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RESEARCH ARTICLE

IMPACT OF TEXTILE DYEING EFFLUNT ON THE HAEMOPOIETIC TISSUE IN THE LARVAE OF DRAGONFLY *DIPLOCODES TRIVIALIS* (RAMBUR) LIBELLULIDAE : ANISOPTERA).

D.Chitra ,A.Reniprabha , G.Dhanalakshmi and K.Sivakumar
PG and Research Department of Zoology.Chikkaiah Naciker college , Erode. Tamil Nadu.India.

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Corresponding Author

D.Chitra ,A.Reniprabha

Abstract

The antepenultimate larvae of dragonfly *Diplocodes trivialis* were collected manually from their breeding places and treated with the textile dyeing effluent which was collected from a local dyeing unit. After the determination of median lethal dose of the effluent to the larvae, three different sub lethal concentrations were selected for long term exposure (30 days) to study the chronic effect of toxicity.In the larvae of *Diplocodes trivialis*, the haemopoietic tissue is situated in 2nd and 3rd abdominal segment in close association with trachea which could not be isolated. The textile dyeing effluent was found to cause hyperplasia and dysplasia with the degeneration of haemopoietic tissue. The degree of damage depends on the dosage of toxicity.

INTRODUCTION

The process of haemopoiesis includes both cell proliferation and cell differentiation. Hoffman(1970) have reported that the phagocytic tissues of the dorsal diaphragm of orthopterans are found to be haemopoietic in nature .The activity of haemopoietic tissue and its functional aspects in insects have been clearly illustrated by Gunnarsson and Lackie (1988).The location and structure of haemopoietic organs have been elaborately reviewed by Hoffman *et al* ., (1979) in Gryllus, Schistocerca locusta and Periplanata. Among the industrial effluents the textile dyeing effluent is found to be more toxic to aquatic organisms. Histopathological studies are necessary for the description and evaluation of potential lesions in aquatic animals exposed to various toxicants (Meyers and Hendricks ,1985).Hence the present investigation has been planned to study the histopathology of haemopoietic tissue due to textile dye effluent stress in the larvae of dragonfly *Diplocodes trivialis.*

2.Materials and methods

The dragonfly larvae were collected from their natural breeding places and the textile dyeing effluent was collected from local dyeing industry. The collected raw effluent was considered as 100 % and diluted with dechlorinated tap water to prepare 10 % ,20%, and 30 % effluent concentration .Static bio-assays were carried out to find out Lc 50/96 hrs value of the effluent to the larvae and it was found to be 30 % .On the sub lethal concentrations of the effluent , the larvae exhibited no moulting and died on day 35 .The experimentation was therefore carried on day 10 , 20 , and 30 which corresponded to the inter moult stages of the last three larval instars. The haemopoietic organs from the control and effluent – treated larvae were dissected out and processed by following the method of Weesner (1968) with suitable modifications. From the larvae, the first four abdominal segments as a whole were cut and fixed immediately in 10 % formal saline for 2 hrs, dehydrated in graded alcohol, cleared in xylene and embedded in paraffin wax. The sections of 5µ thickness were stained with haematoxylin using eosin as counter stain and micro photographed.

3.Results and Discussion

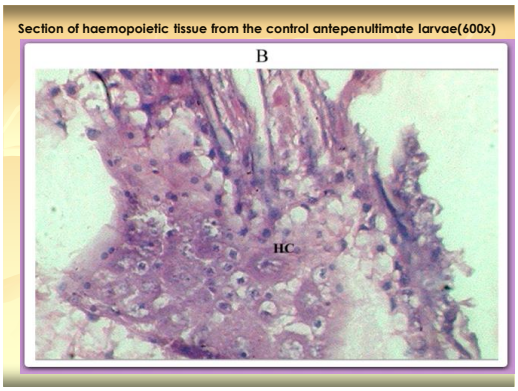
The histological analysis of haemopoietic tissues revealed that in the control antepenultimate larvae of *D.trivialis* the haemopoietic tissue was located in 2nd and 3rd abdominal segments showing the production of haemocytes .The haemopoietic tissue was well organized with the peripheral cortex containing germinal cells and in the centre there were differentiated haemocytes (plate 1).

The textile dyeing effluent caused many histipatological changes in the haemopoietic tissues of treated larvae .During 10 days of exposure , there was a mild hyperplasia with the proliferation of haemocytes in the haemopoietic tissue at 1% effluent concentration . The impact was found to be severe in subsequent concentration (2 ,and 3 %) of the dye effluent .Moderate hyperplasia was noticed with the degeneration of fat cell in the treated larvae (Plate.2).After 20 days of exposure the hyperplasia was intensified and degeneration of haemopoietic tissue was well exhibited .On the prolonged exposure of 30 days treatment resulted in atrophy of haemopoietic tissue with fatty cyst formation in 1 % of the effluent , dysplastic carcinoma in 2 % and carcinoma with the degeneration of haemopoietic tissue in 3 % effluent concentration (Plate.3).

The textile dyeing effluent caused hyperplasia and dysplasia and degeneration of haemopoietic tissue.Atmost malignant change were seen in haeamopoietic tissue , which corroborates the observations of Umbuzeiro *et al* .(2005).Sampath kumar *et al* .(2008) have also noticed that dyes cause allergic dermatitis , mutagenic activity and carcinoma in organisms as observed in the present experimental larvae.

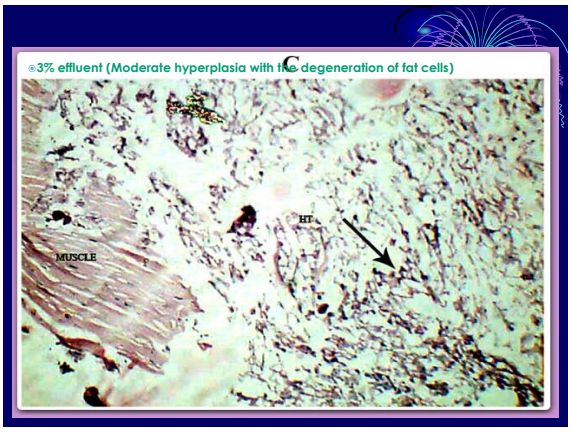
Thus , the textile dyeing effluent was toxic enough to cause malignant changes in vital tissues even at low concentrations.

Section of haemopoietic tissue from the control antepenultimate larvae(600x)

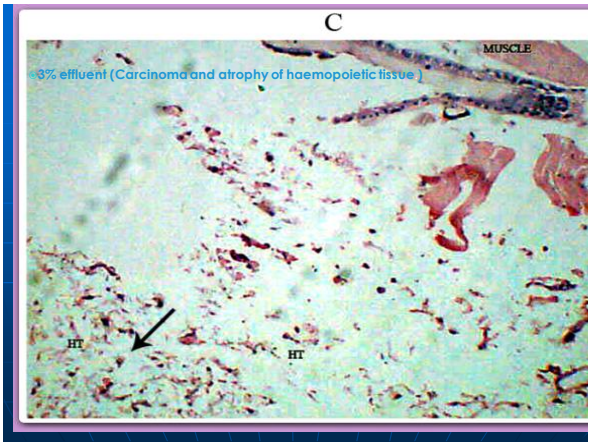


- **2% effluent (Moderate hyperplasia)**

- **3% effluent (Moderate hyperplasia with the degeneration of fat cells)**



- **3% effluent (Carcinoma and atrophy of haemopoietic tissue.)**



Reference:

[1].Hoffman ,1970 Endocrine regulation of the production and differentiation of haemocytes in an orthopteran insect : Locusta moratoria migratoroides .Gen .Comp.Endocrinol.,15(2):198-219.
[2].Gunnarsson ,S.G.S. 1988 , Effects in vivo of b1, 3- glucans from fungal cell walls on the circulating haemocytes of the desert locust Schistocera gregaria .J.Insect Physiol., 34:47-51.
[3].Weesner ,F.M. General zoological microtechniques, Williams and Wilkins company ,Baltimore ,Indian Edition ,Scientific Book Agency ,Calcutta. 1968
[4].Umbuzeiro ,G.A. The contribution of azo dyes to the mutagenic activity of the cristais River ,Chemosphere,60 ;55-64. 2005.
[5].Hoffman ,A.G,D. and Downer ,R.G.H.1979 .End product specificity of treacyl glycerol lipases from and intestine , fat body ,muscle and haemolymph of the American Cockroach ,Periplanta Americana (L) ,Lipids , 14 : 893-899.
[6].Meyers and Hendricks .J.D.1985 Histopathology In ,Fundamentals of aquatic toxicology (Eds : G.M.Rand and S.R.Petrocelli).Hemisphere pudlishing Corpn., Newyork ,pp.283-331.
[7].Sampathkumar ,P.Dheepa ,B,Shaik Abdulla ,S, Satlin ,S,Vinothkannan , R.and Venkatesan ,R.2008 Bioflocculation of heavy metals from textile dye effluent by strychnos potatorum .J.Ecotoxical .Environ .Monit .18 (6) 609-613.