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Intraspecific variation in shell morphometry of *Bellamya dissimilis* (Mueller, 1774) (Architaenioglossa: Viviparidae) from three different lakes of Bangalore Urban District

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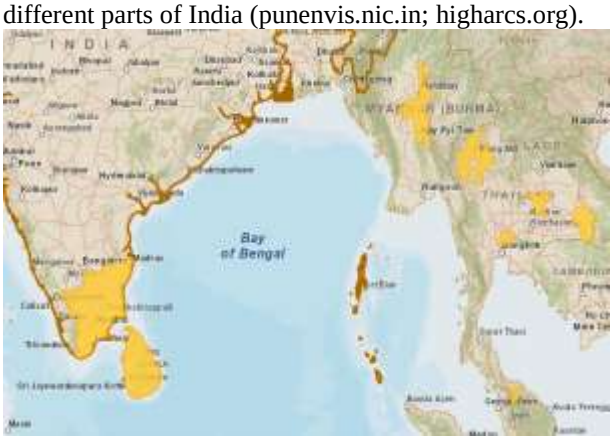
Abstract

The preent paper deals with the intraspecific variations in shell morphometry in different lakes from urban distric of Bangalore.

Key-Words: Morphometry, Bangalore, Urban, Shell

Introduction

Gastropda is the largest class in the phylum mollusca comprising of shelled organisms. Most gastropodan snails and clams are filter feeders and play an important role in the freshwater ecosystems by maintaining the water system clean. The present study is in relation to the fresh water snail, *Bellamya dissimilis* (= *Idiopoma dissimilisis*) commonly found in freshwater streams, ponds, stagnant water etc. It is native to India; Myanmar; Sri Lanka; Thailand (Map 1 from IUCN Redlist v2013.2) and reported from different parts of India (punenvis.nic.in; higharcs.org).



Map.1: Yellow coloured areas represent the distribution of *B. dissimilis*

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Freshwater ecosystems particularly lakes and impoundments in Bengaluru Urban district are under increasing threat due to rapidly expanding population and the subsequent modernization excessively pressurising the aquatic ecosystems via pollution. The aquatic biota of the water bodies are directly impacted by this, hence biodiversity and other eco-biological features of the biota needs to be recorded at regular intervals. As an attempt in that regard morphometric parameters of the Fresh water snail, *B. dissimilis* from three different aquatic ecosystems in Bengaluru Urban district was undertaken.

Material and Methods

Study Area

Three different lakes of Bangalore urban district, Nagavara Lake (13^0 02'41"N 77^0 36'24"E); Hebbal Lake (13^0 02' 48"N 77 35' 12"E); and Rachenalli Lake (13^0 3'50"N 77^0 36'43"E) were selected for the present study.

Sampling

Samples twenty individuals from each lake were collected using hand gloves early in the morning from the littoral zone of the lake margin. The collected snails were washed with the lake water to get rid of adhering debris and plant materials. They were carefully handled owing to their sensitive nature and were measured and released back into the water. Due permission was sought from the concerned authorities to perform the measurements.

Morphometric Measurements

Morphometric measurements were performed using vernier callipers. Seven morphometric parameters listed below were measured; the same is represented in (Fig.1).

ML	:	Maximum Length
MW	:	Maximum Width
AL	:	Aperture length
AW	:	Aperture width
ASD	:	Aperture spiral Distance
SL	:	Spiral Length
T	:	Thickness

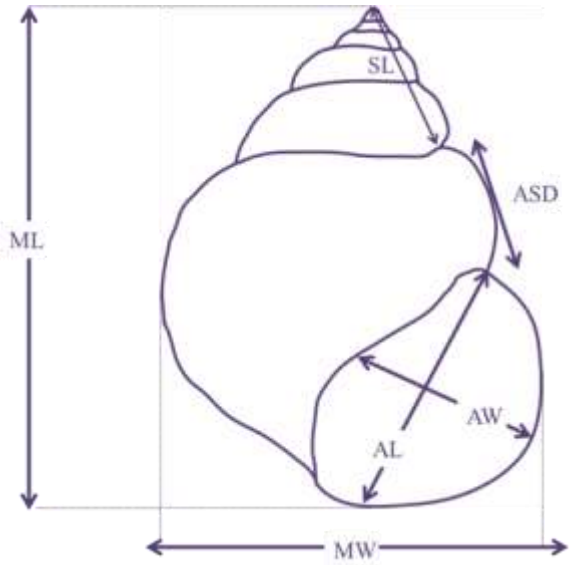

Fig. 1: Morphometric parameters of *B.dissimilis* shell

Statistical Analysis

Statistical analysis was performed in SPSS software (ver.16). Descriptive statistics of the three lake samples and comparison between the samples using One –way ANOVA was performed**.**

Results and Discussion

The results of the statistical analysis are discussed. The basic information related to the morphometry of the snail sub-populations collected from three lakes is presented in as descriptive statistics in Table 1, 3 and 5. The correlation between the parameters is presented in Tables 2, 4 and 6. In most cases a significant positive correlation was obtained between the samples. Regression analysis was performed to related Maximum length and Maximum width of the samples collected, percentage predictions for selected populations from regression analysis was found to be *viz*., Nagavara lake (71%, R^2= 0.711), Hebbal lake (65%, R^2= 0.649) and Rachenalli Lake (65%, R^2 = 0.653). One- way ANOVA indicated significant difference for six of the seven parameters except thickness of the shell among the populations from the three lakes considered (Table 7).

Conclusion

The present analysis is confirmative of the available information of the *B.dissimilis* ; however it is a first time confirmatory study from the water bodies selected. Also, the gastropods selected are known to be ecological indicators of eco toxicology in an aquatic environment (Lam et al., 1997). Therefore the information generated in the present analysis would add to the existing information of the species morphometry and future studies exploring variations due to pollution and microhabitat will aid in understanding the eco-biology of the species.

References

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4.Punenvis.nic.in (http://www.punenvis.nic.in/DATABASE_Tables/Biod iversity_Database/db_bd01.htm)

Table 1: Descriptive statistics of morphometric parameters of sample from Nagavara Lake

Morphometric parameters	Range Statistic	Minimum Statistic	Maximum Statistic	Mean		Std Statistic	Variance Statistic
				Statistic	Std. Error		
ML	6.12	21.00	27.12	23.8640	.3715	1.66157	2.761
MW	3.40	15.54	18.94	17.1240	.2118	.94703	.897
AL	2.44	9.50	11.94	10.7210	.1587	.70983	.504
AW	1.88	8.12	10.00	8.9780	.1097	.49041	.241
ASD	3.40	5.40	8.80	7.1000	.2216	.99108	.982
SL	3.84	6.22	10.06	7.4840	.2082	.93100	.867
T	.50	.24	.74	.4720	.0253	.11321	.013

Table 2: Correlations between morphometric parameters of samples collected from Nagavara Lake

	ML	MW	AL	AW	ASD	SL	T
ML	1	.844(**)	.677(**)	.867(**)	.845(**)	.883(**)	.342
MW		1	.771(**)	.756(**)	.691(**)	.640(**)	.091
AL			1	.801(**)	.499(*)	.480(*)	-.284
AW				1	.674(**)	.703(**)	.180
ASD					1	.743(**)	.278
SL						1	.520(*)
T							1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

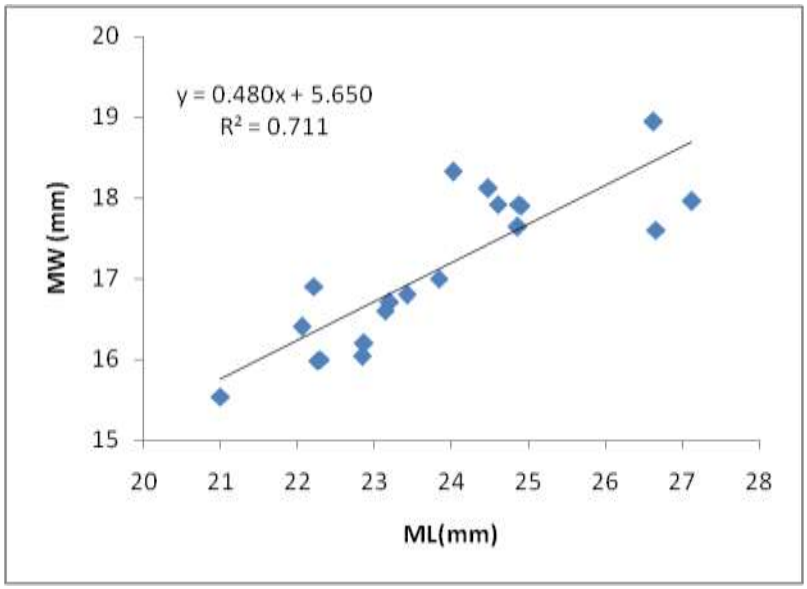

Fig. 2: Regression analysis plots for two parameters with fitted regression equation of sample from Nagavara Lake

Table 3: Descriptive statistics of morphometric parameters of sample from Hebbal Lake

	Range Statistic	Minimum Statistic	Maximum Statistic	Mean		Std Statistic	Variance Statistic
				Statistic	Std. Error		
ML	5.32	21.64	26.96	24.3040	.3382	1.51264	2.288
MW	3.82	16.10	19.92	17.7081	.2141	.95747	.917
AL	3.40	9.72	13.12	11.2860	.1508	.67434	.455
AW	4.04	6.96	11.00	9.2480	.1709	.76410	.584
ASD	2.00	6.00	8.00	6.7770	.1076	.48137	.232
SL	3.62	5.18	8.80	7.4490	.2065	.92341	.853
T	.36	.26	.62	.3950	.0197	.08823	.008

Table 4: Correlations between morphometric parameters of samples collected from Hebbal Lake

	ML	MW	AL	AW	ASD	SL	T
ML	1	.806(**)	.616(**)	.563(**)	.596(**)	.874(**)	-.165
MW		1	.777(**)	.813(**)	.704(**)	.560(*)	-.172
AL			1	.833(**)	.437	.437	-.436
AW				1	.480(*)	.341	-.308
ASD					1	.414	.162
SL						1	-.316
T							1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

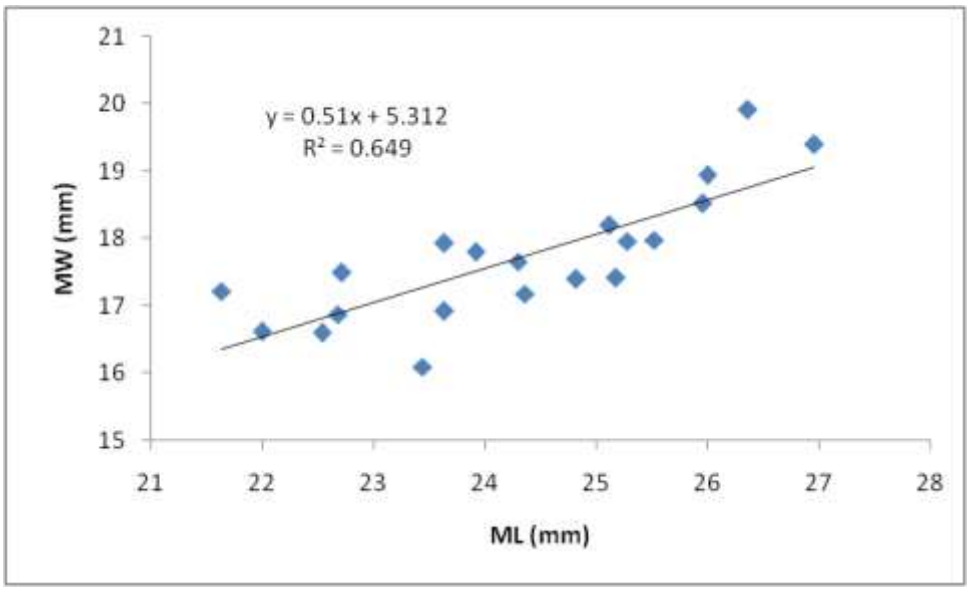

Fig. 3: Regression analysis plots for two parameters with fitted regression equation of sample from Hebbal Lake

Table 5: Descriptive statistics of morphometric parameters of sample from Rachenalli Lake

	Range Statistic	Minimum Statistic	Maximum Statistic	Mean		Std Statistic	Variance Statistic
				Statistic	Std. Error		
ML	6.12	21.00	27.12	23.8640	.3715	1.66157	2.761
MW	3.40	15.54	18.94	17.1240	.2118	.94703	.897
AL	2.44	9.50	11.94	10.7210	.1587	.70983	.504
AW	1.88	8.12	10.00	8.9780	.1097	.49041	.241
ASD	3.40	5.40	8.80	7.1000	.2216	.99108	.982
SL	3.84	6.22	10.06	7.4840	.2082	.93100	.867
T	.50	.24	.74	.4720	.0253	.11321	.013

Table 6: Correlations between morphometric parameters of samples collected from Rachenalli Lake

	ML	MW	AL	AW	ASD	SL	T
ML	1	.808(**)	.831(**)	.655(**)	.709(**)	.881(**)	.583(**)
MW		1	.785(**)	.629(**)	.825(**)	.762(**)	.705(**)
AL			1	.714(**)	.728(**)	.784(**)	.648(**)
AW				1	.633(**)	.536(*)	.538(*)
ASD					1	.647(**)	.508(*)
SL						1	.576(**)
T							1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

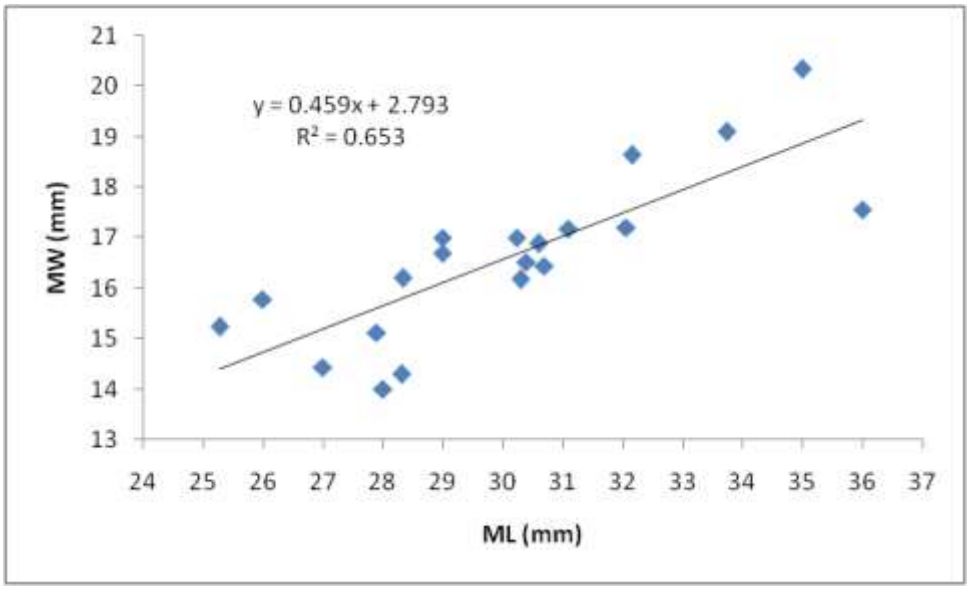

Fig. 3: Regression analysis plots for two parameters with fitted regression equation of sample from Rachenalli Lake

Table 7: One – way ANOVA of morphometric parameters of the samples from three different lakes

Sl. no	Morphometric parameter	F-value	p-value
1	ML	$F_{0.05}$ (2,57) = 55.471	< 0.05*
2	MW	$F_{0.05}$ (2,57) = 4.304	< 0.05*
3	AL	$F_{0.05}$ (2,57) = 29.280	< 0.05*
4	AW	$F_{0.05}$ (2,57) = 34.937	< 0.05*
5	ASD	$F_{0.05}$ (2,57) = 13.735	< 0.05*
6	SL	$F_{0.05}$ (2,57) = 76.137	< 0.05*
7	T	$F_{0.05}$ (2,57) = 2.150	> 0.05

***Significant at 0.05 level.

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