

**OXYGEN CONSUMPTION AND METABOLIC RATE IN RELATION TO BODY SIZE IN
MARTESIA STRIATA (LINN.)**

STUDIES on the oxygen consumption of marine wood boring organisms are very few¹⁻⁴. Eltringham⁴ recorded consumption of oxygen in relation to salinity in a crustacean wood borer *Limnoria*. Lane and Co-workers^{1,2} examined the oxygen consumption of both adult and larval forms of molluscan wood borer *Teredo*. In India, respiratory studies on the pholad wood borer *Martesia fragilis* in relation to body size have been undertaken from Madras harbour³. Water filtration rate of another pholad *M. striata*, of Visakhapatnam, has been studied by Nagabhushanam⁵, but the relationship between body size and oxygen consumption of this local species is not known. In the present investigation, work was therefore initiated to examine the respiration of *M. striata* (Linn.) and to determine the metabolic rate in relation to body size.

Animals of different sizes were removed from the timber exposed at Visakhapatnam harbour without damaging their shell and the experiments were conducted at temperature $25^{\circ} \pm 0.5^{\circ} \text{C}$. Animals (0.077 g to 1.02 g) were taken in individual respiratory chambers and the total oxygen consumed was determined at the end of four hours.

The relationship between the body size and oxygen uptake has been obtained from the following equation⁷:

$$Y = a.X^b$$

where Y = oxygen consumption in ml/hr, X = the body weight, while a & b are constants.

The value of b in the above equation was determined to be 0.5665 and is thus nearer to the two-thirds power of body weight. A regression curve of oxygen consumption to body size (Fig. 1)

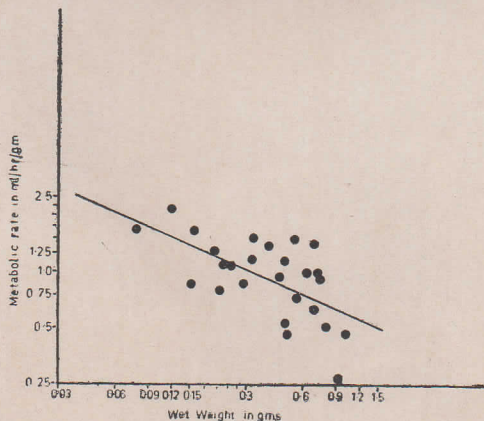


FIG. 1. Double log plot of oxygen consumption vs body weight in *Martesia striata*.

shows that the oxygen consumption of animal increases with an increase in the size. The oxygen consumption varied from 0.131 to 0.7880 ml/hr in the various size groups examined. The oxygen consumption per unit weight or metabolic rate varied from 0.2664 to 2.202 ml/gm/hr being inversely proportional to the body size (Fig. 2).

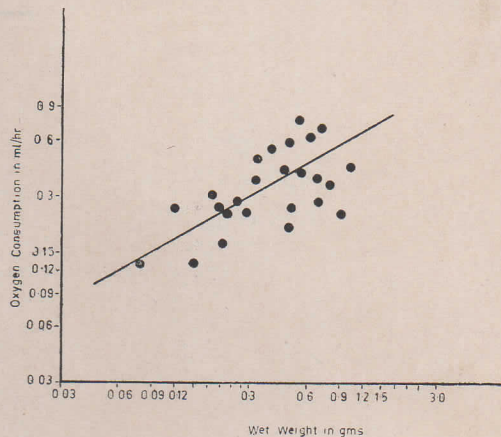


FIG. 2. Double log plot of metabolic rate against body weight.

Although oxygen consumption in *M. striata* shows an exponential relationship to body size, in the same size group itself great variations were evident (Fig. 1). Ghiretti⁸ observed that metabolic rate varied widely within a single species as a result of both intrinsic and extrinsic factors in molluscs. Further even under constant external conditions, the oxygen consumption of a given specimen is extremely variable⁸. The variations recorded in the experiments therefore do not show tendencies unusual to bivalves. The value of b observed in the present studies was also found to be very close to the value obtained for an allied wood borer *M. fragilis* earlier³.

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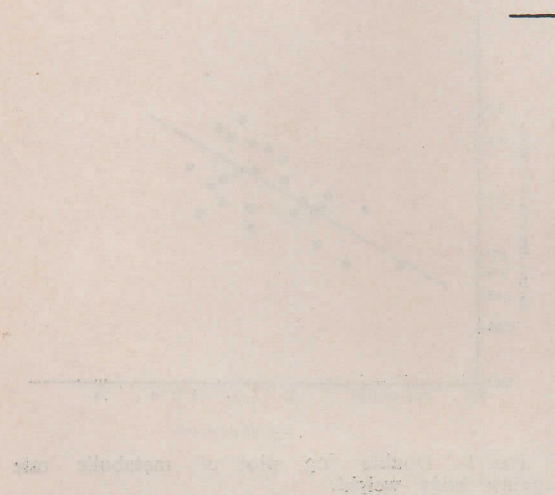
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1. Lane, C. E. and Tierney, J. Q., *Bull. Mar. Sci.*, 1951, 1, 104.
2. —, — and Hennacy, R. H., *Biol. Bull.*, 1954, 106, 323.

3. Srinivasan, V. V., *Proc. Indian Acad. Sci.*, 1966, 62 B, 273.
 4. Eltringham, S. K., *J. Mar. Biol. Ass. U.K.*, 1965, 45, 145.
 5. Nagabhushanam, R., *Proc. Indian Acad. Sci.*, 1956, 43 B, 223.
 6. Ganapati, P. N. and Prasada Rao, D. G. V., *J. Animal Morph. Physiol.*, 1960, 7, 27.
 7. Zeuthen, E., *C.R. Lab. Carlsberg, Ser. Chim.*, 1974, 26, 17.
 8. Ghiretti, F., *The Physiology of Mollusca*, Vol. II, Academic Press, New York, 1966, p. 175.

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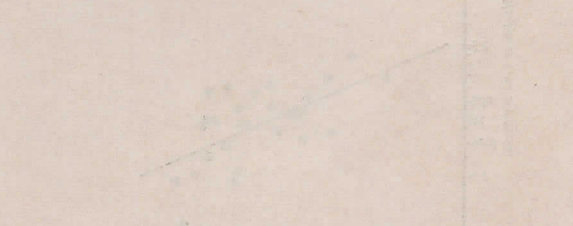


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