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HEMATOLOGY OF THE CARP (CYPRINUS SPP.)

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Abstract

This research paper reveals the significance of hematological evaluation by describing the recommended blood sampling methodology and laboratory evaluation techniques. The inconsistencies that may appear in the literature, regarding the nomenclature, are also discussed.

Two carps (Cyprinus spp.) were used in this experiment. Blood samples were harvested on anticoagulant according to the recommendations available in the literature and examined via light microscopy.

Lymphocytes were the most common found white blood cell, eosinophils were rare and no basophils were observed although the literature suggests their existence in carp blood. It is concluded that this study may help in the standardization of hematologic values in carp.

Keywords: *fish, hematology, EDTA, microscopy.*

INTRODUCTION

Medical diagnostic procedures in fish experienced a significant development especially in the last two decades. Hematology represents an important branch in the context of fish medicine, aiding the researcher in better understanding and evaluating the health status of different fish species. This research paper is limited to Carp hematology, presenting the significance of hematological evaluation, describing the recommended blood sampling methodology, blood cell, structure and functions (with original figures from the Vetmeduni Clinical Division of Fish Medicine), and laboratory evaluation techniques. The inconsistencies that may appear in the literature, regarding the nomenclature, are also discussed.

MATHERIALS AND METHODS

Two carps (Cyprinus spp.) were used in this experiment. Blood samples were harvested on EDTA anticoagulant via the lateral approach of the caudal vessels (figure 1) by positioning the needle cranially, at a 45 ^{o} angle, slightly under the lateral line, in the middle area of the tail, immediately under the vertebras (Stoskopf M., 1993) and via the dorsal aorta (figure 2) approach by inserting the needle with the tip oriented caudally on the dorsal median line of the mouth, immediately after the juncture of the second gill arch (Department of Fisheries and Oceans, Canada, 2004). White blood cell percentage counts where done using Diff-Quick stained blood smears, via light microscopy.

Figure 1. Lateral approach of the caudal vessels (original)

Figure 2. Dorsal approach of the aorta (original).

RESULTS AND DISCUSSIONS

The result of the differential white blood cell count was according to the normal ranges available in the literature for carp (table 1).

Table 1. Percentage white blood cell count from the blood smears

Parameter	Carp no. 1	Carp no. 2	Reference values (Svobodova, Vykusova)
Lymphocytes %	87	94	76-97.5
Heterophils%	8	3	2-10
Eosinophils %	1	0	0-1
Monocytes %	4	3	3-5
Basophils%	0	0	0-0.5

The erythrocytes were most often seen in the blood smears (figure 3), frequently presenting an oval shape with the nucleus centrally positioned. Round shaped cells were also present in low numbers.

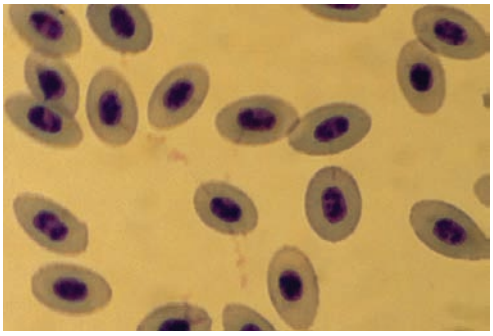

Figure 3. Blood smear presenting normal erythrocytes.

Erythrocyte precursors (figure 4) had a round nucleus located in the center of the cell and a grater nuclear : cytoplasmic (N:C) ratio that the mature erythrocytes.

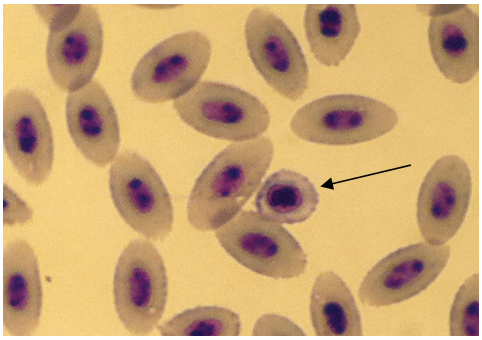

Figure 4. Blood smear presenting normal erythrocytes and an erythrocyte precursor (arrow). (Original)

The thrombocytes (figure 5) presented oval, round or spiked shape and were smaller than erythrocytes. The nucleus was round or elongated.

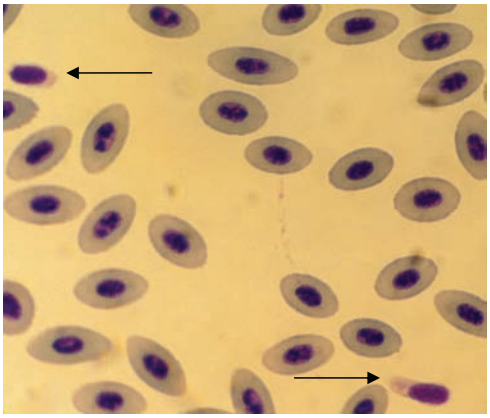

Figure 5. Blood smear presenting normal erythrocytes and two thrombocytes (arrows). (Original)

The lymphocytes were categorized as small (figure 6) and big lymphocytes (figure 7) and were most commonly detected in comparison with other white blood cells.

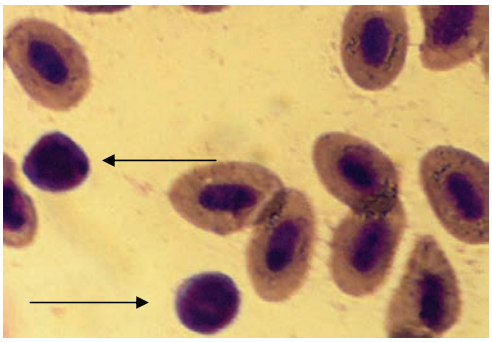

Figure 6. Blood smear presenting normal erythrocytes and two small lymphocytes (arrows). (Original)

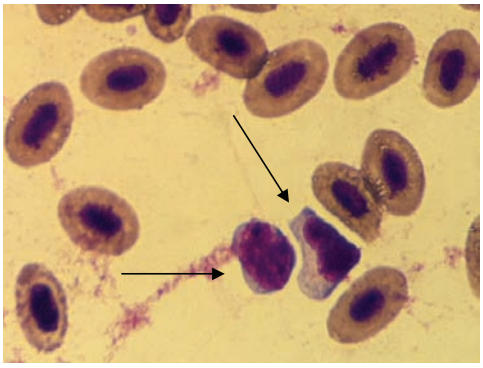

Figure 7. Blood smear presenting normal erythrocytes and two large lymphocytes (arrows). (Original)

The heterophils (figure 8) were round shaped cells and revealed a kidney shaped nucleus or having two or three lobes.î

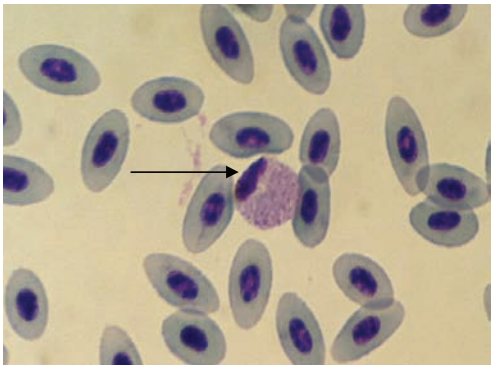

Figure 8. Blood smear revealing normal erythrocytes and a heterophil (arrow). (Original)

The monocytes (figure 9) were observed as the largest white blood cells and revealed an indented nucleus and vacuolated cytoplasm.

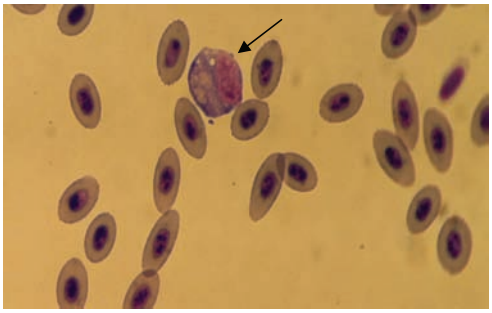

Figure 9. Blood smear presenting normal erythrocytes and a large monocyte (arrow). (Original)

The eosinophils were scarcely observed and revealed a nucleus with an irregular shape and red cytoplasmic granules.

No basophils could be detected in the blood samples harvested in this study.

CONCLUSIONS

This study may have a contribution in the standardization of hematologic values in carp aiding the researcher in a better understanding of fish red blood and white blood cell morphology.

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