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Survivorship Study of the Laboratory Population of A Grassland Millipede *Streptogonopus phipsoni* (Pocock) (Diplopoda: Polydesmida)

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Survivorship curve of the laboratory population of *Streptogonopus phipsoni* showed that mortality rate is maximum at the egg stage and the same differ in different stadia. A few adults emerged from a large number of eggs which probably indicates a self-regulation operating in the life cycle of the species.

Key Words: *Streptogonopus phipsoni*, **Survivorship, Mortality rate, Self regulation**

Introduction

Life table and survivorship studies are two important components in the understanding of the population dynamics of a species.

Except for a species or two, survivorship in diplopods has not been studied. In this paper therefore, survivorship of the laboratory population of *Streptogonopus phipsoni* has been reported.

Materials and Methods

Twenty-five pairs (25 ♂♂ and 25 ♀♀) of adult *Streptogonopus phipsoni* were collected from the grassland of Saktipur, District Murshidabad, West Bengal and each pair was kept in a glass trough (diameter 50 cm, height 15 cm) filled with soil and decomposed litter collected from their natural habitats. The litter was kept moist and occasionally fresh litter was added. Within a week 10 surface active aggregates of first stage juveniles were observed in 10 troughs. Juveniles of each aggregate were sorted out and counted. Soil was thoroughly searched for unfertilized empty or dead eggs to obtain the record of total number of eggs laid per female. After counting, each aggregate was transferred to its respective trough. Number of individuals present in each aggregate of successive juvenile stages was counted when the juveniles became surface active after moulting. *S. phipsoni* moulted six time before developing into sexually mature adults.

Results

Total number of eggs laid, successive juvenile stages and emerging adults in 10 troughs were used to construct survivorship of *S. phipsoni*.

Various measures for the comparison of mortality factors in different stages of *S. phipsoni* are presented in table 1. A survivorship curve was drawn by plotting the number living at a given age against the aggregate age (figure 1).

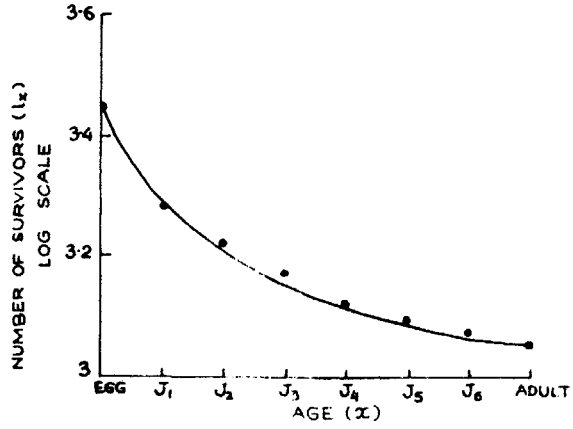

Figure 1 Survivorship Curve of *S. phipsoni* ($J_1 - J_6$ = first to sixth juvenile stages)

Table 1 *Various measures for the comparison of mortality factors in different stages of* S. phipsoni

Measure	Eggs	J1	J2	J3	J4	J5	J6	Adults
% apparent mortality	32.48	13.72	10.66	9.28	7.14	5.02	4.26	
% real mortality	32.48	9.27	6.21	4.83	3.37	2.20	1.77	
% in dispensible mortality	19.35	6.43	5.04	4.22	3.16	2.20	1.77	
Mortality/Survivor ratio	0.48	0.16	0.12	0.10	0.08	0.05	0.04	
Log population	3.45	3.28	3.22	3.17	3.12	3.09	3.07	3.05
K-Values		0.17	0.06	0.05	0.05	0.03	0.02	0.02
							Total K =	0.40

J1–J6, Juvenile stages

From the table and the figure, it is clear that mortality was maximum in egg stage. The real mortality in egg stage was nearly equivalent to the total juvenile mortality. From first stage juvenile mortality was on the decline. Reductions in the viable number of eggs might be due to the presence of unfertilized, empty or dead eggs. The mortality of tiny first and second stage juveniles was very difficult to measure. The cause of their death could be many more but were probably mainly abiotic. The primary cause of death of other juvenile stages could not always be established. Some juveniles were found dead and covered by mould. Others stopped taking food and after some hours died.

Discussion

As the millipede cultures were maintained in the rainy season which was optimum for their population growth and sexual behaviour (Mukhopadhyay & Bhakat 1983), temperature fluctuations need not be questioned thereafter. In the field, where there are more factors of mortality, one would expect a more constant fall in numbers. When the field was flooded due to heavy rainfall, majority of the egg masses which were laid at the soil depth of 5–7 cm would be damaged severely. In case of juvenile mortality, possible predators bird, coleoptera (Snider 1984) etc. and other abiotic factors, rainfall, soil temperature, soil moisture etc. played a vital role.

Levieux and Aonti (1978) showed changes in mortality rates for all stages of *Pachybolus laminatus*. This holds true for *S. phipsoni* also.

It was observed that the large number of eggs laid could only produce a minimum number of adults. The most acceptable theory emphasized the significance of increased interaction between the individuals of population with growing density and the consequent deterioration of the physiological condition of the animals, giving rise to self regulation (Chitty 1957, Wynne Edwards 1962). The results of the present study support the theory of self regulation.

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