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CLOTTING TIME AND HAEMATOCRIT OF "DOURADO", *Salminus maxillosus*, AND CARP, *Cyprinus carpio*

[Tempo de coagulação e hematócrito de dourado, *Salminus maxillosus* e carpa, *Cyprinus carpio*]

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ABSTRACT

In July 1997, seventeen adult specimens of "dourado", *Salminus maxillosus* Valenciennes, 1840, were captured in the Mogi Guaçu River, Pirassununga, SP, and in April 1998, twenty specimens of adult carp, *Cyprinus carpio* Linnaeus, 1758, were captured in Pedreira Station, Fishery Institute, SP, aiming to determine the clotting time (CT) and the haematocrit (Ht) of those species. The averages of haematocrit for the two species were calculated. CT of "dourado" varied from 56 to 472 sec, and the average of haematocrit was 40.53 ± 1.7%. Carp's CT ranged from 43 to 530 sec, with haematocrit average of 30.55 ± 4.2%.

Key words: clotting time, hematocrit, *Salminus maxillosus, Cyprinus carpio*

RESUMO

No mês de julho de 1997 foram capturados, no rio Mogi Guaçu, Cachoeira de Emas, Pirassununga, SP, dezessete exemplares adultos de dourado, *Salminus maxillosus* Valenciennes, 1840, e em abril de 1998, no Posto de Pedreira do Instituto de Pesca, SP, vinte exemplares adultos de carpa, *Cyprinus carpio* Linnaeus, 1758, com o objetivo de conhecer o tempo de coagulação (TC) e o hematócrito (Ht) dessas espécies. Calcularam-se as médias do hematócrito para as duas espécies. O TC do dourado variou de 56 a 472 s e o da carpa de 43 a 530 s. Quanto ao Ht os valores médios foram de 40,53 ± 1,7% e 30,55 ± 4,2%., para o dourado e a carpa, respectivamente.

Palavras-chave: tempo de coagulação, hematócrito, *Salminus maxillosus, Cyprinus carpio*

Introduction

One of the main functions of the blood is to maintain tissue stability, keeping constant internal body environment so that the normal physiological processes can happen. When there is an abnormal vascular condition, like an injury of blood vessel, there are certain processes that are altered to stop blood flood through the wall of the injured vessel. Those physiological alterations are called homeostasis.

Clotting time is a method to measure the quantity and quality of several factors that interfere in the homeostasis mechanisms. Any deviation at this time is indicative of a non perfect mechanism that may be inherent or due to several other factors as: lack of vitamins and minerals, decrease of NaCl, vascular abnormalities and damage in the liver (MACNAB and RONALD,1965, HOLST, 1975, KAWATSU, 1986). Deviations in the number of thrombocytes in coagulation and coagulators factors are also a very important part of this process. Increase of the clotting time has been observed in sick fish (HOUGIE, 1971), after egg-laying (KATZ and SOUTHWARD, 1950), in fish exposed to chemical products (VAN PITTIUS; VAN VUREN; DU PREEZ , 1992), and after stress (CASILLAS and SMITH, 1977, FUJIKATA and IKEDA, 1985a,b, NUSSEY; VAN VUREN; DU PREEZ , 1995).

Blood coagulation system may also serve as an

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indicator of environmental stress (CASILLAS and SMITH, 1977). Mammals have hasty blood coagulation after severe exercises (FERGUSON and GUEST, 1974) and according to CASILLAS and SMITH (1977), the same response seems to occur in fish.

HOUGIE (1971) showed that salmon under disease or egg-laying stress presents considerable raise on blood clotting time when compared to individuals in pre-ovulation.

Therefore, blood coagulation system in fish may vary in response to stress of several origins. Clotting time varies widely in function of the animal species as well as among individuals of the same species.

The haematocrit reading, or the percentage of packed cells in the peripheral blood is one of the most important of all clinical variables. Because of its simplicity and high degree of reproducitbility, this procedure is the most useful in the routine for detection of anemia (SNIESZKO, 1960).

The aim of the present study was to know the values of clotting time (CT) and of haematocrit (Ht) of *Salminus maxillosus* and *Cyprinus carpio* upon which to base more extensive studies.

Material and Methods

In July 1997, seventeen adult specimens of "dourado", *Salminus maxillosus* were captured in the Mogi Guaçu River, Pirassununga, SP, and in April 1998, twenty specimens of adult carp, *Cyprinus carpio,* were captured in Pedreira Station, Fishery Institute, SP.

After capture, fish were transferred to the local Fishery Institute laboratories, anesthetized with benzocaine and the blood was withdrawn by caudal puncture. Haematocrit was determined by the microhaematocrit method (GOLDENFARB *et al.*, 1971). The slide method was used to determine the blood clotting time (LIMA *et al.*, 1959 and GARCIA-NAVARRO and PACHALY, 1994): blood drops were analyzed on a slide, considering the moment that blood was extracted from the vessel as the initial time. The maximum and minimum values of the clotting time were determinated and the haematocrit means were calculated for the two species.

Results

Specimens of "dourado" presented a total length between 38.7 and 73.1 cm and specimens of carp presented a total length between 25.4 and 51.5 cm.

Maximum and minimum values of the clotting time, averages and standard deviations of haematocrit averages for the two species are presented in Table 1.

Table 1. Clotting time (CT) minimum and maximum values, averages ($\bar{x}$) and standard deviations averages ($S\bar{x}$) of the heamatocrit (Ht) of *Salminus maxillosus* and *Cyprinus carpio*

Species	CT (minimum)	CT (maximum)	Ht ($\bar{x} \pm S\bar{x}$)
Salminus maxillosus	56 sec	472 sec	40.53 ± 1.7%
Cyprinus carpio	43 sec	530 sec	30.55 ± 4.2%

Clotting times higher than 600 seconds were found in two "dourado" specimens and in one carp, but they were not taken into account, because it was concluded that the values obtained were probably due to a contamination by liquid from the coelomic cavity.

The range of the values of CT was higher for carp and Ht values were higher for "dourado". It must be remembered that we are dealing with different species, belonging to distinct families and captured in both different environments and periods.

Discussion

The knowledge of the fish blood is an important instrument of diseases diagnosis (RANZANI-PAIVA *et al.*, 1987). However, one of the less studied factors in this subject is the blood clotting time of those animals.

SMIT and SCHOONBEE (1988) compared clotting time of traumatized and non traumatized specimens of *Oreochromis mossambicus,* observing higher CT for the non traumatized. The values obtained for the trau-

matized animals (i.e. 433,52 sec) are similar with those found in this study.

In general, according to the same authors and GUYNTON (1986), total blood clotting time in fish is much shorter than in human beings. This difference can occur due to the higher levels of several coagulation factors in fish blood, which contributes to a higher intrinsic and extrinsic coagulation activity in these animals.

The Ht mean values of C. carpio and S. maxillosus are close to those described for other Brazilian teleost species (RANZANI-PAIVA and GODINHO, 1985 and 1986; RANZANI-PAIVA, 1991 and 1995).

This study is the first record on blood clotting time in Brazilian fish species. The data obtained here can be considered important for the physiological knowledge of the particular species. Unfortunately it was not possible compare these results with other data, due to the lack of literature concerning this subject for the studied Brazilian species, as well as for any other species belonging to the ichthyofauna of Brazil.

Therefore, the main purpose of this assay was to test methods and so to compare them with other standard techniques in order to enable future studies.

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