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COMPARATIVE STUDY OF MILLIPEDES TRIGONIULUS CORALLINUS AND ANOPLODESMUS SAUSSURI IN WEST BENGAL TO UNDERSTAND THEIR COILING BEHAVIOUR

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ABSTRACT

Millipedes are one of the tiny arthropod creatures, which one can find in their locality crawling into houses and mostly found in damp areas. The purpose of this study specifically focuses on establishing a comparative basis between the coiling time and thus drawing a behavioural comparison between the two millipedes, the Trigoniulus corallinus and the Anoplodesmus saussurii. In this study manual stimulus was provided near the head appendage of the study samples and the data for coiling time was recorded and a comparison was drawn to relate and to distinguish between the two millipedes. Significant amounts of homology as well as sparking differences were found in the behaviour of the two millipedes, and even each test sample showed minute behavioural changes. So, it can be concluded that there is direct relation between the coiling response and the behavioural adaptation in both the species with significant variation.

Keywords: crawling, stimulus, coiling time, coiling response, behavioural adaptation.

I. INTRODUCTION

Millipedes are found in the class Diplopoda, which is a highly diverse and variable group among the arthropods, comprising of more than 12,000 species. Strikingly it is the third largest class of terrestrial arthropods after insects and arachnids (Adis 2002). Millipedes are of great significance as they are one of the most important components of terrestrial ecosystems; they play a vital role in the breakdown of organic plant materials and play an important part in nutrient recycling. In case of the millipedes, the individual body segments are fused in pairs, that results in a series of double-legged segments, in contrast to centipedes which have one pair of legs per body segment. A millipede body comprises of the head, collum, and trunk. The millipedes generally show a primary behaviour of curling into coils, which is one the primitive mechanisms of defence. Secondary defence systems

in some species involves emitting toxic liquids or gases from the ozadene gland, via ozopores located on each side of the metazonite (the posterior portion of diplo-segment) (Enghoff 1993). They present an excellent opportunity to improve understanding of arthropod evolution and genomics. The flat millipede Anoplopdesmus saussurii and the rusty millipede Trigoniulus corallinus (Spirobolida) both species are common in West Bengal.

These two species are the point of concern in our study.

The name Millipede derives from Latin roots, 'milli' meaning 'thousand' and 'ped' meaning foot, the fact lies here that these species never have thousands of legs as their name suggests, actually the legs are bristle like structures, as the millipedes move they show a movement which is generated together, and it appears that thousands of legs are moving, so is the name. The maximum number of legs which can be found in a millipede species is around 750, on average 80 to 400 legs are found in typical species of our concern.

The millipede leg appendages are short and many in number which makes them slow, but in fact they are powerful burrowers. The wave like movement of their body and head allows them to burrow their way into the underground. Millipedes have adapted a hard exoskeleton which helps it to protect them against predators. Whenever excited, they coil up into a ball like structure to protect the more vulnerable underside. Some species also emit poisonous liquid secretions through microscopic pores as a sign of a defensive character as mentioned before.

They are usually beneficial to gardens, as they break down decaying plant matter. Occasionally they do become nuisances, and they can be controlled by removing leaf litter, decaying plants, and moisture sources from near the home. Millipedes require a moist and damp habitat. The two species in West Bengal are mostly found in gardens, drain areas and other places like shades. As per their feeding habit, they generally do feed on decaying leaves, fungi and dead plant matter. The two species of millipedes do become household pests during their fall months. As temperatures started

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cooling and the ground hardened, they migrated from their typical feeding areas and entered our houses. It was found in our study that these millipedes are most commonly spotted on lower floors and in bathrooms as it was quite a moist place.

II. METHODOLOGY

The study was conducted in different parts localised in Kolkata and its outskirts on the two target species. The species were collected and kept under ideal natural conditions under normal temperature, pressure and at minimal stress level and fed with ideal nutrition. After this the species were allowed to move freely for a while and then the readings for the time of coiling were taken after disturbing them individually near the anterior region between the two antennas. As the individual specimen move a while once again the readings were taken again after a second round of disturbance. The same thing was done again in the third round and the readings were all noted and piled up. the same work was repeated in the next month and the month to follow after that. All the readings where piled up together and a graph was constructed to compare the individuals within a single species and between the two species and the individuals of the two species.

III. RESULTS AND DISCUSSIONS

Both the graphs and the data were analysed, and it was concluded that the two specimen shared a common character, that is it was found that in both the species after each round of disturbance the time of holding the coiling decreased drastically, and the gap was always visible between the first disturbance mediated coiling time and the last disturbance mediated coiling time. This suggests that whatever maybe the millepede species, there was always a correlation in the case that both wanted to escape after successive rounds of disturbance, as here also there might be a generation of an analogue of the fight or flight response, which got activated to large extent when the millipede species found that their basic protection was not enough to save them, if it would have been a predator, that is why the underlying molecular mechanisms and signalling may have caused to decrease the coiling time and it could be by the increase of metabolic activities that the speed of the millipede movement also increased after the third round in the individual cases of the two species.

SURVEY:

Table 1: The Table 1 deals with the number of specimen of Trigoniulus corallinus collected at different time frames and their readings i.e. the refractory period till it stays in its coiled states, and a comparitive average scale.

Trigoniulus corallinus	Specimen Number	Serial Number	Reading (secs)	Average (secs)
	1	1	127	113
		2	119	
		3	93	
	2	1	92	83
		2	90	
		3	67	
	3	1	29	61
		2	59	
		3	95	

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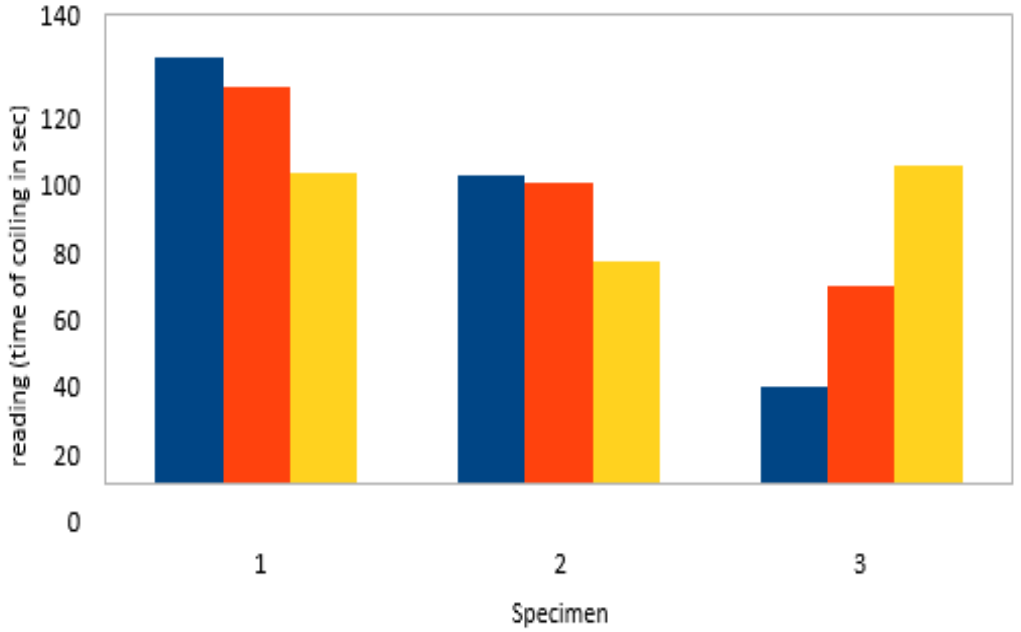

Figure 1 : A Comparitive Analysis Of The Results Of Table 1

Table 2 : The Table 2 deals with the number of specimen of Anoplodesmus saussuri collected at different time frames and their readings i.e. the refractory period till it stays in its coiled states, and a comparitive average scale

Anoplopdesmus saussurii	Specimen Number	Serial Number	Reading (secs)	Average. (secs)
	1	1	122	90.6
		2	105	
		3	45	
	2	1	93	53
		2	35	
		3	31	
	3	1	73	68
		2	81	
		3	50	

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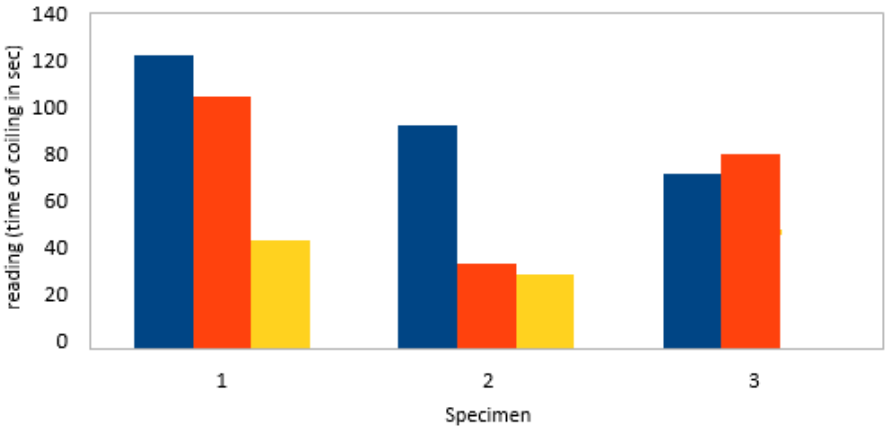

Figure 2 : A Comparitive Analysis Of The Results Of Table 2

Figure - 3 Trigniulus in its moving state

Figure - 4 Anoplodesmus in its moving state

Figure 5: Trigniulus in its colied state

Figure 6: Anoplodesmus in its coiled state

IV. CONCLUSION

From the long spanning study between the two species of millipede it can be concluded that the coiling behaviour in case of the millipedes of the two species are found to be interlinked with each other as the time of coiling suggests. The difference between the movement of the millipedes at end of the first coiling and at the end of the last measured coiling also suggested that there was a potential underlying signalling pathway, which still awaits further research, that guides the millipedes to change over the behaviour in due course of the time of coiling via generation of disturbances.

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