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Polymorphic Characteristics of Terrestrial Snails *Trachea Vittata in* Semi Arid Micro Habitat

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ABSTRACT

Polymorphism shown in snail is a classic example for the evolutionary drive through natural selection on gene frequency in a population. In the present study, a trial has been taken up to understand the variability of colour and banding pattern on poorly known terrestrial snail species, *Trachea vittata*. By collecting 20 specimens from a semi arid microhabitat, the banding pattern, colour variability on shells and its relating microhabitat have been recorded and analysed. Result showed that variation both in number (0 to 9) and thickness of the band is evident and played a significant role in adaptation and found to be disassociated to the microhabitat choice. Findings confirmed that high degree of colour and banding pattern of *T. vittata*shown adaptive significance in order to escape from the pressure exerted by avian predators.

Key words: *Trachea vittata*, Gastropod, microhabitat, active adaptation.

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INTRODUCTION

Land snails constitute about six per cent of the total species on[1]. A large part of molluscan fauna in many tropical regions of the world is still poorly known. They are considered to be the prey base for a number of small mammals and birds[2] *Trachea vittata*displays a high degree of phenotypic polymorphism in shell pattern and colour, but this is poorly researched.

The genetic basis of banding pattern has been worked out in detail for *Cepaea nemoralis* [3]. In their work, banding pattern and colour were classified as follows. It is shown that several banding patterns (e.g. 12300, 02300, 00340, 003300, 00305) should be classified as 00300. The presence or absence of extra (satellite-) bands seems to be multifactorial controlled. Pale is recessive to dark body colour. The latter occurs in several shades which are multifactorial controlled. Reddish body colour is recessive to yellowish, and the gene concerned is linked with that for shell colour. Variation in the expression of dominance was found at the loci for 00300, 00345, 10345, reddish body colour and pale body colour. The presence or absence of band 3 in banded snails does not seem to be genetically determined[4.]Supergene influence and habitat preference must have evolved in different species land snails[5].

Investigation into the mechanisms behind the maintenance of phenotypic polymorphism on poorly known species *T.vittata* is still unclear. The expression of banding pattern of *T.vittata* was varied from *Cepaea nemoralis* but not yet studied.Therefore an attempt has been taken up to identify the banding pattern and its relation with microhabitat and its unique polymorphic characteristics have been analysed in *T. vittata*.

MATERIALS AND METHODS

Data collection

A field survey has been carried out during July 2017 to November 2017 in a stretch starting from *Thirumangalam* (9. 812°N ,77.997 °E) of Madurai district along the road sides towards south about 6 km length .The study site covering diverse plants including *Morinda coreia, Azadirachta indica and Prosopis juliflora* are predominantly occur. The specimens were collected from a grassland site located in the suburbs, where vegetation has been

spontaneously developing for over 60 years.There are also vegetation such as grasses, *Pongamia pinnata*, *Acacia auriculiformis* (about 20% of the site area) with dwarf *Mimusops elengi* diversified by shrubs including blackthorn. Therefore, our chosen study area was dominated by dark, shaded habitats that were composed mainly of shrubs and young trees. In the present study, about 200 aestivating *T.vittata* were collected manually by hand picked carefully with a skilled person, after recording the microhabitat for each specimen. The colour and banding pattern on the shells were observed with the help of a hand lens and grouped in to umbilical, middle and sutural based on the location of the band. Based on the banding pattern, collected specimens were grouped into 20 according to the similarity. The thickness and length of each band on every shell was also recorded and analysis was carried out.

RESULT AND DISCUSSION

The shells of *T.vittata* are whitish in nature with unique band pattern. The collected shells of *T.vittata* showed a varying degree of brown bands.(Table 1) The numbers of brands (0 to 9) and thickness were varied. The thickness of brand was recorded as the range from thin (c0.1 mm) to broad (>2 mm). The bands are broad at the base and near the margin of the mouth or operculum and gradually tapering towards the apex of the shell. Few snails were found to be pale in colour exposed to bright sunlight Result also showed that no correlation between bands and thickness of the shell to the microhabitat.(Table -1)

Allen (2004) demonstrated that terrestrial gastropods are often polymorphic for colouration and the commonest morph is usually the one with best match to the colouration of the background [6,7,8,9,10,11,12].

Direct evidence that habitat morph frequencies are caused by visual hunters removing conspicuous animals come from comparisons of the frequencies of morph with morph frequencies in the population. In contrast, our study revealed that banded pattern in snails *T.vittata* seem to have no relation to the microhabitat choice. The genetically controlled banding patterns of the shell play a relative role of chance in the evolution of land snail[13]. Such a contradiction in the variability in intra population of land snail,*T.vittata* might be

influenced by natural selection. Pale colouration in shells is suggestive that an adoptive variation as in Theba pisana[14,15].

Table - 1 showing polymorphic characteristics of *T.vittata* (Muller) in relating to microhabitat

S. No		Umbilicus				Middle				Sutural				Height on snail found (m)	Height of the plant	Orientation
	No of shell	CT	TN	BD	MD	CT	TN	BD	MD	CT	TN	BD	MD			
1	12	0	4	0	0	0	0	1	1	0	1	1	0	1.23	2.65	W
2	11	0	3	1	2	0	0	2	0	0	2	0	0	1.07	2.06	E
3	9	0	1	0	2	0	0	1	0	0	0	2	0	1.23	3.02	W
4	8	0	1	0	0	0	0	2	0	0	0	1	0	1.52	2.44	W
5	13	0	1	0	1	0	0	1	0	0	0	1	0	1.84	2.66	E
6	11	0	0	0	0	0	2	0	0	0	1	1	0	0.65	2.44	E
7	8	0	1	0	0	0	2	1	0	0	1	0	0	0.65	2.35	E
8	8	0	0	0	2	0	1	1	0	0	2	0	0	1.55	1.68	N
9	10	0	3	0	0	0	2	0	1	0	2	1	0	1.26	1.85	S
10	13	0	0	2	0	0	0	1	0	0	1	1	0	1.63	2.4	E
11	8	3	0	0	0	0	3	1	0	0	0	0	2	1.70	2.61	W
12	17	2	0	0	0	0	0	0	0	0	0	0	0	1.48	1.94	W
13	9	0	2	2	0	0	0	0	0	0	0	0	2	0.41	0.91	W
14	8	0	1	0	0	0	0	1	3	0	1	0	0	3 cm	2.10	S
15	9	0	1	0	0	0	2	1	3	0	0	0	0	1.50	2.2	S
16	7	0	1	0	2	0	0	0	0	0	0	0	1	1.50	3.0	N
17	11	0	2	0	0	0	0	1	0	0	0	0	0	0.92	2.1	S
18	13	0	1	0	0	0	0	0	3	0	0	0	0	1.63	3	W
19	8	0	2	0	0	0	0	0	1	0	1	1	0	1.52	2.6	E
20	7	0	1	0	0	0	0	0	1	0	1	1	1	1.85	2.44	W

CT -Closethikness, TN –Thin, BD –Broad, MD-Moderate, E- East, W- West, N-North and S-South

An unpublished report by Chandran *et al.*,revealed that predatory pressure exerted on *T.vittata* was shown least percent than *C.numeralis.* This banding pattern in *T.vittat*a is an adaptive role to avoid predation using its polymorphic nature as they were all found in equal height and same at microhabitat. Furthermore, it was observed that variation in banding is irrespective to the orientation and plant height where they exist.

CONCLUSION

Polymorphism is a means of survival during the evolutionary drive by using isolating mechanism over a long period of time. The present study has been focussed on the banding patterns of poorly known species, *T.vittata* in its microhabitat. It reveals that banding pattern of this species is unique and exhibit adaptive role in succeeding from the predator by camouflaging to its surrounding. The mechanism of variation in banding variability on genetic basis is a thrust area for future research to this taxa.

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