Morphometric analysis of the Gastropod slug *Laevicaulis alte* (Ferussac, 1822)

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Abstract:

Morphometry of the terrestrial slug *Laevicaulis alte* (Gastropoda: Styllomatophora) was carried out. Slugs were collected from the foot hills of Southern Western Ghats region of Courtallam area. Frequency distributions were calculated on the basis of animal length, breadth and live body weight (at motion and at rest). The study revealed significant positive correlation ($P>0.05$) of the length and breadth of the slug with relevance to body weight of the animal at motion and at rest. The regression equation of length at motion was $y = 1.169x + 0.516$, ($R^2 = 0.983$) and at rest it was $y = 0.684x + 0.76$ ($R^2=0.988$); the breadth at motion $y = 0.276x + 0.541$ ($R^2 = 0.851$) and at rest $y = 0.414x + 0.713$ ($R^2=0.839$). Morphometric measurements are basic details of the animal to study taxonomy, comparison of distribution of similar species and their ecobiology.

Key Words:

Laevicaulis alte, morphometry, length, breadth, body weight.

1. INTRODUCTION

The length and the breadth of molluscs differ from species to species (Arockiam, 1984). Studying growth and establishing allometric relationships are essential for generating useful information for managing resources and understanding changing environmental conditions and pollution (Palmer, 1990; Boulding and Hay, 1993). The morphometrics in molluscs are a common taxonomic tool (Kilgour *et al.*, 1990; Rolan 1991; Johannesson and Johannessan, 1996; Wullschleger and Jokela, 2002). It has been used to show local or regional variations, other times the same techniques are utiilized to explore ecological relationships, usually linking morphological variations to a specific set of environmental conditions. Often growth is estimated by measuring shell dimensions or the volumes of the animal (Hibbert, 1977; Bailey and Green, 1988; Rodhouse *et al.*, 1984; Ross and Lima 1994; Ravera and Sprocati 1997; Rueda and Urban 1998; and Deval, 2001).

Studies on morphometry have been carried out in gastropods (Branch and Marsh 1978, Liop *et al.*, 1991, Trussell, 2000) and also in Pelecypods (Kilgour *et al.*, 1990; Mc Donald *et al.*, 1991; Villalaz 1994, Kafanov *et al.*, 1997; Tanaka and Magalhaes, 1999). The current study is to find out correlation between

the length and breadth of the slug *Laevicaulis alte* with relevance to body weight of the animal at motion and at rest.

2. Materials and Methods:

2.1. Study Area

The terrestrial slugs *Laevicaulis alte* were collected from its natural habitat of Ilanji near Courtallam hills from Tirunelveli District, Tamilnadu, India. It is located near the Western Ghats hill ranges lying at latitude $8^o56'$ N and longitude 77^o 16' E, at an elevation of 160 m.

2.2. Sample Collection

Laevicaulis alte were hand collected at monthly intervals from the study site. The animals were safely brought to the laboratory.

2.3. Morphometric measurements

A total of 100 slugs were used for morphometric measurements. The maximum length and breadth (at rest and at motion) of each animal was measured from the anterior and to the posterior end by using vernier calipers. Simultaneously the body weight of each animal is also recorded with the help of an electronic balance.

2.4. Statistical analysis

Measured snails were divided into different size groups which were estimated using graph. The pearson correlation between body weight and length versus breadth have been found out.

3. RESULTS

Significant ($p > 0.05$) positive correlation was obtained between the body weight of the animal and the length of the slug (both at motion and at rest). The regression equation at motion was $Y = 1.169 x + 0.516$ ($R^2 = 0.983$) and at rest it was $Y = 0.684x + 0.76$ ($R^2 = 0.988$) (Fig.1, 2).

The breadth of the slug also revealed significant ($P > 0.05$) correlation with that of body weight of the animal both during motion and at rest. The regression equation at motion was $Y = 0.276x + 0.541$ ($R^2 = 0.851$) and at rest $Y = 0.414x + 0.713$ ($R^2 = 0.839$) (Fig.3, 4).

The length of the slug also revealed significant ($P > 0.05$) correlation with the breadth of the slug. The regression equation of length was $Y = 0.060x + 0.402$ and the breadth was $Y = 0.103x – 0.11$ ($R^2 = 0.985$) (Fig.5, 6).

Fig.1

Correlation between body weight and animal length (at motion) of slug *Laevicaulis alte.*

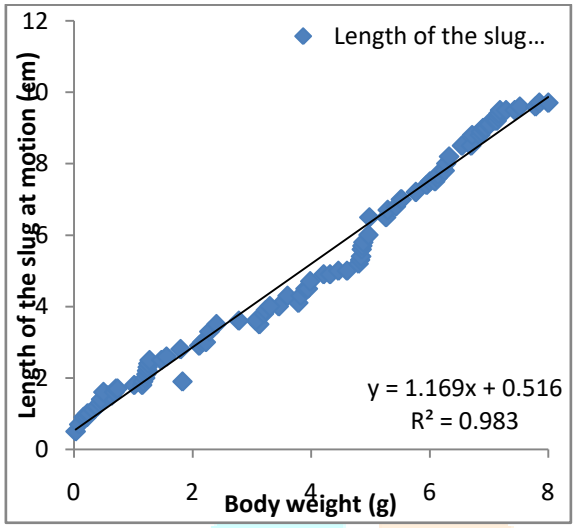


Fig.2

Correlation between body weight and animal breadth (at motion) of *Laevicaulis alte* .

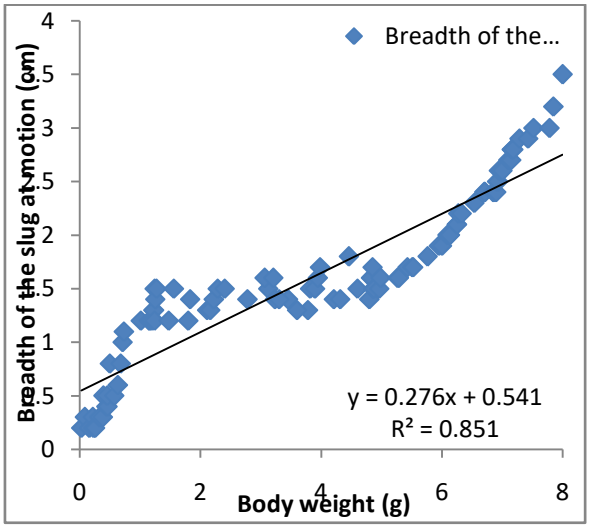


Fig.3

Correlation between body weight and animal length (at rest) of *Laevicaulis alte.*

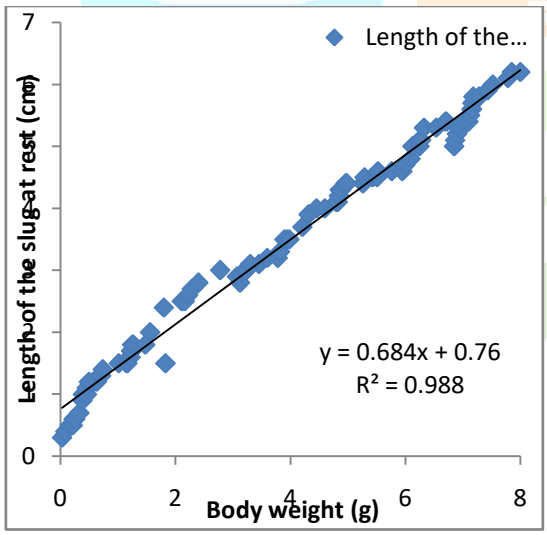


Fig.4

Correlation between body weight and animal breadth (at rest) of *Laevicaulis alte* .

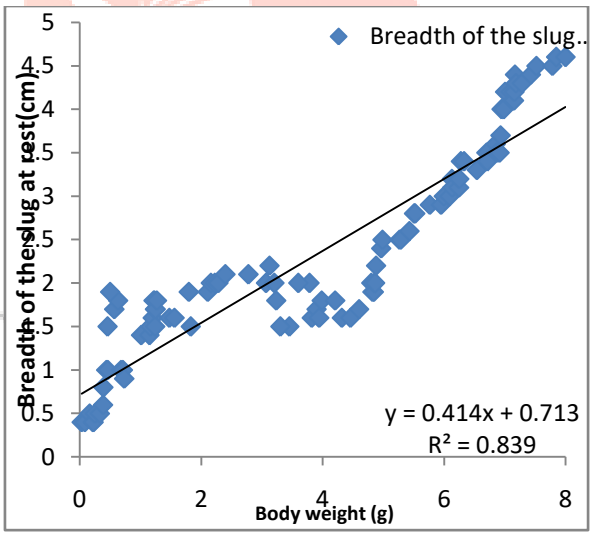


Fig.5

Correlation between length and breadth of the slug (at rest)

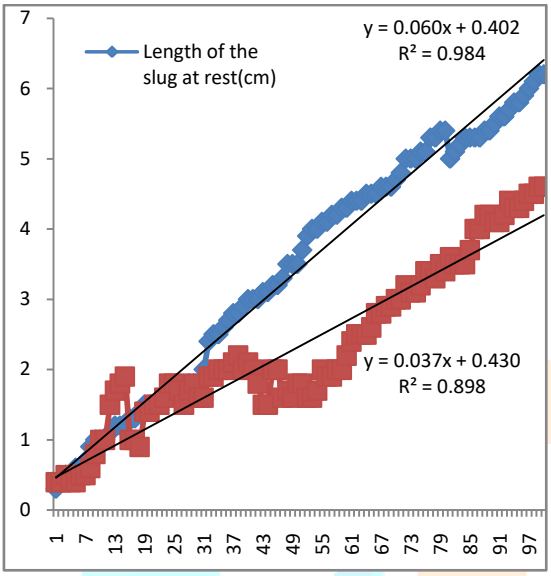
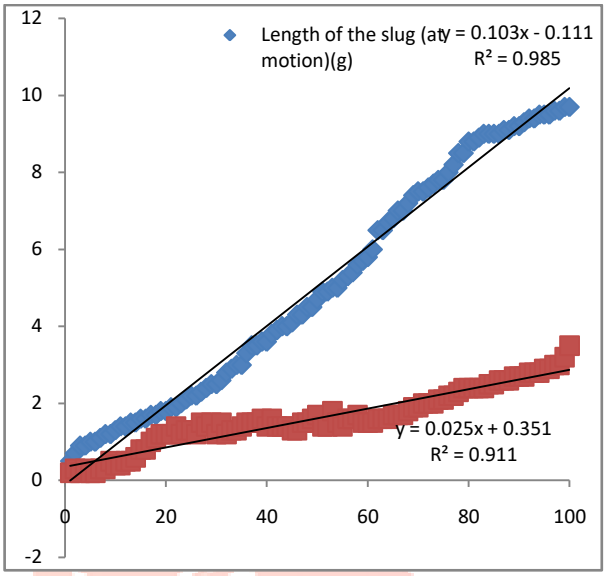


Fig.6

Correlation between length and breadth of the slug (at motion)



4. Discussion

Morphological differences are either preceded by or accompanied simultaneously by an underlying chemical differentiation of each species (Johnson and Wicks, 1959). The current study revealed that there is a significant correlation between the body weight and length of the animal and also between body weight and breadth, both during motion and at rest of *Laevicaulis alte.* Khan and Chaudhuri (1984) also observed the similar findings in *Bellamya variata* with reference to that the length and breadth of the shell.

Similar results have been reported in *Trachea vittata*, *Pila globosa* and *Indoplanorbis exustus* (Mahilini, 2000), in *Bellamya bengalensis* (Sangeetha, 2003) and in *Achatina fulica* (Muthulakshmi, 2005).

The slug *Laevicaulis alte* reached the maximum body weight of 7.21 $\pm$ 0.28gm. Pavankumar *et al*. (1979) have been revealed that adult slug *Laevicaulis alte* reached the maximum size of 6 to 10 gm.

The present study of the morphometry of the slug *Laevicaulis alte* is a potential common taxonomic tool and to find out the local and regional morphological variations with reference specific set of environmental conditions as in Branch and Marsh (1978); Mc Mahon and Whitehead (1987); Lam and Calow (1988) and Denny (2000). Our observations are preliminary and first of its kind from the region and intended to contribute to the understanding of ecobiology of the species.

Conclusion

Terrestrial snails and slugs are diverse and easily sampled and serve as indicators of leaf litter biodiversity (Boycott, 1934). Molluscs play a significant role as links in food chain as detritus feeders, improving bottom sediments and soil condition. They are the natural reducers of inorganic minerals into organic nutrients in natural ecosystem (Kavitha *et al.* 2012; Barker, 1989; Martin, 1991; Reddy, 1995).

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