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Fish physiology

SEASONAL VARIATIONS IN THE HAEMOGLOBIN CONCENTRATION  
AND HAEMATOCRIT VALUES OF *SILURUS TRIOSTEGUS*

SEZONOWE ZMIANY KONCENTRACJI HEMOGLOBINY I WARTOŚCI  
HEMATOKRITU U *SILURUS TRIOSTEGUS*

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The peak values of haemoglobin concentration and haematocrit value in *Silurus triostegus* were found to be 9.42 g/100 ml and 25.23 respectively, for the males. For the females fish were 9.40 g/100 ml and 25.20 respectively. They were observed during the month October of the year. A marked decrease was observed in the value of the two parameters in April where the fish pass the maturation period. During the hot months of the year the haemoglobin concentration and haematocrit value show higher values than the cold months.

## INTRODUCTION

It is well documented that the environment is considered as one of the most important factor that affect the physiology of the fish and that haematological parameters can give an indication of the patho-physiological state of the animal (Blaxhall & Daisly, 1973). No observations concerning the normal seasonal effects on the haematology of the silurid fish, *Silurus triostegus* are available. The works of Al-Hassan and Al-Abood (1988) and Al-Abood and Al-Hassan (1988) are considered the only works on the haematology of *S. triostegus* in the vicinity of Basrah. On the other hand, seasonal variations study was very well recorded for several other fish species (Fourie & Hattingh,

1976; Fourie & Vuren, 1976; Raizada et al., 1983; Anderson et al., 1985; and Hameed & Jiad, 1986).

The aim of the present study is to make a brief account of the haematological estimation of *S. triostegus* during different months of the year and to see whether the haemoglobin concentration and haematocrit values may be used as an early indicator of breeding activity.

## MATERIALS AND METHODS

The fish used in the present study were caught each month in the Shatt al-Arab River, north of Basrah city during the period March 1988 to February 1989.

For haemoglobin concentration estimation, blood was drawn into tubes containing EDTA as an anticoagulant either by a heart puncture (for large fish) or by the severing of the peduncle (for small fish). The haemoglobin concentration per 100 ml. of blood was determined by Sahli's haemometer as described by Radzinskaya (1966) and by Pandey et al., (1976). For haematocrit value determination, the blood was drawn into microhaematocrit tubes containing EDTA as an anticoagulant. The blood samples were centrifuged for 5 min at 3000 rpm. Haematocrit values were determined according to the method of Blaxhall and Daisly (1973).

## RESULTS AND DISCUSSION

The haemoglobin concentration and haematocrit value showed a marked variation in male and female fishes throughout the year. In male, the haemoglobin concentration and haematocrit value varied from 7.54–9.42 g/100 ml. and 22.64–25.23 respectively, while in females they varied from 7.50–9.40 g/100 ml. and 22.60–25.20 respectively (Table 1). The peak values for those two haematological parameters were 9.42 g/100 ml., 25.23 in the males and 9.40 g/100 ml and 25.20 in the females respectively were recorded during October. This peak in the proceeding months showed a registered fall till April. Later on in May they starts to take values higher than April. Haemoglobin concentration and haematocrit values were generally higher in males in all the months of the year than females (Table 1).

During the life cycle of the fish, blood undergoes regular changes of haemoconcentration and haemodilution. These changes are mainly affected by the ecophysiological conditions of the fish (Khan, 1977 and Joshi & Randon, 1977). Different workers reported different time for the presence of the peak of the two haematological parameters in question. Chanchal et. al. (1979) reported that the fish, *Anabas testudeneus* shows the peak values of haematocrit value in May and October. On the other hand, Joshi & Tandon (1977) observed the peak values in May for *Heteropneustes fossilis* and *Mystus vittatus*. In the present study, the peak of both haemoglobin concentration and haematocrit value for

Table 1

Monthly variations in the haemoglobin concentration and haematocrit value of *Silurus triostegus*. M = males; F = females; Hb = haemoglobin concentration; Ht = haematocrit value

	M		F	
	Hb	Ht	Hb	Ht
March	7.94	22.70	7.92	22.67
April	7.54	22.64	7.50	22.62
May	8.53	24.30	8.50	24.28
June	8.54	24.30	8.51	24.27
July	8.56	24.28	8.54	24.26
August	8.59	24.20	8.58	24.19
September	9.00	24.26	8.94	24.23
October	9.42	25.23	9.40	25.20
November	8.20	25.10	8.15	25.09
December	8.10	24.98	8.09	24.96
January	8.00	24.94	7.97	24.92
February	7.98	24.80	7.94	24.76

both sexes was in October and this coincide with the results of Chanchal et. al. (1979) and Raizaca et. al. (1983). The peak in October may be suggested due to the favourable conditions of the environment and the higher metabolic activity of the fish, which lead to the more intake of food. The lowest values obtained in March and this could be due to the begining of the maturation period. It istrue that when the gonads are fully developed, fish consume very little amount of food because the major part of the body cavity is filled up by the developing gonads, resulting in low values of haemoglobin concentration and haematocrit. Lysaya (1951), Robertson et al. (1961) and Hulton (1967) have reported the same observations on Salmon undergowing spawing migration. The lower values during the cold months may be associated with the cold waether when the primary food production as wellas the metabolic rate of the fish slows down, resulting in low consumption of food. The higher haematological values during the summer months could be attributed to the increase in the level of adrenaline and nor adrenaline hormones due to the changes in the environment (Nakano a. Tomlinson 1967).

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SEZONOWOŚĆ ZMIANY KONCENTRACJI HEMOGLOBINY I WARTOŚĆ  
HEMATOKRITU U *SILURUS TRIOSTEGUS*

STRESZCZENIE

Autorzy przebadali poziom hemoglobiny i wartość hematokritu u *Silurus triostegus* w ciągu roku. Stwierdzono zmiany ilościowe w ciągu poszczególnych miesięcy i to zarówno u samców jak i samic.

Poziom hemoglobiny jak i wartość hematokritu były ogólnie wyższe u samców (p. tabela). Najwyższe wartości występowały w listopadzie, a najniższe w kwietniu. Najwyższe wartości dotyczyły miesięcy letnich.

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