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**STUDIES ON THE MORPHOMETRY OF THE TERRESTRIAL SLUG
MARIELLA DUSSUMIERI GRAY (STYLOMMATOPHORA:
ARIOPHANTIDAE)**

Deepak P.¹, Alexander R.¹, Jayashankar M.² and *Ramakrishna S.¹

¹Department of Zoology, Bangalore University, Bangalore-560 056

²Department of Entomology and Nematology, Indian Institute of Horticultural Research,
Bangalore-560 089

*Author for Correspondence

ABSTRACT

The present study reports the morphometric studies on an endemic terrestrial pulmonate slug, *Mariaella dussumieri* Gray (Stylommatophora: Ariophantidae) from Bangalore. The individuals (N=26) were collected from Hebbal forest department nursery, Bangalore north taluk and subjected to traditional morphometry to analyse the intra population variation. Significant positive correlation was obtained between the parameters, length-circumference (0.959); length-live weight (0.787) and circumference-live weight (0.761). Fitted regression equation was obtained for the species considering two sets of morphometric variables viz., length and circumference; live weight and length, ($Y = 0.540x + 2.589$, $R^2 = 0.919$) and ($Y = 0.056x - 1.009$, $R^2 = 0.619$) respectively. Co-occurring terrestrial malacofauna include, *Achatina fulica* (Bowdich), *Cryptozona bistralis* (beck), *Macrochlamys indica* Godwin-Austen, *Laevicaulis alte* (Ferrussac) and *Glessula bravis* (Pfeiffer).

Key Words: *Mariaella Dussumieri*, Nursery, Bangalore, Length, Circumference, Live Weight

INTRODUCTION

The terrestrial slug, *Mariaella dussumieri* (Gray, 1855) (Gastropoda: Ariophantidae) is reported as endemic to Karnataka (Mavinkurve *et al.*, 2004) and reported to infest vanilla plants by feeding voraciously on the succulent buds and leaves in the Western Ghats.

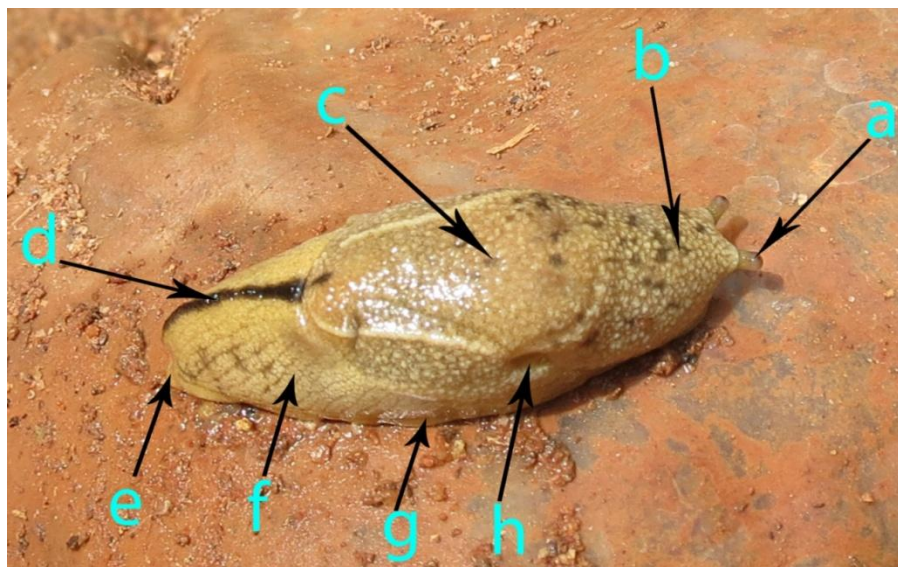


Figure 1: Key morphological features of *M. dussumieri* labeled (a= Tentacles; b=Head; c=Mantle; d=Keel; e= Tail; f= Body; g= Foot fringe; h= pneumostome)

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It is reported to be pestiferous in different parts of the Indian subcontinent viz., feeding on weeds (Raj and Tripathi, 1985), coffee in South India (Bhat and Shamanna, 1972), young rubber plants, green and wing beans in Srilanka (Naggs *et al.*, 2003), damaging spadix of areca palms at Kasargod (CPCRI, 2007), Hibiscus, *Anthurium andraeanum*, *Piper nigrum*, cocoa and *Musa* sp. in Dakshina Kannada district of Karnataka (Daniel and Vanavasn, 2009, and acting as a possible vector of *Anafilaroides rostratus* (Seneviratna, 1959). Given the fact that reports on the slug from the region are scarce, also their impact on local environment lacking, morphometric studies on *M. dussumieri* was undertaken in Bangalore region based on field studies (Jayashankar, 2011, 2013).

Due to their shell-free body form slugs are not as dependent on calcium-rich environments as are shell-bearing snails, but as a result of lacking a protective shell they display behaviors that conserve moisture such as nocturnal activity and dwelling mostly in sheltered environments (Capinera *et al.*, 2011). The present article deals with the morphometry of the *M. dussumieri* Gray. The color of the animal is yellowish brown or olivaceous, sometimes almost black, and generally mottled with dark blotches. The mantle has two narrow raised ridges on the shell-lobes, one running from the little shell-aperture round the left margin of the shell, the other towards the respiratory orifice on the right margin (Figure 1). The size appears to vary up to about 8 inches (200 mm) in length (Blanford and Godwin-Austen, 1908).

MATERIALS AND METHODS

Study Area

The samples (N=26) were collected from Hebbal forest department nursery, Bangalore North taluk, Bangalore Urban district. The field work was carried out in the study site with the onset of south-west monsoon, as the showers triggers the summer aestivating slugs to emerge in large numbers.

Morphometric Measurements

The specimens were hand collected with hand gloves on; into zip lock polythene cover provisioned with holes for aeration. The specimens safely transported to the laboratory at Department of Zoology, Bangalore University. Recording of morphometric parameters (Total length and circumference at the widest region of the body) using thread and centimeter scale in mm and live weight (g) was recorded using electronic weigh balance.

Statistical Analysis

The data was used to analyze the correlation between the morphometric parameters of the randomly collected individuals. Regression analysis was done for two morphometric variables viz., length and circumference; live weight and length. The data was statistically analyzed using SPSS software (11.5 version).

RESULTS AND DISCUSSION

In addition to the slug other co-occurring terrestrial malacofauna include *Achatina fulica* (Bowdich), *Cryptozona bistralis* (beck.), *Macrochlamys indica* Godwin-Austen, and *Laevicaulis alte* (Ferrussac) and *Glessula bravis* (Pfeiffer). The values of descriptive statistics are reported in Table 1.

Table 1: Descriptive Statistics of the sample (N=26)

	Minimum	Maximum	Mean	SD
Length (mm)	15.00	76.00	43.1923	17.22038
Circumference (mm)	11.00	43.00	25.9423	9.71013
Live weight (g)	.08	4.16	1.4438	1.24287

A significant (at 1 % level) positive correlations was obtained between the parameters viz., length-circumference (0.959); length-live weight (0.787); circumference- live weight (0.761). Fitted regression equation was obtained for the species considering two sets of morphometric variables viz., length and

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circumference; live weight and length, ($Y = 0.540x + 2.589$, $R^2 = 0.919$) (Figure 2) and ($Y = 0.056x - 1.009$, $R^2 = 0.619$) (Figure 3) respectively.

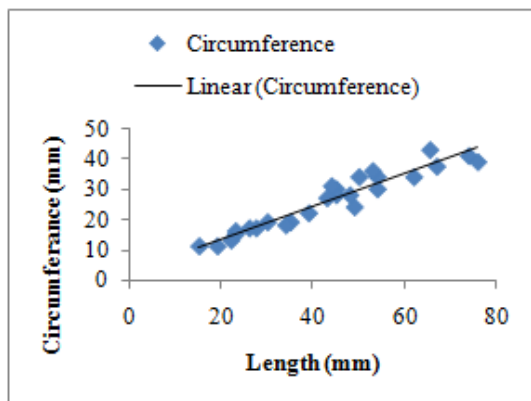


Figure 2: Regression analysis plots for (Length-Circumference) parameter of the sample with fitted regression equation

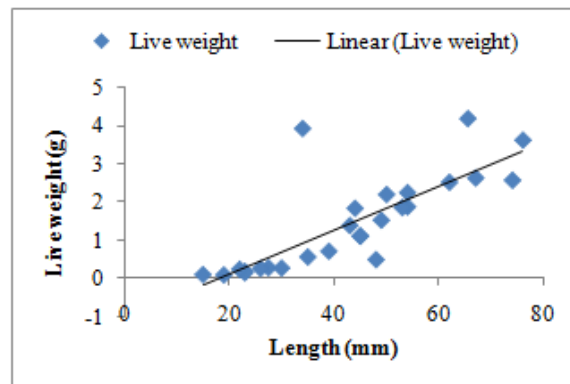


Figure 3: Regression analysis plots for (Live weight-Length) parameter of the sample with fitted regression equation

M. dussumieri is an emerging horticultural pest, shifting from forest to crop ecosystem as cited in the literatures mentioned in the introduction. As focus on their management is becoming necessary, information on their biology which is scarce in India yet pivotal. Hence, the data generated in the present analysis would contribute in that regard. Further studies encompassing field and laboratory observations on the eco-biology of the species need to be undertaken from different localities.

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REFERENCES

- Bhat KP and Shamanna HV (1972).** *Mariella dussumieri*- a new pest of coffee in South India. *Journal of Coffee Research* 2(4) 28-29.
- Blanford WT and Godwin-Austen HH (1908).** *The Fauna of British India, Including Ceylon and Burma*. Mollusca. Testacellidae and Zonitidae. Taylor & Francis, London 204-206.
- Capinera JL, Jodi W and Bernon G (2011).** *Featured Creatures, Entomology and Nematology*. University of Florida, Available: http://www.entnemdept.ufl.edu/creatures/misc/gastro/slugs_of_florida.html.
- CPCRI (2007).** Annual Report 2006-07, Central Plantation Crops Research Institute, Kasaragod - 671 124, Kerala, India 124.
- Daniel M and Vanavasan NK (2009).** The slug *Mariella dussumieri* Gray - an economically important pest of arecanut palms. *Journal of Plant Breeding and Crop Science* 37(1) 88-90.
- Jayashankar M (2011).** Distribution ecology and behaviour of the giant African snail, *Achatina fulica* (Bowdich) in and around Bangalore. PhD thesis submitted to Bangalore University.
- Jayashankar M (2013).** Distribution of Brown slug, *Mariella dussumieri* Gray, 1855 (Gastropoda: Ariophantidae) in Bangalore region (Communicated).
- Mavinkurve RG, Shanbhag SP and Madhyastha NA (2004).** Checklist of terrestrial gastropods of Karnataka, India. *Zoos' Print Journal* 19(11) 1684-1686.
- Naggs F, Raheem DC, Mohan PB, Grimm B, Ranawana KB and Kumburegama NBS (2003).** Ancient relicts and contemporary exotics: Faunal changes and survivorship in Srilanka's Snail fauna.

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Slugs and Snails: Agricultural, Veterinary and Environmental perspectives. 2003 *BCPC Symposium Proceedings* No **80** 103-108.

Raj JPN and Tripathi RS (1985). Effect of herbivory by the slug, *Mariella dussumeri*, and certain insects on growth and competitive success of two sympatric annual weeds. *Agriculture, Ecosystems & Environment* **13** 125-137.

Seneviratna P (1959). Studies on *Anafilaroides rostratus* Gerichter, 1949 in Cats: II. The Life Cycle. *Journal of Helminthology* **33** 109-122.