

A new species and a new record of *Seira* Lubbock (Collembola: Entomobryidae) from Xizang, China

Jincheng LU, Xiaofeng XUE, Feng ZHANG^①

Department of Entomology, College of Plant Protection, Nanjing Agricultural University, Nanjing, Jiangsu 210095, China

Abstract: A new species *Seira xizangensis* **sp. nov.** and a newly recorded species *Seira indra* (Imms, 1912) of *Seira* Lubbock (Collembola, Entomobryidae) are described and illustrated. Both species were collected from Xizang, China. *Seira xizangensis* **sp. nov.** is distinguished by the presence of seven macrochaetae on Abd. I, marking another instance besides *S. cinerea*, *S. kaniskha*, *S. lindei*, and *S. urbana*. *Seira indra* (Imms, 1912) is recorded for the first time in Xizang, China. Species of this genus are extremely rare in China. Discovering new species and records in Xizang indicates the need for further study of Collembola in this area, which is crucial for assessing Chinese faunal diversity and ecological conservation.

Key words: Seirinae; chaetotaxy; Tibet; taxonomy

中国西藏赛蚱属一新种及一新记录种记述（弹尾纲：长角蚱科）

陆金城，薛晓峰，张峰^①

南京农业大学植物保护学院昆虫学系，江苏 南京 210095

摘要：记述中国西藏地区弹尾纲长角蚱科赛蚱属 1 新种 *Seira xizangensis* **sp. nov.**及 1 新记录种 *Seira indra* (Imms, 1912) **rec. nov.**，并对这 2 种进行了描述与图示。2 种均采集自中国西藏。*Seira xizangensis* **sp. nov.** 的主要特征在于腹部第一节 (Abd. I) 上具有 7 根大刚毛，这是继 *S. cinerea*、*S. kaniskha*、*S. lindei* 和 *S. urbana* 后的又一次记录。*Seira indra* (Imms, 1912) 是在中国西藏的首个记录。该属物种在中国极为罕见。此次在西藏发现新物种和新记录种，表明了对该地区弹尾纲进一步探索研究的必要性。此类研究对于评估中国动物区系多样性和推进生态保护工作具有重要意义。

关键词：赛蚱亚科；毛序；西藏；分类

Introduction

The genus *Seira* Lubbock, 1970, is placed within the subfamily Seirinae Yosii, 1961 (sensu Zhang *et al.* 2019). Molecular techniques have advanced taxonomy by moving beyond solely morphological comparisons to integrating genomic data with species descriptions (Godeiro *et al.* 2020, 2021). This integration has clarified the close phylogenetic relationship between *Seira* Lubbock, 1970 and *Lepidocyrtinus* Börner, 1903 (Bellini *et al.* 2019; Godeiro *et al.* 2020, 2021). Species within these two genera exhibit morphological similarities, such as having falcate mucro and 3+3 bothriotracha on Abd. IV (Yosii 1959; Bellini *et al.* 2019).

Accepted 8 December 2024. Published online 4 March 2025.

① Corresponding author, E-mail: fzhang@njau.edu.cn

However, species of the genus *Seira* Lubbock, 1870, are distinguished from those of *Lepidocyrtinus* Börner, 1903, by the absence of blunt macrochaetae on the furca (Bellini *et al.* 2019).

Most species of the genus *Seira* exhibit a remarkably similar appearance and coloration when preserved in ethanol, characterized by a body that ranges from yellowish to brownish, accompanied by darkly pigmented lateral areas on the mesothorax and the fourth abdominal segment. This similarity necessitates reliance on the examination of additional morphological features, particularly dorsal chaetotaxy, to facilitate accurate species identification (Christiansen & Bellinger 2000). However, earlier descriptions of several species within this genus lacked a detailed examination of dorsal chaetotaxy (Szeptycki 1979; Christiansen & Bellinger 2000; Soto-Adames 2008). Consequently, the characterization of species within this genus necessitates meticulous attention to the detailed observation and documentation of dorsal chaetotaxy.

The genus *Seira* is predominantly tropical (Cipola *et al.* 2018) and is scarcely recorded in China (Godeiro & Zhang 2021), originally comprising only four species: *S. boneti* (Denis, 1948), *S. delamarei* (Jacquemart, 1980), *S. musarum* (Ridley, 1890), and *S. oligoseta* (Lee & Park, 1989). Globally, 199 species of this genus have been described (Bellinger *et al.* 1996–2024). The new species *S. xizangensis* **sp. nov.** and the newly recorded species *S. indra* (Imms, 1912) described in this paper were both found in Xizang, from southern Lhasa and Motuobeibeng, respectively, in high-altitude areas. Given that exploration of this genus in the region is not extensive, it is possible that more species of this genus exist (Godeiro & Zhang 2021). Consequently, further collection and identification of Collembola in Xizang are crucial for evaluating soil fauna diversity in China and for ecological conservation efforts.

Material and methods

The most convenient method of collecting Collembola is by the use of aspirator or Berlese-Tullgren funnels depending on the habitat and the objectives of research. Specimens are mounted under a coverslip in Marc André II solution after clearing in Nesbitt's fluid, and are studied using a Nikon E600.

The terminology used in descriptions follows: interocular setae after Mari-Mutt (1986); labial chaetotaxy after Gisin's system (1967); labial papillae, maxillary palp and basolateral and basomedian labial fields after Fjellberg (1999). Type material is deposited in the Department of Entomology, College of Plant Protection, Nanjing Agricultural University (NJAU). All illustrations related to chaetotaxy typically depict one side of the body, unless specified otherwise in the legends.

Abbreviations. Th. — thoracic segment; Abd. — abdominal segment; Ant. — antennal segment.

Taxonomy

Entomobryidae Schött, 1891

Seirinae Yosii, 1961

Seira Lubbock, 1870.

Seira xizangensis sp. nov. Lu & Zhang (Fig. 1)

Description. Body length: 2.22 mm.

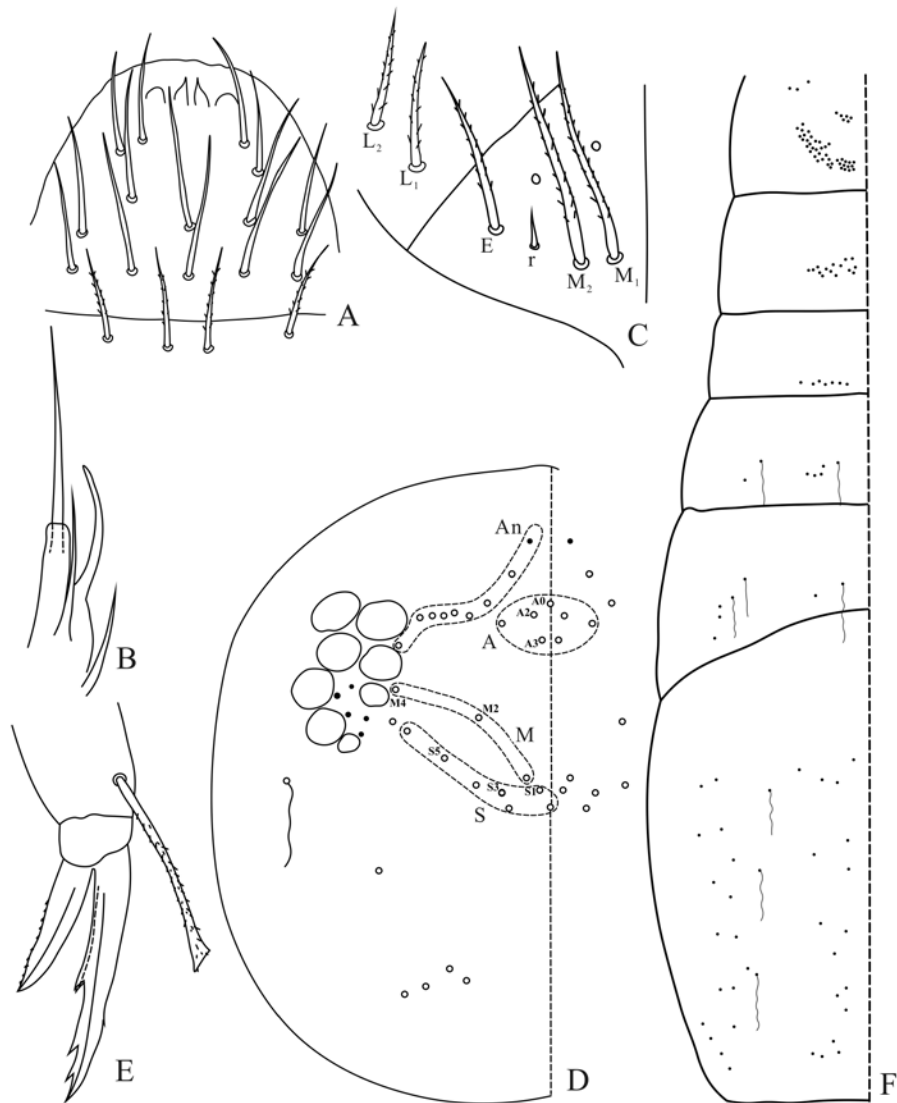


Figure 1. *Seira xizangensis* sp. nov. A. Labrum; B. Lateral process of labial palp; C. Setae on submentum; D. Dorsal cephalic chaetotaxy; E. Claw; F. Body chaetotaxy.

Color pattern. Ground color pale yellow in alcohol. Blue pigment present on eye patches and Ant. III–IV. Antenna 2.9 times as long as cephalic diagonal. Antennal segments ratio as I : II : III : IV = 1 : 1.6 : 1.6 : 2.2. Abd. IV 8 times Abd. III in length along dorsal midline. Eyes 8+8, eyes G and H smallest. Labral margin with two median conical and two lateral rounded papillae. Prelabral and labral setae 4/5, 5, 4; prelabrals ciliate and others smooth (Fig. 1A). Lateral process of labial palp curved, as thick as normal setae, with tip exceeding apex of

labial papilla (Fig. 1B). Labial base as $M_1M_2rEL_1L_2$; r vestigial (Fig. 1C).

Cephalic dorsal chaetotaxy as in Fig. 1D. Interocular setae as pqrst. Unguis with four inner teeth; inner pair with tip reaching 0.29–0.41 distance from base of ventral edge, median one at 0.76 and distal one 0.88 distance from base. Unguiculus acuminate with outer edge serrate. Tenent hair slightly ciliate, clavate and shorter than unguis (Fig. 1E). Tenaculum with 4 + 4 teeth and one large striate seta. Ventral tube not clear. Distal smooth part of dens 1.5 times mucro in length. Mucro falcate without basal spine. Most scales oval with tip rounded or truncate; present on head and body, Ant. I–II, legs, and ventral side of furcula.

Chaetotaxy (Fig. 1F). Th. II with six medio-median and about 40 posterior macrochaetae. Th. III with 15 macrochaetae centrally. Abd. I with seven macrochaetae. Abd. II with four central and one lateral macrochaetae. Abd. III with one central and three lateral macrochaetae. Abd. IV with 17 central, 17 lateral and three bothriotricha on each side.

Holotype. ♀, **China**, Xizang, southern Lhasa, near river, altitude 3,100 m, 22-VI-1997, Ming WU.

Ecology. Under bricks.

Etymology. The new species is named after the type locality.

Remarks. This new species is characterized by absence of pigment on body, vestigial seta r on labium, large unguis inner teeth, abundant macrochaetae on Th. II, Abd. I and IV. *Seira xizangensis* is another species recorded to have seven macrochaetae on Abd. I, alongside *S. cinerea*, *S. kaniskha*, *S. lindei*, and *S. urbana*. More specimens should be collected for the more details.

Table 1. Comparison of the number of macrochaetae on each dorsal segment and color patterns on each body segment among five species of *Seira*

Characters	<i>S. xizangensis</i> sp. nov.	<i>S. cinerea</i>	<i>S. kaniskha</i>	<i>S. lindei</i>	<i>S. urbana</i>
color pattern	without	present	present	present	present
Mac on Th. II	46	17	19	16	19
Mac on Th. III	15	13	14	12	14
Mac on Abd. I	7	7	7	7	7
Mac on Abd. II	5	4	4	4	5
Mac on Abd. III	4	0	unclear	0	4
Mac on Abd. IV	34	unclear	unclear	unclear	14+

Seira indra (Imms, 1912) (Fig. 2)

Pseudosira indra Imms, 1912.

Seira indra Yosii, 1965.

Type locality. India.

Additions to original description. Lateral process of labial palp as thick as normal chaetae, with tip reaching beyond apex of labial papilla (Fig. 2A). Subapical chaeta of maxillary outer lobe thin, subequal to apical one; three smooth hairs on sublobal plate (Fig. 2B). Labial base as $M_1M_2rEL_1L_2$; chaeta r vestigial; twociliate chaetae and one rounded scale along cephalic groove (Fig. 2C). Dorsal cephalic chaetotaxy as in Fig. 2D; interocular chaetae as pqrst (Fig. 2E). Dorsal body chaetotaxy shown in Fig. 2F. Th. II with five medio-median,

13 posterior macrochaetae on each side. Th. III with 11 central and three lateral macrochaetae. Abd. I with five macrochaetae. Abd. II with three central and one lateral macrochaetae. Abd. III with one central and two lateral macrochaetae. Abd. IV with six central and about 12 lateral macrochaetae. Ventral tube anteriorly with about 13 cilia on each side (Fig. 2G). Ventral tube ventrally with four subapical chaetae (Fig. 2H).

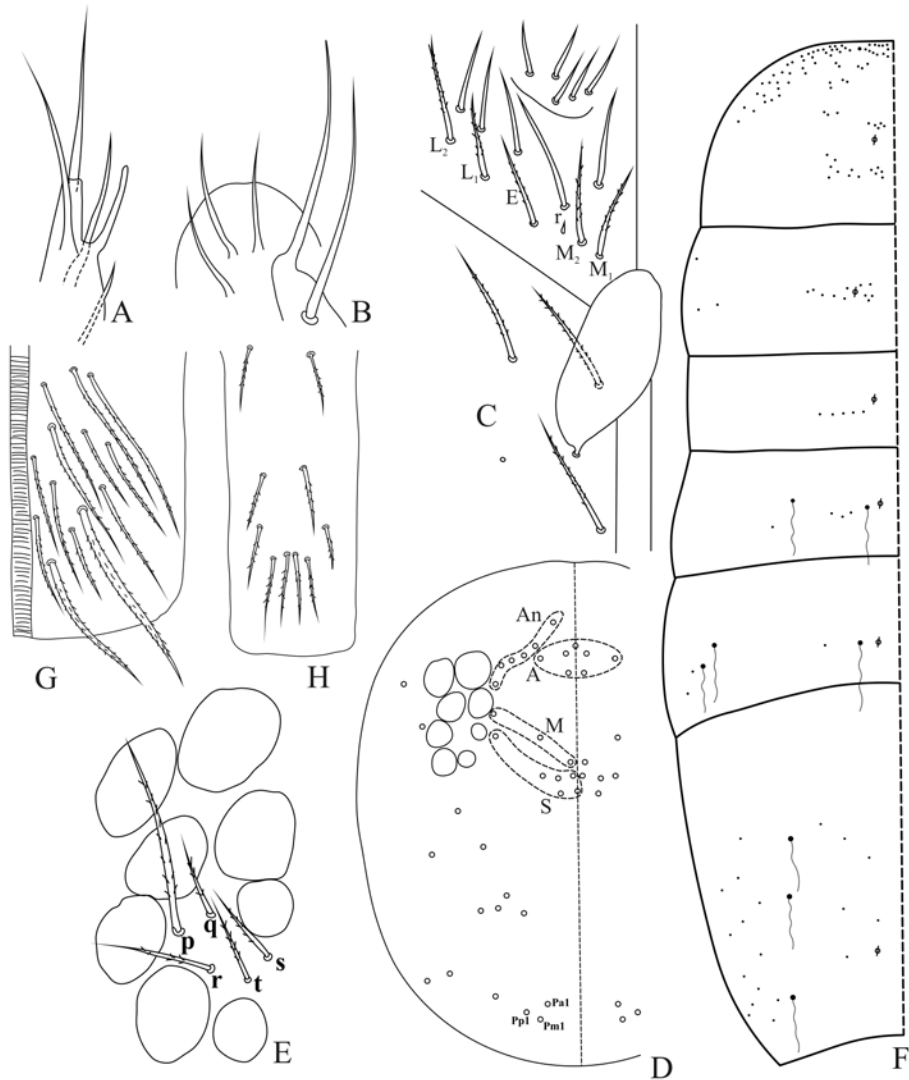


Figure 2. *Seira indra* (Imms). A. Lateral process of labial palp; B. Maxillary outer lobe; C. Setae on ventral head; D. Dorsal cephalic chaetotaxy; E. Interoocular setae; F. Dorsal body chaetotaxy; G. Anterior side of ventral tube; H. Ventral side of ventral tube.

Specimens examined. 8♀ on slides, **China**, Xizang, Motuobeibeng, 31-VIII-1974, Fusheng HUANG; 2♀ on slides, **China**, Guizhou, Jianhe, 17-VII-2005, Zhaohui LI; 2♀ on

slides, **China**, Guangxi, Shangsi, Hongqi Forest, 18-III-1998, Ming WU; 7♀ on slides, **China**, Guangdong, Guangzhou, Dinghu Mountain, 16-IX-2006, Jianxiu CHEN.

Ecology. Under the forest litter.

Remarks. *S. indra* is widely distributed in India, Pakistan, South China and Japan, is easily recognized by its colour pattern, and scattered purplish pigment on lateral Th. III–Abd. III. The characteristics observed for this species in this paper align with the original literature descriptions and supplement details that were not explicitly documented.

Discussion

Including the new species described in this article, there are now a total of six species of the genus *Seira* in China: *S. xizangensis* **sp. nov.** (from China: Xizang: southern Lhasa), *S. boneti* (Denis, 1948), *S. delamarei* (Jacquemart, 1980), *S. indra* (Imms, 1912), *S. musarum* (Ridley, 1890), and *S. oligoseta* (Lee & Park, 1989). Species of this genus are exceedingly rare in China. The distribution of the 199 species within this genus is predominantly in tropical regions worldwide. Although many areas in China are tropical, factors such as the complex geographical environment in southern China, extensive human activities, and limited domestic research have constrained the exploration of these species in China. The discovery of the new species *S. xizangensis* and the newly-recorded species *S. indra* in Xizang underscores the insufficient exploration of this genus in this region. Consequently, conducting comprehensive surveys of soil fauna, including Collembola, in Xizang is essential. This will improve the investigation and assessment of soil faunal diversity in China.

Acknowledgments

This study was supported by the National Natural Science Foundation of China (32270470; 31970434).

Reference

- Bellinger PF, Christiansen KA & Janssens F. 1996–2024. Checklist of the Collembola of the World. Available from: <http://www.collembola.org> (accessed 31 August 2024)
- Bellini BC, Santos NMC, Souza PGC & Weiner WM. 2019. Two new species of Brazilian springtails (Hexapoda: Collembola) with comments on Neotropical *Brachystomella* Ågren and *Seira* (*Lepidocyrtinus*) Börner. *Insect Systematics & Evolution*, 50: 297–326.
- Christiansen K & Bellinger P. 2000. A survey of the genus *Seira* (Collembola: Entomobryidae) in the Americas. *Caribbean Journal of Science*, 36: 39–75.
- Cipola NG, Arbea J, Baquero E & Jordana R. 2018. *Seira* Lubbock, 1870 (Collembola, Entomobryidae, Seirinae) from Iberian Peninsula and Canary Islands, including three new species. *Zootaxa*, 4458(1): 66.
- Fjellberg A. 1999. The labial palp in Collembola. *Zoologischer Anzeiger*, 237: 309–330.
- Gisin H. 1967. Espèces nouvelles et lignées évolutives de *Pseudosinella endogés* (Collembola). *Memórias e Estudos do Museu Zoológico da Universidade de Coimbra*, 301: 1–25.
- Godeiro NN, Zhang F & Cipola NG. 2020. First partial mitogenome of a new *Seira* Lubbock species

- (Collembola, Entomobryidae, Seirinae) from Cambodia reveals a possible separate lineage from the Neotropical Seirinae. *Zootaxa*, 4890: 451–472.
- Godeiro NN & Zhang F. 2021. First record of *Seira dowlingi* (Wray, 1953) (Collembola, Entomobryidae, Seirinae) from China and mitogenome comparison with the New World specimens. *Zootaxa*, 5020(1): 191–196.
- Imms AD. 1912. On some Collembola from India, Burma, and Ceylon with a Catalogue of the Oriental species of the order. *Proceedings of the Zoological Society of London*, 1912: 80–125.
- Mari-Mutt JA. 1986. Puerto Rican species of *Lepidocyrtus* and *Pseudosinella* (Collembola: Entomobryidae). *Caribbean Journal of Science*, 22: 1–48.
- Soto-Adames FN. 2008. Postembryonic development of the dorsal chaetotaxy in *Seira dowlingi* (Collembola, Entomobryidae); with an analysis of the diagnostic and phylogenetic significance of primary chaetotaxy in *Seira*. *Zootaxa*, 1683(1): 1–31.
- Szeptycki A. 1979. *Chaetotaxy of the Entomobryidae and its phylogenetical significance. Morpho-systematic studies on Collembola. IV.* Polska Akademia Nauk, Zakład Zoologii Systematycznej i Doświadczalnej, Państwowe Wydawnictwo Naukowe, Warszawa, Kraków, 219 pp.
- Yosii R. 1959. Collembolan fauna of the Cape Province, with special reference to the genus *Seira* Lubbock. *Special Publications from the Seto Marine Biological Laboratory*, 1: 1–24.
- Zhang F, Bellini BC & Soto-Adames FN. 2019. New insights into the systematics of Entomobryoidea (Collembola: Entomobryomorpha): first instar chaetotaxy, homology and classification. *Zoological Systematics*, 44: 249–278.