil Gupta and party [Reg. No. $3/H_{13}$].

Distribution in India: India: Bihar, Chhattisgarh (Raipur), Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, West Bengal and Western Ghats. *Outside of India*: Australia, Brazil, Ceylon, East Africa, Formosa, Madagascar, Malay Peninsula, Southern Japan, Sri Lanka and Sumatra.

Oligotoma annandalei Kapur & Kripalani, 1957 [Figure 1C]

Diagnostic characters: 10LP elongated slightly constricted at the base, rather club-shaped with rounded apex and bearing two well separated spines on the left side [Figure1E.i]. Ninth sternite (H) broad basally but gradually narrowed towards the left cercus to a process (HP) bearing a number of short, conical spines [Figure 1F]. Distinct LPPT is present and broad, hooked inwards and upwards terminally and acutely pointed beneath HP [Figure 1E].

Material examined: India: Chhattisgarh: Kabirdham: Rengakhar, 21°57′35.2″ N, 80°52′54.7″ E, 8 June 2012 (1 ♂) [Reg. No. $1/H_{13}$]; Chilpi: Jhapidabra, 22°11′00.82″ N, 81°02′58.40″ E, 9 June 2012 (1 ♂); coll. by A. Raha and party [Reg. No. CHCAM-3293]

Distribution: India: Chhattisgarh (Kabirdham) and Orissa.

Remark: Description of the holotype male indicates the body color of this brown with some parts darker, but the collected specimens were dark black-brown throughout the body.

Family Embiidae
Genus *Pseudembia* Davis, 1939

Pseudembia setosa Ross, 1950 (Figure 1D)

Diagnostic characters: Hind basitarsi elongate, densely setose with two bare bladders. Medial flap of right hemitergite, small, sub-dorsal, bearing a very dense cluster of long caudally directed setae, the basal sockets of which is so close that they touch one another at the apices (Figure 2E–F).

Material examined: India: Chhattisgarh: Korba: Kudmurah, 22°19′14.9″ N, 83°04′43.5″ E, 31 May 2012

(1♂) [Reg. No. 5/H_{13}], 01 June 2012 (2♂) [Reg. No. 6/H_{13}]; Kartala, Lat.: 22°16′4.5″ N, 83°04′43.5″ E, 04 June 2012 (1♂) [Reg. No. 7/H_{13}], 05 June 2012 (2♂) [Reg. No. 4/H_{13}]; coll. by K. Chandra and party.

Distribution: India: Chhattisgarh (Korba), South India (Tamil Nadu).

Among the 32 species or subspecies of Embioptera reported from India, four species included in the present paper are recorded for the first time from Chhattisgarh. Of these four species, two are endemic Indian species (*Oligotoma annandalei* and *Pseudembia setosa*), earlier recorded from Orissa and Tamil Nadu respectively. The other two species are widely distributed in India and other countries. Most of the specimens were winged male and collected using a light trap. The ability of embiopterans to run backwards very fast was a remarkable behaviour that was observed in the field. It is clear that further taxonomic and ecological study of embiopteran insects from Chhattisgarh, India may reveal more species and additional interesting information about their habit and habitats.

Acknowledgements: The authors are thankful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata for providing necessary facilities and encouragement. Thanks are also due to Chhattisgarh (CAMPA) for the financial support for this project. Thanks are also due for the Research Scholars of Chhattisgarh Project and GNBR project for their every support during the study.

Literature Cited

Ananthakrishnan, T.N. and K.S. Ananthasubramanian. 1956. Some Embioptera from South India. *Indian Journal of Entomology* 17: 105–168.

Bradoo, B.L. 1971. Two new species of Embioptera with records of others from South India. *Oriental Insects* 5(2): 263–267.

Chandra, K. 1999. On Embioptera from South Andaman and Barren Island. *Journal of the Andaman Science Association* 15(2): 79–80.

Davis, C. 1939. Taxonomic notes on the order Embioptera. VI–X. *Proceedings of the Linnaean Society of New South Wales* 64: 474–495 (http://biodiversitylibrary.org/page/35123725).

Edgerly, J.S., J.A. Davilla and N. Schoenfeld 2002. Silk spinning behaviour and domicile construction in webspinners. *Journal of Insect Behavior* 15(2): 219–242 (doi: 10.1023/A:1015437001089).

Imms, A.D. 1913. Contribution to a knowledge of the structure and biology of some Indian insects. — II. On *Embia major*, sp. nov., from the Himalayas. *Transactions of Linnaean Society of London* 11: 167–195 (doi: 10.1111/j.1096-3642.1913.tb00486.x).

Kapur, A.P. and M.B. Kripalani, 1957. Studies in Embioptera Part I. The Oligotomidae of India, *Transactions of the Entomological Society of London* 109: 111–134 (doi: 10.1111/j.1365-2311.1957.tb00139.x).

Miller, K.B. 2009. Genus and family group names in the order Embioptera (Insecta). *Zootaxa* 2055: 1–34.

Miller, K.B., C. Hayashi, M.F. Whiting, G.J. Stevson and J.S. Edgerly. 2012. The phylogeny and classification of Embioptera (Insecta). *Systematic Entomology* 37: 550–570 (doi: 10.1111/j.1365-3113.2012.00628.x).

Mitra, T.R. and V.D. Srivastava, 1991. Embioptera; pp. 291–296, in: Director (ed.). *Animal Resources of India*. Zoological Survey of India, Kolkata.

Mukerji, S. 1927. On the morphology and bionomics of *Embia minor* sp. nov. with special reference to its spinning organ. A contribution to our knowledge of the Indian Embioptera. *Records of the Indian Museum* 9: 253–282.

Ross, E.S. 1943. Two new Indian Embioptera and the lectotype of *Oligotoma borneensis* Hagen. *Psyche* 50: 100–108.

Ross, E.S. 1950. The Embiidae of India. *The Wasmann Journal of Biology* 8(2): 133–153 (http://digitalcollections.usfca.edu/cdm/ref/collection/p15129coll11/id/46).

Ross, E.S. 2000a. Embia: Contributions to the biosystematics of the insect order Embiidina. Part 1. Origin, relationships and integumental anatomy of the insect order Embiidina. *Occasional Papers of the California Academy of Sciences* 149: 1–53.

Ross, E.S. 2000b. Embia: Contributions to the biosystematics of the insect order Embiidina. Part 2. A review of the biology of Embiidina. *Occasional Papers of the California Academy of Sciences* 149: 1–36.

Ross, E.S. 2007. The Embiidina of Eastern Asia, Part I. *Proceedings of the California Academy of Sciences* 58: 575–600.

Received: December 2012
Accepted: October 2014
Published online: December 2014
Editorial responsibility: Marcelo Ribeiro Pereira