



Diversity of Millipedes (Arthropod: Diplopoda) from District-Sangli, Western Maharashtra India

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ABSTRACT

The millipedes (Thousand leggers) are belonging to Phylum-Arthropoda and Class- Diplopoda. Millipedes are one of the largest macro arthropods in forest ecosystems and play vital role of detritivores. In present study on millipedes diversity from District-Sangli of Western Maharashtra, India reveals the presence of three millipede's species from Order-Polydesmida. Members of the Order-Polydesmida are also known as "flat-backed millipedes", because on most species, each body segment has wide lateral keels known as paranota. These millipedes do not roll upon disturbing.

Keywords: Arthropod, Diplopoda, Millipedes, Polydesmida, Flat-back millipedes.

INTRODUCTION

Millipeds are saprophagous fauna. It is the largest class constituting the third biggest group of terrestrial arthropods after Insecta and Arachnida. Millipedes come in a variety of body shapes and sizes, ranging from 2 mm to around 35 cm in length, and have as few as eleven to over a hundred body segments. They are generally black or brown in color, although there are a few brightly colored species, and some have aposematic colouring to warn that they are toxic. Species of *Motyxia* produce cyanide as a chemical defense. Millipedes were classified into 16 orders and 145 families (Shelley, 2007). The millipede species was found active at early morning in rainy season. These were mostly present at wet landscape.

Millipedes are one of the largest macro arthropods in forest ecosystems and play vital role of detritivores invertebrates in enriching decomposition of dead plant material is to stimulate microbial activity. Ramel (2007) studied that in addition to its important role in nutrient flux, it plays key role in food chains by serving as food for predators such as beetles, shrews, hedgehogs, rodents, frogs, lizards, turtle and birds. The millipedes were found to be good decomposers, especially in forest ecosystem (Aldgasam and Ramanathan, 2013). Most millipedes are detritivores and

feed on decomposing vegetation, feces, or organic matter mixed with soil. They often play important roles in the breakdown and decomposition of plant litter. The leaf litter is fragmented in the millipede gut and excreted as pellets of leaf fragments. Millipedes are helpful in increasing fertility of soil, helps in organic farming and also these creatures interact with much diverse fauna and microbes which helps in organic matter processing and facilitates decomposition by the microorganisms. (Shridhar and Ashwini, 2016).

Ten species of millipedes (Diplopoda) were identified from Yelagiri hills of Southern Eastern Ghats of Tamil Nadu, India (Chezhian and Prabakaran, 2016). Five species of millipedes belonging to Order-Polydesmida and Order-Spirobolida were recorded from tropical or agricultural landscape of Rajgurunagar (Patil *et. al.*, 2018). Brunner (2001) states that millipedes were considered as biological indicators as they showed variation in environment and climatic conditions. The millipedes were found to be seasonal arthropods, as they are commonly found in rainy season and rarely found in summer season, as fluctuation in temperature affects millipede. (Ashwini and Shridhar, 2006). Golovatch and Wesener (2016) listed the different species of millipedes. Lewis (2001) described and discussed biology of two litter dwelling species of the flat-backed millipedes (Genus- *Aporodesmus* and Family- Pterodesmidae. Likewise, Golovatch (2019) discussed new genus and five new species of Paradoxosomatid millipedes from Indonesia, Vietnam, Thailand and China. Rowe and Sierwald (2006) described morphology and species level characteristic of Australian millipedes in the tribe Australiesomatini Brolemann, 1916 (Polydesmida: Paradoxosomatidae). Marek *et. al.* (2018) explained *Apheloria polychroma*, a new species of millipedes (Polydesmida: Xystodesmidae) from Cumberland Mountains which is functioning as a model species of Mimicry rings. Choudhari *et. al.* (2014) have observed and reported four species of millipedes from Order- Polydesmida and Order- Spirobolida, two species from each order. Henrik Enghoff (1990) studied influence of factors on body size, such as age, sex, food, latitude, altitude, habitat and co-existence with other species and also correlation between body size and ancestry. In India especially from Western Maharashtra, there is no such proper information available on the identification,

diversity and role of millipedes in forest ecosystem. Hence, the present study was undertaken to observe and identify the diversity of millipedes from District-Sangli, Western Maharashtra.

MATERIAL AND METHODS

Material:

For present study, material selected was Millipedes from District- Sangli (Shirala, Sagarshwar, Tasgaon, Haripur, Sawalwadi, Khotwadi, Nandre, Bramhnal, Dhavali regions of District-Sangli). The occurrence of millipedes was mostly from every selected site. Millipedes were collected from the study area by handpicked method. At each and every sampling time, air temperature and soil temperature were recorded at 10 cm above and at depth of the strata using mercury thermometer. After observations, these millipedes were again released into their natural environments.

Location:

The green vegetation is the very little during the period of pre-monsoon. In the green grassland vegetation, following locations was selected at different altitude. Those selected sites were as- region from District- Sangli of Western Maharashtra (Plate-I, Figure- a, b, c).

Latitude : 16.867634

DMS Lat: 16° 52' 3.4824" N

Longitude: 74.570389

DMS Long: 74° 34' 13.4004" E

Duration:

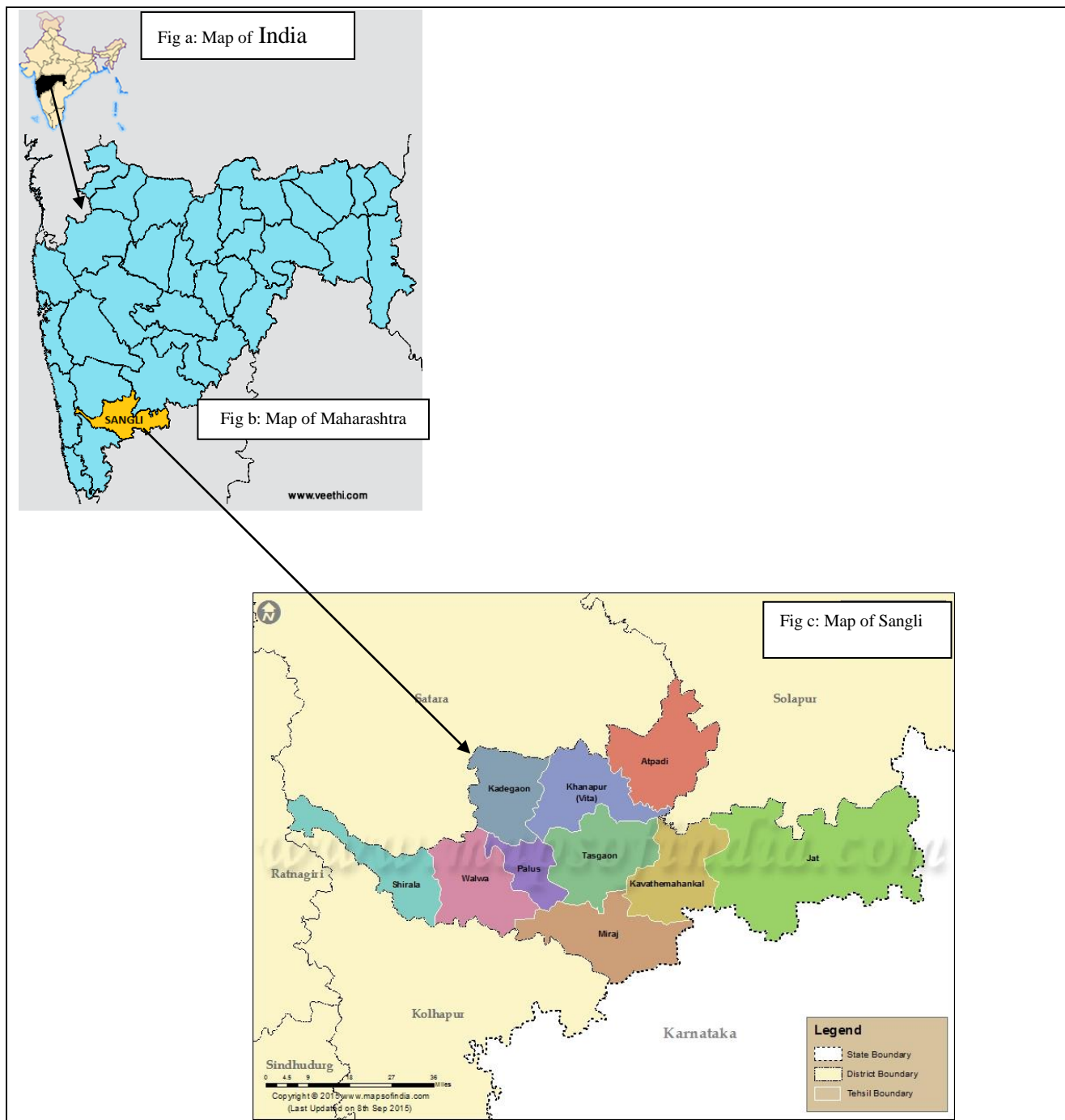
The study was carried out during the pre-monsoon, monsoon and post-monsoon season (June to December) in every week early in the morning for two years (2012-2014).

Photography:

Photography was done by the Cannon Power shot SX50 HS Black Camera.

Identification key:

Millipedes were identified by using various field guides available, from literature, Identification keys available online and Wikipedia site and through the online Google search engine.



RESULT AND DISCUSSION:

In the present study, three species of Flat-backed millipedes belonging to Order: Polydesmida were recorded from different sites of District-Sangli, Western Maharashtra, India. Members of the Order-Polydesmida are also known as "flat-backed millipedes", because on most species, each body

segment has wide lateral keels known as paranota. These keels are produced by the posterior half (metazonite) of each body ring behind the collum. Those species are as follows: Flat-back Millipedes: (Plate- II, Fig. 1, 2 and 3):

Millipedes may have 18 to 22 body rings. 20 body rings is the most common. Dorsal groove absent.



Fig. 1

Flat-Backed Millipedes form Order-Polydesmida (Fig. 1, 2 and 3)



Fig. 2



Fig. 3

Members of some families vividly colored with red, yellow, orange and black. Millipedes form Order-Polydesmida may have 19 or 20 segments and are cylindrical but many species have wing-like lateral extensions to the tergites called paranota, giving the group its common name of 'flat-backed millipedes'. The dorsal plates and paranota are often ornamented

with ridges, tubercles, and patches of color. All polydesmidans lack eyes, and the great majority of species have either 58 or 62 legs as adults with one leg pair on each of the first three leg-bearing segments, and two leg pairs on each of the posterior 13 or 14 leg-bearing segments. They have many pores along their body that produce hydrocyanide, formic acid and

other irritants used for defense. Most species release the liquid slowly, but some can discharge it as a spray.

From all the selected sites of study area showed occurrence of flat-backed millipedes. Decker (2013) annotated list of millipedes (Diplopoda) and Centipedes (Chilopoda) from Singapore. Sierwald and Bond (2007) studied combined morphological and molecular analysis of millipedes orders with the review of Phylogenetics of class. Dash and Priyadarshini (2016) recorded three species of Millipedes (Diplopoda: Paradoxosomatidae) from Gujarat. Decker and Tertilt (2012) first introduced two millipedes as *Anoplodesmus saussurii* and *Chondromorpha xanthotricha* (Diplopoda: Polydesmida: Paradoxosomatidae) from Singapore. Shear and Edgecombe (2010) reviewed myriapoda phylogeny. Mesibov (2015) redescribed *Brochopeltis mjoebergi* Verhoeff, 1924 and a second *Brochopeltis* species was described from Australia (Diplopoda, Polydesmida, Paradoxosomatidae).

CONCLUSION

The study of millipedes gives the information that how and in what way they are helpful not only to mankind but also they play very important role in maintaining healthy and moist environmental conditions. It was also seen that many species of Diplopoda are becoming at risk of endemism due to environmental changes and also due to interference of human being, hence there is need to conserve these creatures on earth from different regions and also to increase species richness.

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Conflict of interest

The author declares that there is no conflict of interest.

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