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Biology of Tele Kankra, *Sartoriana spinigera* (Wood-Mason, 1871) from East Kolkata Wetland, India

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Abstract

The length-weight relationship and condition factor of *Sartoriana spinigera* (Wood-Mason, 1871) was studied from East Kolkata Wetland of West Bengal, India. The study assesses the relationship of some body dimensions and weight and size frequency of Wood Mason crab *S. spinigera*. The variations in the condition factor (carapace length/weight) was analysed for sex wise as well as for combined sexes. Length-weight relationship of the crabs indicates a negative allometric growth. The study shows that the condition factor of the studied male crab was 2.26, female 2.16 and for combined sexes 2.16. The sex ratio is 1 male: 1.51 female. The study reveals that there is a strong co-relation between various morphometric characters. The highest number of crabs (203) found between the size group of 32 to 37 mm carapace length and the lowest number of crabs (8) found between the size group of 44 to 49 mm carapace length.

Keywords: Length-weight relationship, condition factor, sex ratio and size distribution

Introduction

Freshwater crabs due to their role in nutrient cycle, water quality monitoring and small-scale fisheries have been considered as ecologically as well as economically important group. A total of 96 species, under 41 genera in 6 families hitherto recorded from India [1, 2, 3, 6, 13, 16]. Among these 96 species *Sartoriana spinigera* is an important edible freshwater crab species under the family Gecarcinucidae. The crab is commonly known as Wood Meson crab and in West Bengal it is locally known as Tele Kankra. *S. spinigera* are abundantly found in the mud soil wetland of Bangladesh, Pakistan and India (Assam, Bihar, Uttar Pradesh, West Bengal). The wetland habitats are the most favourable shelter for the propagation of this crab. These crabs are found crawling, burrowing and even buried in the mud soil of the littoral region of wetlands. The carapace of the crab is oily and smooth in texture; semi-triangular in shape which has many spines often camouflaged with algae and other encrusting species. In population studies, morphometric analysis provides a powerful complement to genetic and environmental stock identification approaches [4]. Data on species composition, length distribution of a commercially used fish stock is required for sustainable fisheries management [10, 12]. Size frequency distribution of a population is a dynamic characteristic that fluctuate during the year and season. Sex and size distribution provides information on productivity, longevity, period of maturity, recruitment of various classes and determination of potential yield. Sex ratio is an important and useful indicator to assess relative excess of deficit of male or female in a given population at that point of time. Several works on the size distribution, sex ratio and length-weight relationship on different crabs were done by various workers [5, 7, 8, 9, 11, 15]. But no such work has done on the biology of *S. spinigera* till now. Only two works were done on ecology, haematology and biochemical composition of exoskeleton of this crab species [14]. The present study revealed with the general biology, size distribution and sex ratio of the *S. spinigera*.

Materials and methods

Study area

The East Kolkata Wetlands (EKW), located on the eastern fringes of Kolkata city is one of the largest assemblages of sewage fed fish ponds. EKW is the only Ramsar site in West Bengal, is very significant for the wide use of sewage water, especially for aquaculture and harbouring

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the biological diversity. The wetland area exists approximately between latitudes 22°25' to 22°40' north and longitudes 88°20' to 88°35' east.

Specimen collection:

A total of 347 specimens of *S. spinigera* (138 males and 209 females) were collected from a particular locality of East Kolkata Wetland. The present study was carried out from November, 2014 to November, 2015 from East Kolkata Wetland area. The crabs were washed thoroughly to remove all mud and epizoic forms and were preserved in 4% formalin.

Measurement: The specimen weighted to the nearest g by using an electrical weighing balance. The measurements used for morphometric studies in *S. spinigera* are taken by using a Vernier Calliper scale to the nearest mm.

Statistical analysis:

The L-W data were analysed according to the method mentioned by Le Cren [17]. The equation of the parabolic relationship of the form $W = aL^b$ was used where W represents weight of the fish in gram; L being the total length in millimetre; 'a' the constant and 'b' an exponent to which L can be raised. The equation expressed in logarithmic form becomes: $\text{Log } W = \text{Log } a + b \text{ Log } L$. The equation was calculated for male, female and combined sex sample and a linear relationship between the logarithm length, width and logarithm weight was found from the examination of scatter diagram. The empirical points were submitted to regression analysis, using the power function ($y = ax^b$), where W = the dependent variable (y), Length/Width = the independent variable (x), "a" = the condition factor, and "b" = the weight increase. The variation between the regression coefficients (b) in male and female crab was calculated using ANOVA (Analysis of covariance). The coefficient of correlation and the regression line was calculated and drawn from the formula given by Spiegel [18]. To test the regression coefficient (isometric, $b=3$; positively allometric, $b>3$; and negatively allometric, $b<3$) was confirmed by the "t" test of the difference from 3, using a 1% significance level [19]. The fit was evaluated by the coefficient of determination (R^2). All data were analysed by using internationally reputed Software Statistical Package for Social Sciences (SPSS-16.0) and MS Excel.

Condition Factor was calculated by using the following formula $K=100W/L^3$ as given by Bagenal, 1978, where 'W' denotes weight of the crab in g and 'L' denotes the carapace length of the crab in mm. The strength of Length-weight relationship is determined by coefficient of determination (r^2)

and slope value ($b =3$) is tested by t- test at ($p=0.05$) level of significance.

Results and Discussion

S. spinigera possess brownish yellow, orange, brown or dark brown carapace colour and orange to brown chillete colour. The carapace texture of the crab is very much oily. A large 'V' shaped patten with dark brown spot present on the carapace of the crab. The dorsal and ventral views of the male and female crab are shown in fig.1.

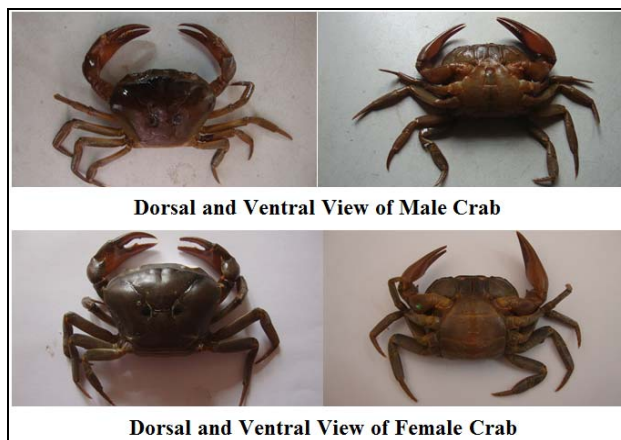


Fig 1: The dorsal and ventral views of the male and female crab

A total 347 crab specimens were collected and analysed among which 138 males (39.77%) and 209 females (60.23%). The sex ratio of the crab during the year of study was Male: Female = 1: 1.51. The percentage occurrence of male and female crabs and the sex ratio showed that the female population was greater than male population.

It was observed that the female possess a broader abdomen than that of the male. The descriptive statistics i.e. minimum, maximum and mean results for widths (mm), lengths (mm), Weights (g) and standard deviation (\pm SD) of carapace, abdomen and chelar propodous used in the analysis of length/width and weight relationships are given in table 1. The weight of female ranged between 5.72g to 33.63g whereas the weight of male ranged between 3.47g to 38.75g. From table 1 it is revealed that maximum number of crabs (203) found between the size group of 32 to 37 mm carapace length. The minimum number of crabs (8) found between the size group of 44 to 49 mm carapace length.

Table 1: Descriptive statistics of length weight characteristics of carapace of categories Male, Female, and Combined (weight in g, and length, width, and height in mm)

Parameters	WT (gm)	CL (mm)	CW (mm)	Ab L (mm)	Ab W (mm)	Ch L (mm)	Ch H (mm)
Female							
MAX	33.63	47	57	47	31	36	21
MIN	5.72	26	31	22	13	17	7
AVG	16.451	35.650	43.248	33.110	22.521	25.861	13.708
Male							
MAX	38.75	47	60	38	23	44	30
MIN	3.47	20	27	14	8	14	8
AVG	15.439	35.043	42.463	27.065	15.753	27.130	15.181
Combined							
MAX	38.75	47	57	47	31	44	30
MIN	5.72	26	31	22	13	17	8
AVG	16.451	35.650	43.248	33.110	22.521	25.861	15.181

The size distributions of male and female crab are presented in table 2. From the table 2 it is revealed that largest amount of male and female crabs were collected in the size range of

32-37 mm and smallest amount of crabs noticed in the size range of 20-25mm. The size wise occurrence of male and female crabs are illustrate in fig 2.

Table 2: Size wise distribution of crabs

Size group (mm)	Male (No)	Female (No)	Total No. of Crabs
20-25	5	0	5
26-31	22	22	44
32-37	75	128	203
38-43	30	57	87
44-49	6	2	8

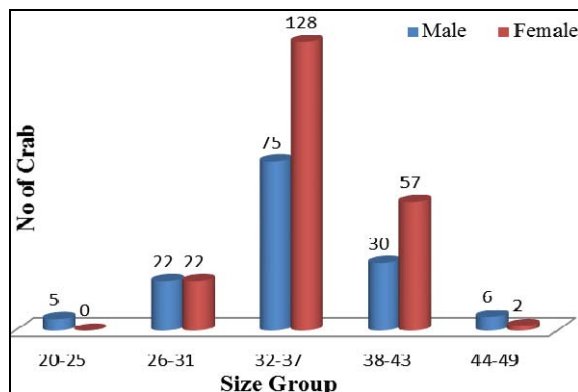


Fig 2: Size wise occurrence of male and female crabs

The Correlation coefficient r^2 was used as an indicator of the quality of the linear regressions (Scherrer *et al.* 1999). Table 3 showing a high degree of correlation between r and r^2 parameters. The result justified the fact that there was a strong significant relationship between length and weight of *S. spinigera*. In the present study higher regression coefficient ($b < 3$) were recorded for both the sexes and combined sex and it was an indication of negative allometric growth. The similar result were observed in case of *Barytelphusa gurini* of

Badagry, Lagos and Lekki lagoons [20]. Scatter diagrams each for carapace length/width and weight in respect to *S. spinigera* was obtained of male, female and combined crabs (fig. 3-5). From the closeness of the scatter diagram and from the parabolic nature of the plot, it is clear that there is a good relationship between every variables of the crab and also the suitability of fitting the exponential formula, $W = aL^b$ to the data.

Table 3: Relationship between carapace length, width and weight of crabs:

Variation	Sex	Equation	Regression statistics	
			R	R
Carapace length/weight	Male	$\text{Log } W = - 2.331 + 2.267 L$	0.858	0.736
	Female	$\text{Log } W = - 2.966 + 2.687 L$	0.900	0.810
	Combined	$\text{Log } W = - 2.625 + 2.463 L$	0.876	0.769
Carapace width/weight	Male	$\text{Log } W = - 2.993 + 2.558 L$	0.925	0.857
	Female	$\text{Log } W = - 2.732 + 2.406 L$	0.858	0.736
	Combined	$\text{Log } W = - 2.886 + 2.497 L$	0.893	0.797
Carapace length / carapace width	Male	$\text{Log } W = 0.292 + 0.864 L$	0.903	0.816
	Female	$\text{Log } W = 0.166 + 0.946 L$	0.889	0.791
	Combined	$\text{Log } W = 1.606 + 0.015 L$	0.014	0.0002

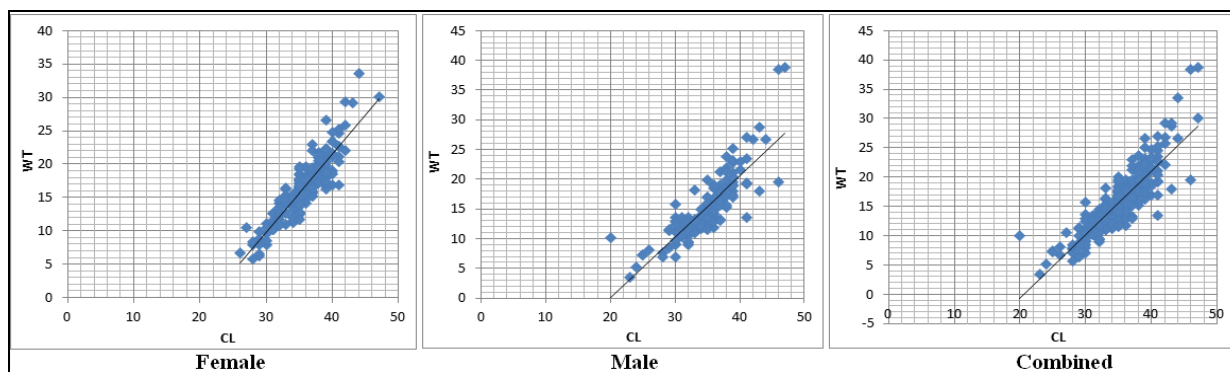


Fig. 3: Logarithmic relationships between Carapace length–weight of *S. spinigera*

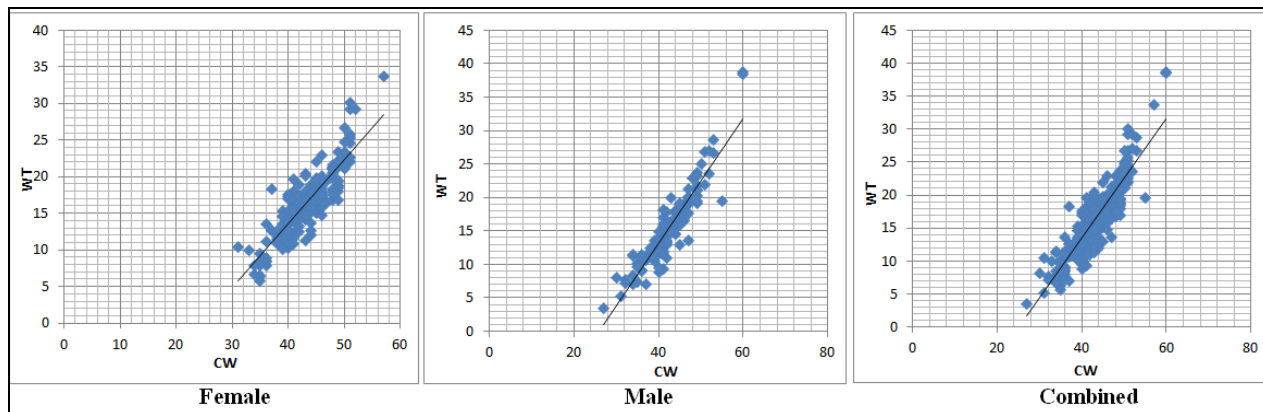


Fig. 4: Logarithmic relationships between Carapace width–weight of *S. spinigera*

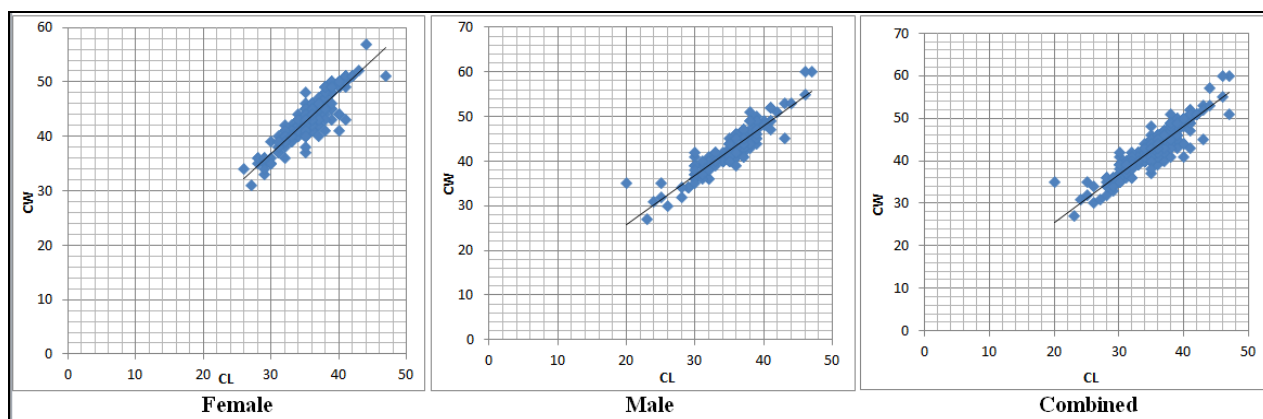


Fig. 5: Logarithmic relationships between Carapace length–width of *S. spinigera*

The variation of condition factor reflects information on the physiological state of the crab. The mean K value was calculated of male, female and combined sex for carapace length/weight is mentioned in table 4. The condition factor indicated the good physiological condition like well growth, good L-W relationship of the crab in East Kolkata Wetland area. It was observed that the mean K value of male crabs was little better than female crabs.

Table 4: K value (Condition factor) for carapace length/weight of crabs

Variation	Sex	K value
Carapace length/weight	Male	2.26
	Female	2.16
	Combined sex	2.16

Conclusion

This is the first report on the biology and length-weight analysis of *S. spinigera* from India especially from West Bengal. Present study indicates the negative allometric growth of the crab. But the high K value indicates good health condition of the studied crab from East Kolkata Wetland. The results of the study will definitely be useful for conservation and judicious utilisation of wood mason crab, *S. spinigera*.

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