PREFACE

Gillsare main organ of aquatic respiration in fishes. Water contains 30 to 40 minute less oxygen than air, typically, bony fishes have four gills. In most cases water enter the mouth and possess through the gill filament before leaving through a slit behind the gill cover. Although the gill filaments are richly supplied with fine blood vessels, this is not enough for the efficient absorption of oxygen. To increase absorption, the gill filaments are made up of large numbers of tiny, the leaf l like lamellae. In this way the surface area of the gill is increased many thousand times.

A second modification that increases the efficiency of the gills concerns the directions of the flow of blood in the gill lamellae. This is in the opposite direction to the flow of water across the gills. The use of a counter current principle has the important result that at whatever point the blood and water are in contact the water will have a higher oxygen content than the blood.

The third method of inereasing the efficiency of gills is the provision of a constant slow of water.

Fish gills are complex structures, the various units of which are covered by different kinds of epithelia which show variations in their surface specialization, density and distribution of the branchial glands. It is one of those important body organs that perform diverse functions. Gills the highly sensitive and physiologically active organ, represents one of the principal interfaces between the external and the internal environment of an animals.

Fish skin forms a critical interface between the organism and *Milieu interier*. The effectiveness of these barriess in protecting the body is dependent on their continually achieving equilibrium with external and internal environments which maintains the defence system of healthy surfaces.

Cadmium is the most notorious heavy metal. The seriousness and persistence of heavy metals in water is compounded by the fact that they are generally water soluble non degradable and strongly bounded to polypeptides and proteins.

The wide spread use of heavy metal (Cadmium chloride) in aquaculture is greatly responsible for considerable increase of pollution to cultivable waters and has posed a great threat to the whole of the aquatic community including fish a rich source of high quality animal protein, omega 3 polyunsturated fatty acid, vitamins and minerals bodly lacking in the diet of our people. Every drop of coming effuents to any aquafic system charges the chemical property of the water, disturbs the equlibria and disorganizes the surface barrier machanism, directly affecting the normal physiology of the gills and epidermis. This will be effected by change in the chemical nature and organization patter of its cellular components. Influence of various environmental agents on fish gills and epidermis, thagh have been the subject matter of detailstudies by many fish biologists our knowledge about the toxicity of heavy metal (Cadmium chloride) on fish gills and epidermis is sporadic & scanty.

The present investigation has therefore, been designed to determine the toxicity of a heavy metal (Cadmium chloride) to fish *Ompok bimaculatus* & *Lepidocephalicuthys guntea* and the effect of its lethal and sublethal concentrations on the cellular constituents of the gills and epidermis. The cellular localization of various chemical constituents with the availability of a wide variety of histochemical techniques contribute mainly to unravel the functional significance associated with tissues. Keeping this in view the chemical nature of cellular components of the gills and epidermis with emphasis on carbohydrate and protein moieties has also been demonstrated during the course of this study.

The subject matter is spread over five chapters. The first one is Introduction. It gives a general idea about the fish and outlines the previous investigations to bring out the scope of the present work. The second chapter is devoted to the heavy metal (Cadmium chloride) used and the methods employed in this study where as third chapter contains the valuminous data on the toxicity of cadmium chloride to the fish *Ompok bimaculatus* & *Lepidocephalicuthys guntea* and the effect of its lethal and sub-lethal concentrations on the structural organization and the histochemistry of the cellular components of the gills and epidermis of these fishes. The photographic plates, and tables have been used and appropriately placed to illustrate the results. The fourth chapter present an interprepietation of data, with special reference to their functional significance in relation to the altered

environment. The concluding chapter fifth gives a resume of the done. The main text is followed by a list of references where as it is preceded by preface, acknowledgment and contents.

It is felt that there still remains many a lacuna in our knowledge in this field of scientific cognizance that requires further work and experimentation. My quest to investigate the ultrastractural changes, in the aetered conditions, in various cellular components of the gills and epidermis could not be accomplished due to unavailability of the facilities for electron microscopy.

However, I have very much enjoyed the failure and the successes that come in my endeavours during the course of this work and that has provided the stimulus to try to find out many things that I have always wasted to know everything that one writes becomes progressively obsolete because of incompleteness rather because of wrong information or misinterpretations of facts.

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*Date...*20-12-2006...