CHAPTER FOUR

MATERIALS AND METHODS OF BIOLOGICAL PARAMETERS

CHAPTER – IV

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BIOLOGICAL PARAMETERS

4.1 : BIOLOGICAL STUDIES ON FOUR *Macrobrachium* SPECIES

A selective studies on the biology of four *Macrobrachium* species also done which include *M. birmanicum choprae, M. malcolmsonii* mostly of running water and *M. dayanum* and *M. assamensis* mostly of standing water system. Studies were made on the following parameters-

4.1.1: Length – Weight Relationship :

Macrobrachium species were collected during the year 2004 to 2006. The collection were done in different seasons viz. Pre-monsoon, Monsoon and Retreating monsoon. A total of 20 prawns of each variety were measured for total length and weight using measuring board and top pan balance after removing excess water from the body (king, 1966) and data were recorded to the nearest decimal point.

t-test: t-test for difference of means for length and weight with reference to two different places were calculated by using the following formula.

$$t = \frac{|x - \tilde{Y}|}{S \sqrt{1/n_1 + 1/n_2}}, \text{ at 5\% probability level for } (n_1 + n_2 - 2)df.$$

$$\text{Where, } S^2 = \frac{1}{n_1 + n_2 - 2} \left[\sum(x_i - x)^2 + \sum(Yi - \tilde{Y})^2 \right].$$

The t-test for significance of coefficient of correlation was calculated by using the formula

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \text{ and tested at 5\% probability level for } (n-2) df.$$

4.1.2 : Regression analysis for length weight relationship :-

The length –weight relationship were found out using the following formula, where "a" and "b" constant (Huxely, 1924)

$$W = a L^b$$

Coefficient of correlation :

Coefficient of correlation was calculated using the following formula

$$r = \frac{N\sum X_i Y_i - \sum Y_i}{\sqrt{\{N\sum X_i - (\sum X_i)^2\} \{N\sum Y_i - (\sum Y_i)^2\}}}$$

Where,   R   =   coefficient of correlation

N   =   number of observation

X_i =   values of independent factors

Y_i =   values of dependent factors

Co-efficient of variation: This co-efficient of variation was calculated using the following formula (Wilks, 1962)

$$CV = \frac{\sigma}{x} \times 100$$

4.1.3 : Confidence limit :

Confidence limit for co-efficient of co-relation was calculated using the formula

$r \pm 1.96 \ [\ (1-r^2)/\sqrt{n}]$ where n= number of observation.

4.1.4 : Conditions factor:

The *condition factors* or *K-factor* or *ponderal index* were calculated using following formula.

$$K = \frac{W \times 10^5}{L^3}$$

Where,   K = condition factor

W = weight of the fish

L = length of the fish

4.2 : Reproductive biology

4.2.1. Morphological observation of gonads :

The morphological observation of developments of gonads during pre-breeding and post-breeding were carried throughout the year during which usually development of gonads took place.

4.2.2. Gonadosomatic index (GSI):

To calculate gonadosomatic index 10 prawns were taken in each month from January until December and total body weight and weight of testes and ovary were taken. The GSI or K= value was calculated using the following formula.

$$GSI = \frac{\text{Weight of gonads} \times 100}{\text{Total body weight}}$$

4.3. : Relative gut length (RGL) value :

The relative gut length (RGL) value is an index that gives an idea about nature of food which the *Macrobrachium* species feeds on. The RGL value was calculated by taking into account the ratio of gut length and body length.

$$\text{RGL} = \frac{\text{Length of the gut}}{\text{Total body length}}$$

4.4 : ESTIMATION OF TRACE ELEMENTS:

Zinc, Iron and Copper

In all the four varieties viz. *M. birmanicum choprae*, *M. malcolmsonii*, *M. dayanum* and *M. assamensis*, these three trace elements were estimated. The estimation was carried out both in muscles and carapace.

For the analysis of the trace elements (Zinc, Irons and Copper) 500mg of dry tissue was talren and digested with nitric acid, perchloric acid and sulphuric acid to the ratio of 10:4:1 respectively. After the digestion, distilled water was added to make 50ml/. The analysis of the trace elements was done by Atomic Absorption Spectrophotometer (GBC-932) using atomic absorption anaylyzer model (Hitachi 207)

The concentration of the elements was measured by extent to which the beam of energy is attenerated and calculation was done as follows:

$$\frac{\text{Reading of unknown}}{\text{Reading of known}} \times \text{Standard} \times \frac{\text{Vol. of digested material}}{\text{Weight of dry tissue}}$$

The quantity of trace elements were expressed in micorgram per gram of dry tissue which is known as Aliquotc.

PLATE - 1
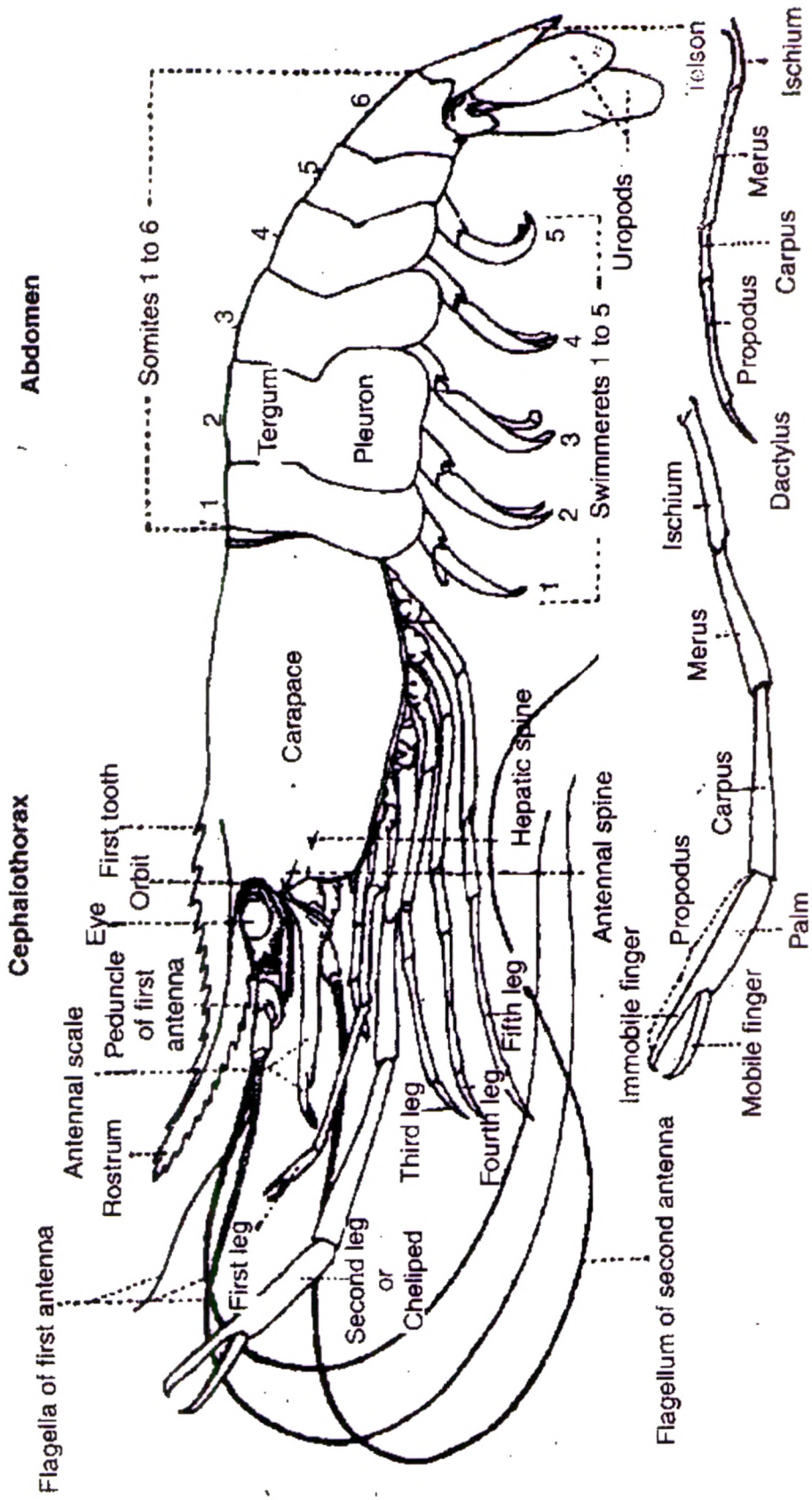
Morphology of a typical *Macrobrachium* spp.