

GROWTH AND MORPHOMETRIC CHARACTERISTIC IN THE HORSE-SHOE CRAB, *CARCINOSCORPIUS ROTUNDICAUDA* (LATREILLE) FROM CANNING (WEST BENGAL), INDIA

A. Chatterji, R. Vijayakumar and A. H. Parulekar

National Institute of Oceanography, Dona Paula, Goa-403 004, India

(Received April 13, 1988; revised June 27, 1988)

A significant relationship was observed between carapace length – body weight/carapace width/carapace weight and body weight – carapace weight of the horse-shoe crab, *Carcinoscorpius rotundicauda* (Latreille). Increase in weight was found to follow the cube law in females. The two curves of males and females intersected between the carapace length 130-135 mm which showed the length at which the animal attained sexual maturity. The carapace width grew faster at higher carapace length in females as compared to males whereas, carapace weight in males was more at higher carapace length.

Key words: Growth, Morphometric characteristic, *Carcinoscorpius rotundicauda*.

INTRODUCTION

A discrete population of the horse-shoe crab, *Carcinoscorpius rotundicauda* (Latreille) is abundantly found from Digha (Lat 21° 40' N; Long 87° 40.5' E) to Canning (Lat 22° 19' N; Long 88° 39' E) in West Bengal along the east coast of India. Maximum density of this species observed at Canning in the Sunderbans area of the West Bengal. Considering the phylogenetic and economic importance of the horse-shoe crab for human use [1], an attempt was made to study the eco-biology of the species in Indian waters. The present paper deals with the growth of *C. rotundicauda* as assessed from carapace length and body weight relationship.

MATERIALS AND METHODS

Samples were collected in the months of May and November, 1985 during the extreme high waters spring tide by a shore seine in Bohugankhali estuary at Canning, West Bengal. A total of 305 specimens of the horse-shoe crab of both the sexes (139 males between 127-184 mm and 166 females between 110-212 mm in size) were analysed. The total carapace length and carapace width of each of the crab (Fig. 1) was recorded to the nearest mm by Vernier Calipers. Body and carapace weights were recorded to 0.1 g on a single pan balance. The animals were grouped into males and females [2] and the relationships between carapace length – body weight/carapace width/carapace weight and body weight – carapace weight, were estimated by the method of least square. In each relationship, carapace length of the crab was considered as a basic index. The regression equation $\text{Log } W = a + n \text{ Log } L$ was calculated

separately, for each relationship for both the sexes and a straight line was fitted to the scatter diagram.

RESULTS AND DISCUSSION

A linear relationship was observed after logarithmic transformations of the values of body weight and carapace length (Fig. 2). The regression equation calculated for this relationship is expressed as:

$\text{Log B.W.} = - 6.069 + 3.893 \text{ Log C.L.}$ ($r=0.97$) where B.W. and C.L. are the body weight and carapace length of the female of horse-shoe crab, respectively.

The carapace length and body weight relationship, in females, showed that the weight of the crab increased gradually more than the cube of the carapace length. In males, the body weight – carapace length relationship was not followed the cube law but observed to be highly significant and expressed as:

$\text{Log B.W.} = - 2.080 + 2.206 \text{ Log C.L.}$ ($r=0.97$)

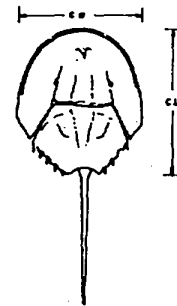


Fig. 1. Dorsal view of the horse-shoe crab, *Carcinoscorpius rotundicauda*.

Females of the horse-shoe crab were found to be lighter than the males upto the size of 130 mm as against heavier females in higher length group. The linear curves of both the sexes intersected at a point between the carapace length 130-135 mm. The point of intersection of the two curves of length and weight relationship of male and female is presumed to indicate the length at which the animal attains sexual maturity [3, 4 and 5]. In the present study, the horse-shoe crabs having carapace length of more than 130 mm harboured ripe eggs in body cavity. It confirms that the crab between the carapace length of 130-135 mm attains sexual maturity. This aspect needs to be confirmed further, from the study of maturation and spawning periodicity.

The carapace width upto 130 mm size of the crab was observed to be less in females than in males (Fig. 2). The relationship in both the sexes was found significant and expressed as:

$$\text{Male: } \log C.W. = 0.258 + 0.876 \log C.L. \quad (r=0.98)$$

$$\text{Female: } \log C.W. = 1.243 + 0.452 \log C.L. \quad (r=0.98)$$

where, C.W. is the carapace width of the horse-shoe crab.

The relationship shows that carapace width in females grow slowly as compared to males in relation to smaller length, whereas, faster at higher carapace lengths. The higher carapace width in females at higher carapace length is probably due to enlargement of ova which occupy a major portion of the body cavity of the crab.

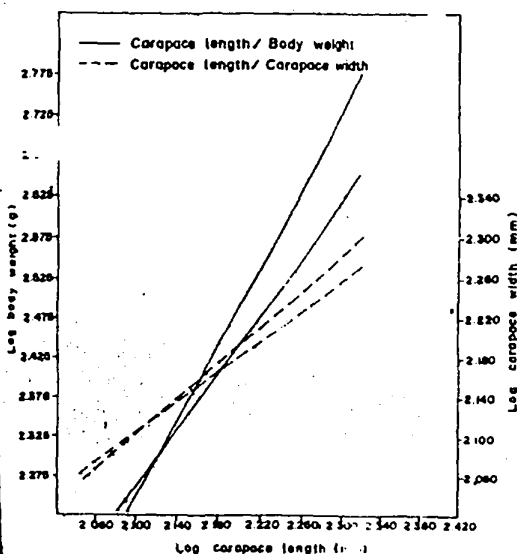


Fig. 2. Log carapace length - Log body weight/Log carapace width relationship of male and female of *C. rotundicauda*.

A significant relationship was observed between the carapace length and carapace weight and expressed as:

$$\text{Male: } \log C. Wt. = 0.786 + 1.298 \log C.L. \quad (r=0.97)$$

$$\text{Female: } \log C. Wt. = 0.127 + 0.852 \log C.L. \quad (r=0.96)$$

where, C.Wt. is the carapace weight of the horse-shoe crab.

The regression equation describes this relationship more vividly in males as compared to the females. Carapace weight was found to be higher carapace length (Fig. 3). The carapace weight in males was found heavier than the females as compared to the body weight. The equations describing these relationships are as follows:

$$\text{Male: } \log B.W. = 0.576 + 0.605 \log C. Wt. \quad (r=0.95)$$

$$\text{Female: } \log B.W. = 0.790 + 0.623 \log C. Wt. \quad (r=0.99)$$

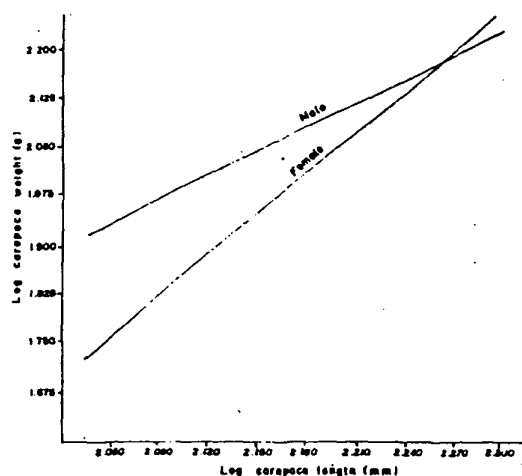


Fig. 3. Log carapace length - Log carapace weight relationship of male and female of *C. rotundicauda*.

Acknowledgements: The authors are thankful to Dr. B. N. Desai, Director, N.I.O. for encouragements and Mr. A.V. Modi, M.D. Unichem Laboratories, Bombay for financial support.

REFERENCES

1. A. Rudloe, *Biomedical Applications of the Horse-shoe Crab* (Limuliidae) (E. Cohen, ed. Alan R. Liss. Inc., New York, 1979).
2. K. V. Ramarao and K.V. Suryarao, *Proc. Indian Acad. Sci.*, **38**, 206 (1972).
3. Y.H. Olsen and D. Merimann, *Bull. Bingham Oceanogr. Coll.*, **9**, 1 (1946).
4. A. Chatterji, A.Q. Siddiqui and A.A. Khan, *Proc. Indian Acad. Sci.*, **86**, 189 (1977).
5. A. Chatterji, M. Ali and A. Mumtaz, *Indian J. Fish.*, **27**, 261 (1980).