Respiration is undoubtedly the most vital phenomenon for life to exist, in every possible niche available on this earth. Gills are main organ of aquatic respiration in fishes.

We have traditionally regarded that gills are the typical respiratory organs of fish in their usual habitat of well-aerated water. Considering that it has always been under the operculum, as readily accessible for study, as anything could be, one would think that by now Zoologists would have learned all there is to know about it. Not so, Zoologists have indeed known for a long time that the gill has other functions, yet discoveries over the past few years have forced us to acknowledge how astonishingly little we have understood about this vital organ, organisms used so casually and frequently. Fish gills are complex structures, the various units of which are covered by different kinds of epithelia which show variations in their surface specializations, 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 animal.
The wide spread use of dyeing chemicals/synthetic detergents 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 protein badly lacking in the diet of our people. Every drop of incoming effluents to any aquatic system, changes the chemical property of the water, disturbs the equilibria and disorganizes the surface barrier mechanism, directly effecting the normal physiology of the gill. This will be reflected by changes in the chemical nature and the organization pattern of its cellular components. Influence of various environmental agents on fish gills, though, have been the subject matter of detail studies by many fish biologists, our knowledge about the toxicity and the extent of damage caused by carpet dyeing chemical is sporadic and scanty.

The present investigation has therefore, been designed to determine the toxicity of a carpet dyeing chemical Chrome Black- T, on the cellular constituents of the gill of climbing perch, *Anabas tetudineus* and catfish, *Mystus vittatus*. The 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 the cellular components of
the gills 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 introductory. It gives a general idea about the fish and outlines the previous investigations to bring out the scope of present work. The second chapter is devoted to the materials used and the method employed in this study whereas, the third chapter contains the voluminous data on the toxicity and histopathological changes to *Anabas testudineus* and *Mystus vittatus*. The effect of lethal and sub-lethal concentrations and the histochemical alterations in the cellular components of the fish gill is also included in this chapter. The photographic plates, figures and tables have been used and appropriately placed to illustrate the results. The fourth chapter presents an interpretation of data, with special reference to their functional significance in relation to the altered environment. The concluding chapter, gives a resume of the work done. The main text is followed by a list of references where as, it is preceded by preface, acknowledgements and contents.

The range of environments inhabited by fishes is vast and the successful maintenance of fish population in challenging environment requires responsive adjustments in physiology. Among the fishes, a remarkably wide range of biological adaptations to diverse habitats has
evolved as well as, living in the conventional habitats of lakes, ponds, rivers, rock pools and the open sea has solved the problems of life in the deep sea, in the cold Antarctic and in the warm waters of high alkalinity or of low oxygen. Along with these adaptations, we find the most impressing specialization of morphology, physiology and behaviour. Moreover, fish are of considerable importance to human beings, in the form of nutritious, delicious and diverse food. Rational exploitation and management of our global stocks of fishes must rely upon a detailed and precise insight of their biology. Therefore, fish as a research material has always been a challenge to biologist, irrespective of the field of interest, whether, it is anatomical, biochemical or behavioral.

The present work has been undertaken to elucidate a comparative account of the histopathological and cytochemical characteristics of various cellular components of the gills of *Anabas testudineus* and *Mystus vittatus* exposed to carpet dyeing chemical, Chrome Black-T.

I had not begun to appreciate fully the extent of recent advances of our knowledge of the biology of the gills in fish until I began to write this thesis. 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.
The work could be regarded as a series of islands of facts joined together by bridges of hypothesis. It could be argued that some of the bridges are too long and rather insecure, but nevertheless I feel that having a working hypothesis is better than having no ideas. Hypotheses are the essential fountains from which the future facts emerge following the experimental testing of these hypotheses. In this respect, therefore, we make no apologies for our theories but we sincerely hope that some of them may stimulate other workers to prove or disprove them and thus bring new facts to light. It would indeed be most gratifying to see the islands of facts expand, and the bridges shrink until they almost cease to exist, it would be too much to hope that they will disappear.

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