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Morphometric and length/breadth-weight relationship of *Lobothelphusa woodmasoni* (Rathbun, 1905) from Bajali district, Assam, India

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Abstract
The present study was carried out to gather the data to study morphometrics, coefficient of correlation and length/ breadth-weight relationship of certain body part of *Lobothelphusa woodmasoni*. A total of 37 crabs were collected, from November 2024 to April 2025 in the different localities of Bajali district. The length of first working leg of carapace of *L. woodmasoni* ranged from 4.4 to 9.4 cm, the carapace length of *L. woodmasoni* ranged from 4 to 8.5cm, the carapace breadth of *L. woodmasoni* ranged from 3.7 to 7 cm and the total weight of *L. woodmasoni* ranged 18.46 to 65.34 g. The mean of first working leg of carapace is 6.7cm, the mean of carapace length is 5.781 cm, the mean of carapace breadth is 5.15 cm and the mean of total weight is 34.44g. The coefficient of correlation between total weight and first walking leg of carapace of *L. woodmasoni* is found 0.712, The coefficient of correlation between total weight and carapace length of *L. woodmasoni* is found 0.896. The coefficient of correlation between total weight and carapace breadth of *L. woodmasoni* is found 0.397. Length/breadth -weight relationship in relation to total weight between length of first walking leg, carapace length and carapace breadth show the negative allometry growth. The study provides insights into the morphometric and length-weight relationship of *L. woodmasoni.*

Keywords: Morphometric, coefficient of correlation, length/breadth-weight relationship, Carapace breadth.

Introduction
The river, ponds, beels are lucrative habitat of crabs and is being harvested by the local fishermen. The length-width/weight relationship in crabs indicates the growth dynamics for developing the crustacean fisheries. The carapace length and weight of the crabs have manifolded significance and is being used to know the standing stock biomass, condition indices, analysis of ontogenetic changes and several other aspects of crustacean population dynamics (Atar & Seçer, 2003). In addition, they are used for the management of population within the ecosystem. According to Lagler (1968), the relationship can be used to estimate the recovery of edible meat from crabs of various sizes. Body weight, total length and carapace length are the most frequently used dimensions in the study of crustaceans (Sukumaran & Neelakantan, 1997). Study of the length-weight relationship in aquatic animals has wide application in delineating the growth patterns during their developmental pathways (Bagenal, 1978). The species *Lobothelphusa woodmasoni* is not known so far in details from the Bajali area and considering this view, the aim of present study is to gather the information to know morphometrics, coefficient of correlation and relationship between length/ breadth and weight of certain body part of *Lobothelphusa woodmasoni* (Rathbun, 1905) for sustainable ecosystem.

Materials and methods
Study area
The present study was under taken from November 2024 to April 2025 in the different localities of Bajali District. The specimens for the experiment were collected from three different stations i.e Saudarvitha (latitude 8 º28ʾ 10.0056" N & longitude 42º 43ʾ18.1344" E). Kothalmurighat (latitude 8° 29' 36.186" N & longitude 42° 38′ 59.2008" E), Pathsala (latitude 26° 30' 42.7824" N & longitude 91° 10' 51.2508" E) of Bajali district of Assam, India.

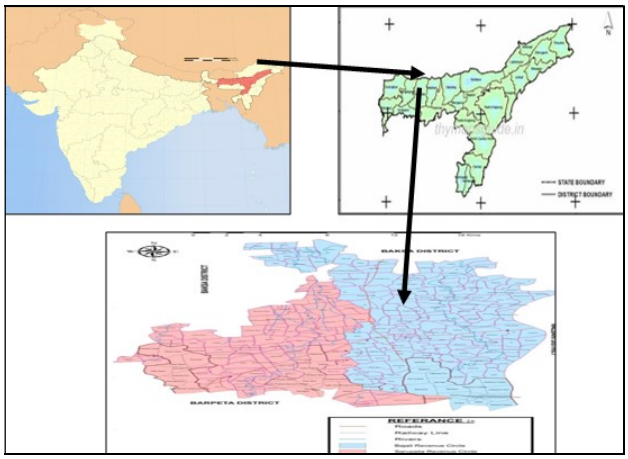

Fig 1: Locational map of study area. (Source: Google map)

Preservation and identification
The collected specimens were immediately taken to the laboratory of Bhattadev University, Bajali in live condition and were kept in an aquarium (20x4x4) separately. Later the specimens were identified following standard literature and related documents and photographs were taken.

Morphometric measurement
Various morphometric measurement *viz* carapace lengths, carapace breath, total weight, length of first working leg etc were taken using ruler to the nearest centimetre, total body weights were taken using the balance to the nearest gram and were noted in the datasheet.

Statistical analysis

Karl Pearson method (1885) was employed to calculate coefficient of correlation (r), $r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$; Where, x = X-$\bar{X}$, y = Y −$\bar{Y}$. The relationship between the length (L) and weight (w) of *L. woodmasoni* was expressed by Pauly (1983): $W = aL^b$ (Bagenal and Tesch, 1978): Where, W is total weight of *L. woodmasoni* (g), L is length of first walking leg or carapace length or breadth of *L. woodmasoni* (cm), a is constant proportionality (intercept), b is allometry coefficient (slope). The equation is represented in log transformation- Log W = Log a + b Log L. Coefficient of variation (CV) was calculated using $CV = \frac{\text{Standard deviation X 100}}{\text{mean}}$. Statistical analysis was calculated using PAST software.

Results

Size composition of *L. woodmasoni*

A total of 37 specimens of *Lobothelphusa woodmasoni* (Rathbun, 1905) were studied.

The length of first working leg of carapace of *L. woodmasoni* ranged from 4.4 to 9.4 cm, the carapace length of *L. woodmasoni* ranged from 4 to 8.5cm, the carapace breadth of *L. woodmasoni* ranged from 3.7 to 7 cm and the total weight of *L. woodmasoni* ranged 18.46 to 65.34 g (table.1 and fig.2). The mean of first working leg of carapace is 6.7cm, the mean of carapace length is 5.781 cm, the mean of carapace breadth is 5.15 cm and the mean of total weight is 34.44g.

Statistical analysis

Coefficient of correlation and coefficient of variation of *L. woodmasoni*

The coefficient of correlation, inference and significance are summarized in table. 1. The coefficient of correlation between total weight and first walking leg of carapace of *L. woodmasoni* is found 0.712, which is moderate degree of correlation. The coefficient of correlation between total weight and carapace length of *L. woodmasoni* is found 0.896, which is fairly high degree of correlation. The coefficient of correlation between total weight and carapace breadth of *L. woodmasoni* is found 0.397, which is low degree of correlation. The Coefficient of variation of length of first walking leg of carapace, carapace length, carapace breadth and total weight of *L. woodmasoni* is found to be 15.493, 16.194, 16.039, 29.76 respectively.

Table 1: Measurement of different part and coefficient of variation (CV) of the *Lobothelphusa woodmasoni* (Rathbun, 1905)

Number of species	Length of first walking leg (cm)			Carapace length (cm)			Carapace breadth (cm)			Total weight (g)		
	Range	Mean ± standard deviation	CV	Range	Mean ± standard deviation	CV	Range	Mean ± standard deviation	CV	Range	Mean ± standard deviation	CV
37	4.5-9.4	6.7 ±1.038	15.493	4-8.5	5.78 ±0.936	16.194	3.7-7	5.15 ±0.826	16.039	18.9-65.34	34.44± 10.117	29.376

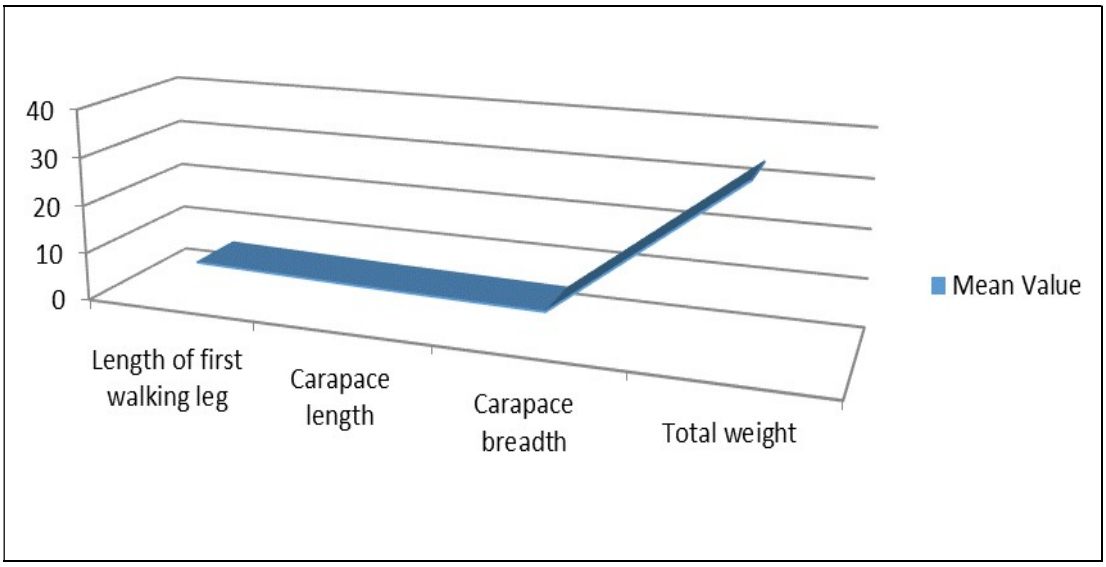

Fig 2: Comparison the mean value of length of first working leg, carapace length, carapace breadth and total weight of *L. woodmasoni.*

Length/breadth -weight relationship of *L. woodmasoni:*

Length/breadth -weight relationship between length of first walking leg & total weight, carapace length & total weight and carapace breadth & total weight show the negative allometry growth. This is because the coefficient b, varied significantly from the theoretical value of 3 (given by Bagenal and Tesch, 1978) (table.2 and fig.3). The calculated value of 'a' and 'b' are 2.25 and 1.07 for the length of first walking leg & total weight, 4.20 and 1.19 for the carapace length & total weight and 6.47 and 1.01 for the carapace breadth and the total weight of *L. woodmasoni* respectively.

Table 2: Length/ breadth -weight relationship, coefficient of correlation (r) between parameters of *Lobothelphusa woodmasoni* (Rathbun, 1905)

Relationships	$W = aL^b$		b	Growth type	'r' values
	a	b			
Length of first walking leg & Total weight	2.25	1.07	b<3	Negative allometry	0.712
Carapace length & Total weight	4.20	1.19	b<3	Negative allometry	0.896
Carapace breadth & Total weight	6.47	1.01	b<3	Negative allometry	0.397

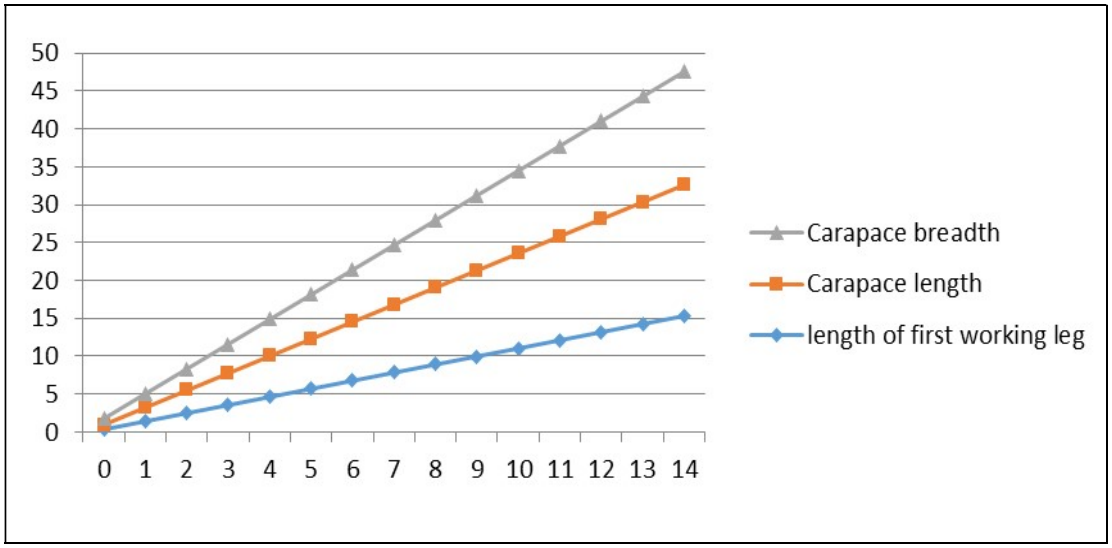

Fig 3: Comparison Length- Weight relationship between the length of first walking leg, Carapace length and carapace breadth in relation to total weight *L. woodmasoni.*

Discussion

Patil and Patil (2012) have carried out on length-weight relationship and condition factor of freshwater crab *Barytelphusa gurini*, (Decapoda, Brachyura) and found the exponent 'b', value for males 2.83 and for females which is found to be 2.03 respectively and combined crabs is found to be 2.35. The growth shows negative allometry in males, females and combined sex crab. The coefficient of determination (r^2) for male is 97.8%, in female it is 98.6%. According to Olusoji *et al*., (2009), the relationship between length-weight, condition factor and fecundity of the West Africa freshwater crab, *Sudanonautes africanus* (Milne-Edwards 1883), was found the growth parameters a of the length-weight relationship for *S. africanus* was 0.889, 5.029 and 0.713 for males, females and entire population, respectively. The values of b estimated were 2.475, 3.185 and 2.567 for males, females and whole population, respectively. The coefficient of determination of males, females and entire population were 0.716, 1.049 and 0.699, respectively, which showing a strong positive correlation between the parameters. There was a strong relationship (r^2 = 0.81) between length and weight of males and females and the entire crab population. According to Ahmadoon (2019), the morphometric and length-weight relationship in the mud crab (*Scylla serrata*) was found the ranged of total weight of male from 261-1352 mm while in female ranged from 316-1287 mm. Growth was negatively allometric in carapace length-weight relationship for both females and males. Carapace length-Carapace width was positively allometric for both males and females. Atar and Seçer (2003) have carried out study on width/length-weight relationships of the blue crab (*Callinectes sapidus* Rathbun 1896) in Beymelek Lagoon Lake and found the relationship between carapace width and weight was found to be $W = 0.6804L^{2.9364}$ with correlation coefficient 0.86 also carapace length and weight was found to be $W = 0.1907L^{2.5656}$ with correlation coefficient 0.88.

Conclusion

The species as it belongs to least concern categories from conservation point of view, the result will focus on speculation about morphometric trait. So, more investigate is needed to understand the ecological and environmental factors influencing the species growth and abundance. The result will act as a baseline information on its taxonomical study.

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