

A REPORT OF THE EFFECT OF SOLAR ECLIPSE ON AN INDIAN TELEOST, *CHANNA PUNCTATUS* (BLOCH)

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Effect of solar eclipse on the behaviour, feeding habit and certain haematological parameters were studied in an air breathing teleost, *C. punctatus*. The fishes initially showed excitement but later on they settled down. During eclipse the fishes took less food. Blood glucose level at the end of eclipse increased whereas R.B.C. count and haemoglobin content of blood showed a significant decrease. No marked change was noticed in blood clotting time.

INTRODUCTION

Blood is important in the maintenance of physiological activities of life. The effect of various environmental factors such as temperature (Dewilde & Houston, 1967; Miles and Smith, 1968; Farghaly *et al.*, 1973; Denton & Yousef, 1975; Pandey *et al.*, 1976), photoperiod (Choubey *et al.* 1976), dissolved oxygen content of water (Hughes, 1964; Starmach, 1967), salinity (Farghaly *et al.* 1973; Pandey 1975), age, body size and weight (Dube & Munshi, 1973; Pandey *et al.*, 1975; Munshi *et al.*, 1975; Pandey *et al.*, 1976), physiological changes during breeding period (Pandey, 1977), stress of various kinds (Houston & Dewilde 1969) on fish blood have been investigated. These works on fish blood indicate a wide range in the haematological parameters in different species of fish and at times are controversial.

Solar eclipse of about 85% occurred on 16.2.1980 between 2.44 P.M. to 5.45 P.M. at the place of experiment. The present paper reports the changes in behaviour, blood glucose content, R. B. C. number and blood clotting time during eclipse and immediately after that and appears to be the first work of its kind.

MATERIAL AND METHODS

Apparently healthy looking adult specimen of both sexes of *Channa punctatus* (Bloch) of weight ranging from 100-120 gms and of length varying from 20-22 cms were obtained from local market. They were kept in 50 litres

glass aquaria and were left for seven days to recover from asphyxia suffered from transportation and to acclimate to the laboratory conditions. During this period the fishes were fed with goat liver, earthworms and minced fish *ad libitum*. The initial level of different blood parameters considered in this work were obtained on laboratory conditions. The control value was obtained by exposing the fish to sun light exactly in the same time and hour of the day in which eclipse was to occur. The experimental fish were exposed to the sun during the period of eclipse. A set of thirty fish, each for establishing initial control, experimental control and for experiment were used.

The erythrocyte count was made by improved Neubauer haemocytometer, haemoglobin was determined by Sahli's method, coagulation time by Wright's method (Dacie & Lewis, 1963) and glucose by Folin & Wu method (Varley, 1975). Blood was collected by cutting the caudal region near the anal fin.

RESULTS

It is evident that the experimental control fish showed a slight hyperglycemia over those of initial control in both males and females. This hyperglycemic condition was very much evident and significant (0.1%) in the fishes of both sexes after exposing them to the solar eclipse (Fig. 1). R.B.C. count of blood also showed the increase in number of erythrocytes in experimental fish of both sexes (Fig. 1). This fall was significant (5%) in both males and females. Increase in haemoglobin content was also noted in experimental control over the initial control in both sexes but this increase did not persist in experimental fish and a fall was noticed. The fall, though significant in both sexes, was less in male (1%) than in females (0.1%). No marked change was noticed in blood coagulation time of either sex (Fig. 2). The initial control, experimental control and experimental fish always showed that females had higher, though nonsignificant value as compared to males.

No detectable change in the behaviour of experimental control and initial control fish was marked but when exposed to eclipse the fishes showed active movement in the aquarium. Then gradually they became sluggish and finally settled down at the bottom. It was also noticed that during eclipse the fishes took lesser amount of food than their usual quota.

REMARKS

Blood glucose increased sharply immediately after the eclipse. This result may be due to circadian variation in the species studied. Harding *et al.* (1932) in man and Allcroft & Strand (1933) in sheep have observed higher glucose

level in the afternoon. Circadian variation in blood glucose level has also been reported by Narasimhan & Sundraraj (1971) in *Notopterus notopterus*. The rise in blood glucose level in this species after about three hours of eclipse could be a combined effect of circadian variation and excitation caused by unprecedented darkness.

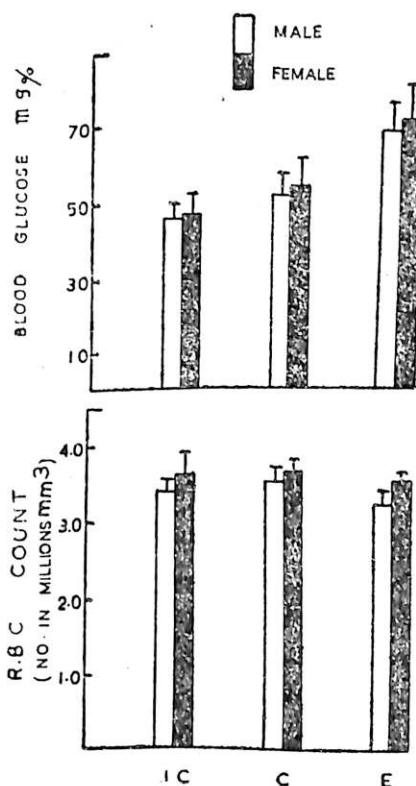


Fig. 1. Histogram showing the mean blood glucose level and erythrocyte number of initial control (IC), experimental control (C) and solar eclipse affected (E) in *Channa punctatus*.

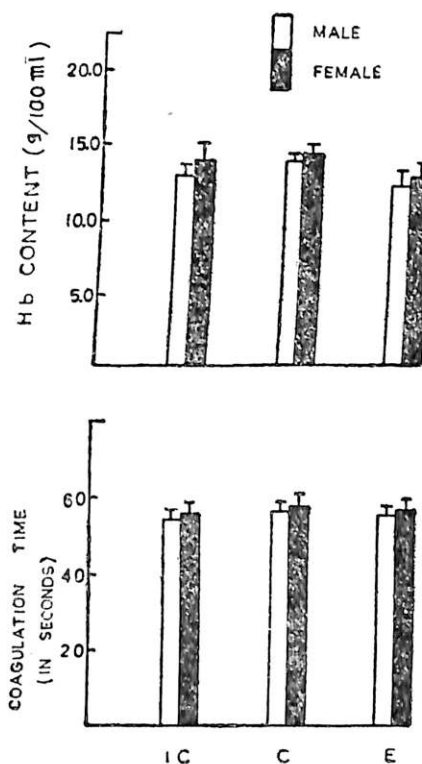


Fig. 2. Histogram showing the mean haemoglobin value and clotting time of initial control (IC), experimental control (C) and solar eclipse control (E) in *Channa punctatus*.

A rise in R.B.C. number and haemoglobin content was observed in control fish. The rise in water temperature due to sun light may be considered the likely reason for these increases, a view which tallies with those of Farghaly *et al.* (1973). Pandey *et al.* (1976) also noticed an increase at a nonsignificant level with increasing temperature. Platner (1950) in *Carassius auratus* found that oxygen dissolves more in water of low temperature, hence the fishes in cooler water need less of haemoglobin. Darkness caused lowering of water temperature of the aquarium causing the changes in R.B.C. number and haemoglobin content. Inactiveness of the fish also may be one of the causes of low haemoglobin since at resting phase fishes need less oxygen.

The decrease in the consumption of food by fishes during eclipse could be due to the diurnal nature of the fish. The temporary appearance of darkness by eclipse first created an excitement in fish due to unusual shortening of the day but later on they settled down. This also affected their normal behaviour.

The present study thus is a basic report and may be concluded that whatever changes occurred in the behaviour and blood parameters of *C. punctatus* was as a result of the solar eclipse and can be explained only on the basis of physiological changes due to change in the surrounding environment.

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