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1. Although much of the evidence for cyclically repetitive behavioural patterns and their control mechanisms in animals have been obtained from terrestrial forms, information on rhythmicity of activity in fishes is accruing rapidly only in recent years. The fish, *Tilapia mossambica* forms a comparatively cheap source of protein and any information on the nature of biological rhythm in this species will be of considerable economic importance and hence the present study was initiated.

2. The oxygen consumption, which was taken as a parameter to measure the nature of physiological rhythm showed two peaks in a day, one at 1200 hours and another at 2400 hours. The amplitude of the daytime peak was higher in young ones and the night time peak was higher in comparatively older individuals.

3. The rates of feeding, oxygen consumption, absorption and conversion were higher in lower weight groups whereas these rates were comparatively lower in the higher weight groups.

4. The pattern of oxygen consumption, rates of oxygen uptake, feeding, absorption and conversion didn't show significant variation between male and female individuals.
5. The pattern of oxygen consumption rhythm was not affected by the number of individuals in a group. The amplitude of the rhythm, the rates of oxygen uptake and feeding were increased with increasing number of individuals/group, whereas the conversion rate didn't show significant difference.

6. Under natural light conditions (LD), the rate of oxygen consumption exhibited the basic bimodal pattern. The test individuals consumed $3.89 \pm 0.26$ ml/g/day oxygen, $46.31 \pm 1.81$ mg/g/day food and converted $11.35 \pm 0.07$ mg/g/day into body weight.

7. Under constant light condition (LL) the oxygen consumption rhythm of higher weight group didn't show much variation whereas in lower weight groups the peak rates of oxygen consumption were advanced by 3 h. Rates of feeding and oxygen consumption were maximum but the conversion rate was lesser than that of the 'control' group.

8. Under continuous dark conditions (DD) the higher weight groups showed the basic bimodal pattern as in control whereas the young ones showed a delay of 3 h, in their peak pattern. The rates of oxygen consumption and conversion were minimum in this group. Under reversed light conditions the fish showed the bimodal oxygen consumption and the rate at night times was higher. The feeding/conversion rate were comparatively lesser.
9. The oxygen consumption rhythm was not much affected by the temperature within the range of 10°C. The amplitude of the rhythm was higher at 29°C and lower at 19°C when compared to that at the normal environmental temperature (24°C).

10. The maximum conversion rate was recorded at the environmental temperature (24°C) than at 29°C where the fish consumed more oxygen and more food. At low temperature (19°C) the fish consumed less oxygen, less food and hence the conversion rate also was less.

11. When fed with different qualities of food such as goat-liver, mutton, groundnut cake, biscuit and Spirogyra maxima, the basic pattern of oxygen consumption was not affected. But the amplitude of the rhythm increased with increasing complexity of the food.

12. The rates of feeding, absorption and conversion also increased in the following order of food quality $S$. maxima $\rightarrow$ biscuit $\rightarrow$ groundnut cake $\rightarrow$ mutton $\rightarrow$ liver.

13. The basic pattern of rhythm was not affected when fed with different rations of goat-liver. The amplitude of the rhythm decreased with decreasing percentage of ration and weight gain of the individuals were also in line with oxygen uptake.
14. The oxygen consumption rhythm was affected by time of feeding of the day. The fish fed at 1500 hours showed an additional peak at 1800 hours. Likewise the group which received food at 0300 hours showed an additional peak at 0600 hours.

15. The oxygen consumption was maximum when the individuals were fed at 1200 hours and minimum when fed at 2400 hours. The maximum conversion rate was recorded for the group fed at 0900 hours.

16. The amplitude of the oxygen consumption rhythm increased with increasing frequency of feeding. The rate of oxygen consumption and feeding rate also increased with increasing frequency. But the conversion rate recorded was maximum in the group which received its meal for three times in a day.

17. The oxygen consumption rhythm was affected by food deprivation. The amplitude of the rhythm decreased with increasing hours of food deprivation. The rhythm pattern flattened when they were starved to the extent of 216 hours.
18. Daily fluctuations in the levels of blood glucose showed a bimodal rhythm similar to that of the oxygen consumption rhythm. The day time peak was much higher in amplitude than the night time peak.

19. Plasma chlorides showed circadian variation. A prominent single peak at 1200 hours was observed.