AgriCos e-Newsletter
ISSN: 2582-7049
Volume: 02 Issue: 04 April 2021 Article No: 39

Ichthyocrinotoxins - Fish Defensins: An Overview

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SUMMARY

Ichthyocrinotoxins, the toxic secretions of certains fish mostly from the skin are able to cause lethality of the other fish when kept together. This secretions fishes mainly used as a defensive mechanism to save themselves from the predation. In case of terrestrial animals the substances used for defensive purposes are airborne and should possess considerable volatility which was explained by Barbier in the year 1976. In case of marine environment these defenses act as allomones, that is the defensive substances can act in its monomeric form without affecting the allomone producing organisms.

INTRODUCTION

Fish immune system is very well developed and consists of both innate and adaptive means of immunity. Fish skin mucus forms the first line of defense comprises a number of immune components which have bactericidal activities which includes goblet cells , malphighian cells, cellular components of mucosal innate immunity, migratory macrophages and lymphocytes, neutrophils and other granulocytes (Alvarez-Pellitero P. 2008). The epithelial skin mucus layers are therefore considered a key component of fish innate defence mechanisms. The mucosal immunity is especially important for the host defence response to invasive pathogens, moreover several fish species possess venomous apparatuses that provide protection against predators during feeding or when fish are stressed or provoked. Many species of marine fishes are reported to be ichthyocrinotoxic which releases toxic skin secretions into the surrounding water as a repellent agent such as shark repellents . Fish are in intimate contact with their microbial-rich environment and have a unique physical barrier composed of skin and skin mucus which act as a first line of defence against attachment and penetration by potentially harmful agents. Many species of marine fishes are reported to be ichthyocrinotoxic that releases toxic skin secretions into the surrounding water.

Ichthyocrinotoxic Exhibited By Fishes:

The ichtyocrinotoxicity, their mode of action and chemistry have been well studied in few fishes such as trunk fish or box fish, soap fish, toad fish and flat fish, although the Ichthyocrinotoxicity is exhibited by many number of species of fish. These venomous secretions are opaque and foamy indicating the presence of surfactant activity. These amphipatic detergent like substances is lethal to the receipient surrounding fish in the environment. These ichtyocrinotoxic substances can occur in the form of simple detergents or polypeptides (Hashimoto Y, Oshima Y, 1972).

An important non peptide detergent secretion is pahutoxin derived from boxfishes. Pavonins, a steroid-N- cetyl glucosaminidesis secreted from flatfish is 40 percent ichthyotoxic (Tachibana, K., & Gruber, S. H. 1988) the biological significance of these secretions are mainly in their allomonal defensive function and also for their protection from the environmental abnormalities such as avoidance of fouling organisms, it has been reported that the secretions of flat are strongly sharp repellents making the flat fish non palatable for the sharks. Certain catfishes in Mumbai coast have also been reported to produce defensive secretions. Marine catfishes Arius dussumieri and Osteogeneiosus militaris from Mumbai waters. In the experimental partially purified toxin of both the cat fishes had shown pronounced hemagglutination activity of 32 HAU.

CONCLUSION

These ichthyocrinotoxins paves the way for the future study for the use of these defensins in the antibacterial/ antiviral studies. Production of these ichthyocrinotoxins in the synthetic way can be used to a greater extent that could be used as shark repellents that prevent the shark attacks in the public beaches. The synthetic toxins can also be used for the costimulation growth of two different fishes. The vast study of these defenses in fish is required for the futuristic approach.

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