

Trypanosoma murmanensis: ITS EFFECTS ON THE LONGHORN SCULPIN, *Myoxocephalus octodecemspinosus*

Authors: KHAN, R. A., BARRETT, M., and CAMPBELL, J.

Source: Journal of Wildlife Diseases, 16(3) : 359-361

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-16.3.359>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Trypanosoma murmanensis: ITS EFFECTS ON THE LONGHORN SCULPIN, *Myoxocephalus octodecemspinosus*

R. A. KHAN, M. BARRETT and J. CAMPBELL, Department of Biology and Marine Sciences Research Laboratory, Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1C 5S7

Abstract: A study was undertaken to ascertain the effects of *Trypanosoma murmanensis*, on adult longhorn sculpins (*Myoxocephalus octodecemspinosus*) following experimental infection. Blood samples, taken at intervals after infection, indicated a decrease in hematocrit, hemoglobin and total plasma protein levels which did not return to normal for at least 72 days. An increase of lymphocytic cells occurred about 42 and 58 days but reverted later to normal levels. Anemia persisted despite low parasitemias and might be attributed to lytic factors released directly or indirectly by the parasite and/or an inability of the erythropoietic system to respond following the initial blood loss.

INTRODUCTION

Trypanosoma murmanensis Nikitin, 1927 of marine fish has been reported previously to induce irreversible blood changes in young Atlantic cod (*Gadus morhua*) following transmission.⁴ In older cod, while slight alterations occur, recovery is apparent. Since the effects of this parasite on other species of marine fish is unknown, an experiment was conducted to determine if blood changes occur in the longhorn sculpin (*Myoxocephalus octodecemspinosus*). The latter is a littoral fish shown previously to be susceptible to *T. murmanensis*.³

MATERIALS AND METHODS

Adult longhorn sculpins were collected 8 months prior to the experiment by scuba divers and held in tanks (100 × 80 × 65 cm) through which sea water flowed at 5 l/min. They were fed capelin (*Mallotus villosus*) *ad libitum* thrice weekly. Only fish free of both haematozoa and ectoparasites were used.

The experimental protocol followed procedures outlined previously.⁴ About 5 to 10 infected leeches (*Johanssonia arctica*) were attached to feed on 20 ex-

perimental sculpins while uninfected leeches were placed on control fish. The fish were held at 0 to 2 C, the available water temperature. Hematological parameters were determined from cardiac blood (about 0.25 ml) removed at intervals after infection. These included hematocrit, hemoglobin, differential white cell counts from Giemsa-stained blood smears and total plasma protein by the Lowry method.² Parasitemias were estimated by means of a hemocytometer. At the conclusion of the experiment, experimental and control fish were killed and tissues, which included heart, liver, kidney, spleen, intestine and gills were fixed in Bouin's, processed by conventional histological methods and stained with haematoxylin and eosin and Giemsa.

RESULTS AND DISCUSSION

Trypanosomes were observed in all sculpins at 20 days post infection and parasitemias varied from about 0.5×10^3 to 3×10^4 parasites/ml at 25 to 42 days. Thereafter, parasite levels were too low to estimate accurately. Blood determinations at intervals from 25 days onwards indicate a somewhat fluctuating decrease of hematocrit,

hemoglobin and total plasma protein levels, reaching a mean low at either 58 or 72 days, respectively (Fig. 1). At 72 days, there was no suggestion that these values would return to normal despite low parasitemias. Anemia was evident by pale gills. There was an increase (up to 30%) of white blood cells, primarily lymphocytes, at 42 and 58 days but these levels reverted to normal at 72 days. Blood parameters of control fish, however, were within normal limits. There was no evidence of increased erythropoiesis in blood smears or in kidney sections of infected sculpins. Histological examination of the tissues, moreover, did not reveal any changes such as hemorrhages, inflammation or splenomegaly.

The results suggest a remarkable similarity in the blood picture between sculpins and small Atlantic cod, although higher parasitemias occur in the latter. The persistent anemia noted in infected sculpins, despite low parasite levels, in absence of erythrophagocytosis, might be attributed to lytic substances released either directly or indirectly by the parasite. Moreover, absence of immature erythrocytes in blood smears and erythroblastic activity in the kidney implies that the piscine host was incapable of producing new red cells during the cold months of the year following the initial blood loss and this could be partly responsible for the persistent anemia. However, the profound changes associated with *Trypanoplasma* infections were not apparent in our infected sculpins.^{1,5,6,7,8}

Acknowledgements

This study was supported by funds from the National Research Council of Canada. Mrs. Maureen James kindly typed the manuscript.

LITERATURE CITED

1. DYKOVA, I. and J. LOM. 1979. Histopathological changes in *Trypanosoma danilewskyi* Laveran & Mesnil, 1904 and *Trypanoplasma borelli* Laveran & Mesnil, 1902 infections of goldfish, *Carassius auratus* (L.). J. Fish. Dis. 2: 381-390.

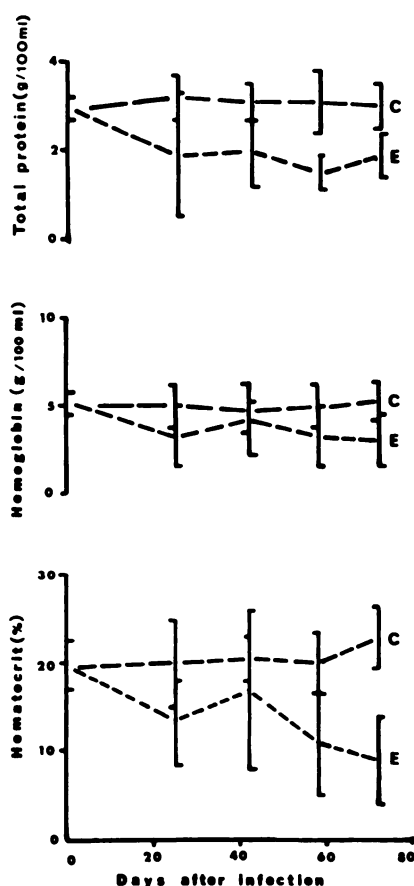


FIGURE 1. Mean changes in hematocrit, hemoglobin and total serum protein (broken lines, with 95% confidence intervals) in experimental (E) and control (C) longhorn sculpins up to 72 days post infection.

2. HARTREE, E.F. 1972. Determination of protein: A modification of the Lowry method that gives a linear photometric response. *Anal. Biochem.* 48: 422-427.
3. KHAN, R.A. 1977. Susceptibility of marine fish to trypanosomes. *Can. J. Zool.* 55: 1235-1241.
4. ———. 1977. Blood changes in Atlantic cod (*Gadus morhua*) infected with *Trypanosoma murmanensis*. *J. Fish. Res. Bd. Can.* 34: 2193-2196.
5. LOWE-JINDE, L. 1979. Some observations of rainbow trout, *Salmo gairdneri*, Richardson, infected with *Cryptobia salmositica*. *J. Fish. Biol.* 14: 297-302.
6. NEWMAN, M.W. 1978. Pathology associated with *Cryptobia* infection in a summer flounder (*Paralichthys dentatus*). *J. Wildl. Dis.* 14: 299-304.
7. PUTZ, R.E. 1972. Biological studies of the hemoflagellates *Cryptobia cataractae* and *Cryptobia salmositica*. *Tech. Pap. Bur. Sport. Fish. Wildl.* 63: 3-25.
8. WOO, P.T.K. 1979. *Trypanoplasma salmositica*: experimental infections in rainbow trout, *Salmo gairdneri*. *Exp. Parasit.* 47: 36-48.

Received for publication 19 October, 1979
