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Molecular Diversity and Functional Implication of Amphibian Interferon Complex: Remarking Immune Adaptation in Vertebrate Evolution

Cross-species comparison of vertebrate genomes has unraveled previously unknown complexities of interferon (IFN) systems in amphibian species. Recent genomic curation revealed that amphibian species have evolved expanded repertoires of four types of intron-containing IFN genes akin to those seen in jawed fish, intronless type I IFNs and intron-containing type III IFNs akin to those seen in amniotes, as well as uniquely intronless type III IFNs. This appears to be the case with at least ten analyzed amphibian species; with distinct species encoding diverse repertoires of these respective IFN gene subsets. Amphibians represent a key stage in vertebrate evolution, and in this context offer a unique perspective into the divergent and converged pathways leading to the emergence of distinct IFN families and groups. Recent studies have begun to unravel the roles of amphibian IFNs during these animals' immune responses in general and during their antiviral responses, in particular. However, the pleiotropic potentials of these highly expanded amphibian IFN repertoires warrant further studies. Based on recent reports and our omics analyses using *Xenopus* models, we posit that amphibian IFN complex may have evolved novel functions, as indicated by their extensive molecular diversity. Here, we provide an overview and an update of the present understanding of the amphibian IFN complex in the context of the evolution of vertebrate immune systems. A greater understanding of the amphibian IFN complex will grant new perspectives on the evolution of vertebrate immunity and may yield new measures by which to counteract the global amphibian declines.

Keywords: Amphibian evolution, Immune response, Interferon complex, Xenopus models

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