

The Occurrence of *Lepidocyrtus* Genus, (Arthropoda, Collembola) of Phaltan Tehsil, Maharashtra, India

Chavan M. M^{*1}, Abdar M. R² and Kengar S. B³

¹Yashwantrao Chavan College of Science, Karad - 415 124, Maharashtra, India

²Department of Zoology, Krantisinh Nana Patil College, Walwa - 416 313, Maharashtra, India

³Department of Zoology, Yashwantrao Chavan College of Science, Karad - 415 124, Maharashtra, India

Received: 23 Jul 2024; Revised accepted: 20 Sep 2024

Abstract

Our knowledge about environmental correlates of the spatial distribution of animal species stems mostly from the study of well-known vertebrate and a few invertebrate taxa. Collembolans commonly called as Springtails are omnipresent members of soil fauna. The Collembolans are major part of soil biota. Their collection and identification require expertise hand to know the status of soil biota, therefore the present study of Collembola fauna of different vegetation (Agricultural land and Barren land) in Phaltan Tehsil of Maharashtra region, was studied from January 2022 to November 2022. The present study carried out to know the diversity of collembolan species in different habitats of phaltan tehsil which can help to know the fertility of soil. Diversity of collembola carried by using Berlese funnel method. The result of present study shows presence of "*Lepidocyrtus*" genera which belongs to family Entomobryidae. It is one of the largest genera within the order Collembola.

Key words: Collembola, *Lepidocyrtus*, Soil, Hexapods, Zoo-geographical regions

The Collembola or Springtails are amongst the smallest but most successful animals [1]. These tiny creatures are most abundant insects in the world, found in vast number in almost all habitats from seashores to the tops of the mountains. The name collembola, derived from the Greek "coll" meaning glue and "embol" meaning a wedge, refers to a peg shaped abdominal segment. The colophore, on the underside to the first abdominal segment. The colophore was once thought to function as an adhesive organ [2-3]. Collembola is one of the most important groups in soil mesofauna, mainly because of their important in soil genesis, dynamic and evolution (Palacias – vargas) The great diversity of habitats response to environmental variations, mainly those caused by anthropic modification, as deforestation and burning, make this group useful as bioindicators [4-5]. The *Lepidocyrtus* genus belongs to the *Collembola* group within the *Arthropoda* phylum. Collembolans, commonly known as springtails, are tiny, soil-dwelling arthropods that play a vital role in the decomposition process and soil health by aiding in nutrient cycling [6]. The *Lepidocyrtus* genus is distinguished by its elongated body and scaled cuticle, which gives it a unique appearance among other Collembola.

The Springtails are among the most abundant of all soil-dwelling arthropods. They are found in vast numbers in almost all terrestrial ecosystems, especially in soils rich in organic matter [7]. Their populations can reach several hundred thousand to millions per square meter, particularly in healthy, undisturbed environments like forests and grasslands. They live in a variety of habitats. Springtails are named for a forked

jumping organ (the furcula) found on the fourth abdominal segment. Immature collembola are similar in appearance segment [8]. They usually molts 4-5 times before reaching maturity and continue to molt periodically throughout the rest of their life. Unlike insects that undergo complete or partial metamorphosis (e.g., larvae, pupae, and adult stages), Collembola grow by simply increasing in size through successive molts without changing their overall body form [9-11]. The life-long molting characteristic, combined with their abundance and rapid reproduction, makes Collembola key contributors to soil ecosystems, particularly in processes like decomposition and nutrient cycling [12-14]. They have a great influence in functioning of decomposer as a result of their feeding activities and have a great potential as bioindicators of environmental conditions. There are approximately 8143 species described worldwide. First Indian collembolan species described from Malabar hill region.

MATERIALS AND METHODS

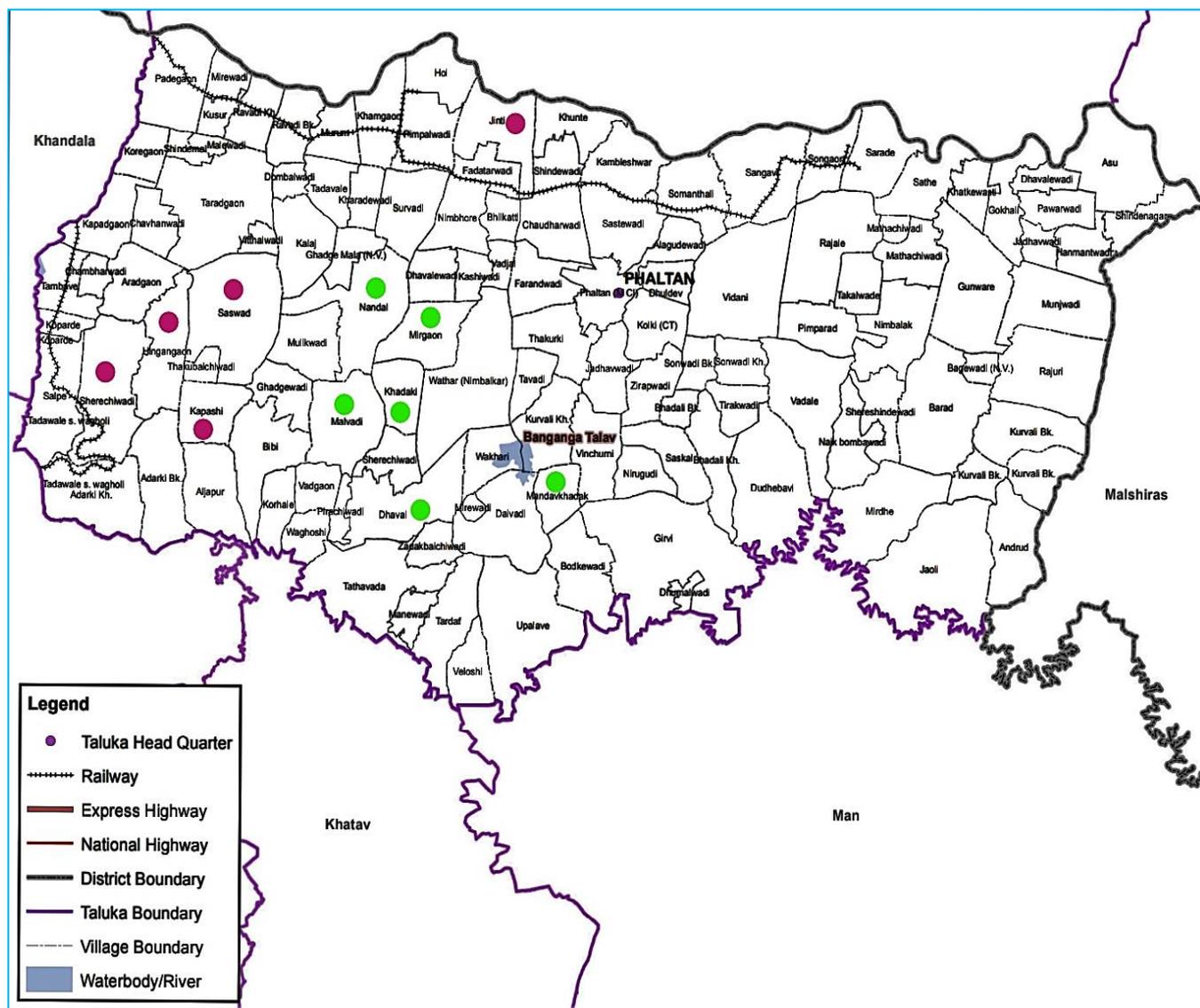
Phaltan is located at 17.98°N and 74.43°E. in Satara district. The town is about 59 kilometers northeast of the city of Satara and about 110 km from Pune. This area is open barren land and evergreen vegetation. About 11 different locations will be selected at different altitudes, which will be visited every month. The study areas are consisting of Agricultural land and Barren land. Total 11 villages are selected for collection of soil. Collection of soil will made through each study area along to parallel transects (each 50m long and 10m apart) with spacing

*Correspondence to: Chavan M. M, E-mail: mohinichavan070@gmail.com; Tel: +91 7666850174

Citation: Chavan MM, Abdar MR, Kengar SB. 2024. The Occurrence of *Lepidocyrtus* genus, (Arthropoda, Collembola) of Phaltan Tehsil, Maharashtra, India. *Res. Jr. Agril. Sci.* 15(5): 1168-1171.

of 5m between samples. 57m × 57m steel tubes were inserted to a depth of 100 mm and the soil was collected in polythene

bags and cooled and take to the laboratory for further identification. Study areas mentioned below:



Purple colour shows agricultural land and green colour shows barren land area

Fig 1 shows different study areas

The present study was carried out at total 11 locations of Phaltan tehsil of Maharashtra. The study area consists of Agricultural area and Barren land area. To determine the diversity of soil collembolans, collections were made during three seasons. Many tiny arthropods make their homes in leaf litter, rotting wood or soil. They can be coaxed to leave their habitat if you make conditions uncomfortable enough. Since their preferred habitat is dark, cool and moist, we can force them out by applying light and heat. Gather a small sample of leaf litter, wood, or soil. The most common method is Berless funnel method which is used to collect springtails.

A Berless funnel is a good tool to collect small insects from leaf litter plant debris or old logs. A Berless funnel consists of a funnel with a coarse screen on the inside and a dish of alcohol below to catch the insects as they move out of the plant material. The plant material can be allowed to dry or force dried the insects out. Simple Berless funnel can be home-made using plastic soda bottles by cutting off the bottom and inserting a piece of screen.

Soil material was collected by digging surface soil and leaf litter, preferably moist and containing decaying vegetation.

The soil sampling was done in agricultural land and barren land. During January to November 2022 from Phaltan region. The soil samples were collected at the rate of 2 samples from each vegetation site once in month. Every sampling unit was collected on separate polythene bag and brought to laboratory and the extraction process was done through modified dynamic Tullgren funnel or Berless funnel. Place the material on sieve and position the lamp 4 to 5 inches above the surface. The specimens are collected in collecting jar gradually drying out the soil. Typically leave the lamp on for 12-36 hours. The specially were sorted and segregated out under Zoom-Stereomicroscope from vials. These specimens were preserved at 90% ethylene. The individuals were identified by using available taxonomic keys [15-16].

RESULTS AND DISCUSSION

In the present study, shows the presence of genera *Lepidocyrtus* which belongs to family Entomobryidae. This family includes members of the Arthropleona characterised by reduced protorax, without setae and post antennal segment and

with scales or multilateral ciliate setae on all trunk segments, trochanteral organ, a series of short differentiated setae on the inner surface of the trochanter, fourth abdominal segment of

some species much longer than the third segment [17]. Furcula always well developed; dens and mucro are characteristics of the different subfamilies. Sexual dimorphism little or absent.



Lepidocyrtus genus

Lepidocyrtus is one of the largest genera within the order collembola. On the global scale listed 260 species [18]. From India total 20 species recorded by Mandal [19]. The distinguishing characters of the genus *Lepidocyrtus* as it recognized by four- jointed antennae. The antennae are comparatively short throughout the genus, never being so long as the body. Very long unknobbed hairs are scattered over other parts of the body. Both the long and short hairs are often distinctly fringed. On the surface of body blunt scales are present. The abdomen is long and cylindrical and the fourth segment is about three or four times long than third segment. Claws having the pair of lateral teeth. Club shaped hairs may be grown sometimes on various parts of the body [20].

Rudy C. Nunes, Nerivania N. Godeiro George Pacheco, Shanlin Liu, Marcus Thomas P. Gillbert Fernando Alvarez-Valin, Feng Zhang and Bruno C. Bellini., Discovers Neotropical *Lepidosira* (Collembola, Entomobryidae) and its systematic position. Also, Daniel Winkler, Eduardo Mateos, Gyorgy Traser, Ferec Lakatos and Viktoria Toth work on, New insight into the systematics of European *Lepidocyrtus* (Collembola: Entomobryidae) Using Molecular and Morphological Data. Gy. Traser and L. Danyi done their work and discovers *Lepidocyrtus mariani* sp. n., a new springtail

species from Hungary (Collembola: Entomobryidae).

CONCLUSION

In conclusion, the present study highlights the presence of the genus *Lepidocyrtus*, belonging to the family Entomobryidae, which is distinguished by unique morphological features, such as a reduced prothorax, multilateral ciliate setae, and a well-developed furcula. The genus *Lepidocyrtus*, one of the largest within the order Collembola, is characterized by its short, four-jointed antennae, long cylindrical abdomen with an elongated fourth segment, and the presence of blunt scales and fringed hairs on the body. Globally, around 260 species of *Lepidocyrtus* have been identified, with 20 species recorded from India. Recent discoveries and molecular studies on *Lepidocyrtus* species, including *Lepidocyrtus mariani* from Hungary, provide new insights into the systematics and evolutionary relationships within this diverse group of springtails. The integration of morphological and molecular data is enhancing our understanding of the taxonomy and phylogeny of *Lepidocyrtus*, contributing to the broader knowledge of Collembola biodiversity.

LITERATURE CITED

1. Yadav RS. 2017. First records of a Collembola and their diversity measurement from B.A.U. Ranchi, Jharkhand. *Journal of Entomology and Zoology Studies* 5(5): 1724-1727.
2. Mandal GP. 2018. Collembola of India- An updated checklist. *Halters* 9: 116-130.
3. Yadav RS, Kumbar D, Kerketta D, Prasad S. 2018. Vertical distribution of Collembola (Arthropoda: Collembola) at Varanasi, India. *International Journal of Current Microbiology and Applied Science* 7(3): 609-613.
4. Janssens F. 2012. Checklist of collembola of the World. <http://www.Collembola.org>.
5. Bellinger PF, Christiansen KA, Janssens F. 2015. Checklist of the Collembola of the world. <http://www.collembola.org>. 27, June 2015.
6. Costa D, Timmermans MJTN, Sousa JP, Ribeiro R, Roelofs D, Van Straalen NM. 2013. Genetic structure of soil invertebrate population: Collembolans, earthworms.
7. Winkler D, Mateos E, Traser G, Lakatos F, Toth V. 2020. New insight into the systematic of European *Lepidocyrtus* (Collembola: Entomobryidae) using molecular and morphological data. *Insects* 11: 302.
8. Bano R. 2015. Insecta: Collembola, Fauna of Phansad wildlife sanctuary, Raigad, Maharashtra: Conservation area series, *Zoological Survey of India* 13(39): 26-28.
9. Winkler D, Korda M. 2012. Rare and little known Collembola species from Hungary. *Opusc. Zoology Budapest* 43(1): 89-95.
10. Yadav RS. 2017. Preliminary checklist of Springtails (Arthropoda: Collembola) of Uttar Pradesh, India. *Journal of Threatened Taxa* 9(12): 11054-11059.

11. Raghuraman M, Yadav RS, Singh J. 2010. Biodiversity of Collembola at Varanasi. *Indian Journal of Entomology* 72(4): 333-336.
12. Mateos E. 2008. Definition of *Lepidocyrtus lusitanicus* Gama, 1964 species-complex (Collembola, Entomobryidae), with description of new species and color forms from the *Iberian peninsula*. *Zootaxa* 1917: 38-54.
13. Hazra AK. 2015. A review on Paronellinae (Collembola: Paronellidae) of India, record. *Zoological Survey of India, Occasional paper No.* 368: 1-63.
14. Yadav R, Prasad S, Kumar D. 2018. Diversity of epigenic Collembola of Bibhutibhushan wildlife sanctuary, North 24 Parganas, West Bengal (India). *International Journal of Fauna and Biological Studies* 5(2): 17-21.
15. Nunes RC, Godeiro NN, Pacheco G, Liu S, Thomus M, Gilbert P, Alvarez F. 2019. The discovery of neotropical *Lepidosira* (Collembola, Entomobryidae) and its systematic position. *Zoologica Scripta* 48: 783-800.
16. Bellinger PF, Christiansen KA, Janssens F. 2011. Checklist of the Collembola of the World. Available online at: <http://www.Collembola.Org>.
17. Kerketta, Yadav RS, Pinkra. 2018. A preliminary report of Collembola (Arthropoda: Collembola) from Northern hill region of Chhattisgarh, India. *Int. Jr. Microbiol. Applied Science* 7(9): 3385-3392.
18. Ruquaeya B, Roy S. 2015. On collection of some collembola (Hexapoda: Entognatha: Collembola) from Rajasthan, India. *International Journal of Fauna and Biological Studies* 2(4): 110-113.
19. Mandal GP. 2014. New records of Collembola (Hexapoda) from Hazaribagh National Par, Jharkhand, India. *Biological forum: An International Journal* 6(2): 197-202
20. Mateos E, Petersen H. 2012. Definition of the European *Lepidocyrtus Curvicollis* group (Collembola: Entomobryidea) with description of a new species from Sardinia (Italy). *Zootaxa* 3272: 51-62.