

Tracking of viral evolution during an outbreak of emerging *beak and feather disease virus* (BFDV) infection in the critically endangered Orange-bellied parrot (*Neophema chrysogaster*)

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Abstract

Beak and Feather Disease Virus (BFDV) has a relatively simple but compact circular single-stranded DNA (ssDNA) genome of approximately 2000 nucleotides encoding a replicase protein (*Rep*) and a single capsid protein (*Cap*) which facilitates whole genome viral epidemiological analysis. Compared with other DNA viruses, of which the 5 kb circular genome of avian polyomavirus is most analogous, BFDV is highly genetically diverse and prone to genetic mutation. The recent re-emergence of BFDV infection in the critically endangered orange-bellied parrot (*Neophema chrysogaster*) with a population size of less than 300 individual birds provided an opportunity to longitudinally track viral replication and mutation events in a ssDNA virus over a period of four years. Combinations of PCR primers, primer walking, direct amplicon sequencing and sequencing of cloned amplicons revealed the emergence of multiple genotypes both within the population and within individually infected hosts. Preferential PCR amplification events were also detected in an individual sample containing up to 8 genotypes and this was likely due to less efficient priming of DNA synthesis because of immediate downstream mismatches close to the primer binding site. Analysis of complete viral genomes ($n=15$) and *Rep* gene sequences ($n=35$) revealed a high mutation rate (3.41×10^{-3} and 3.10×10^{-5} per site/yr respectively), approaching that for RNA viruses, as well as recombination events in the different genotypes in the c-terminal portions of the capsid (*Cap*) and replicase (*Rep*) protein genes.

Biography

Subir Sarker is a PhD research student with Prof. Dr. Shane Raidal in the Charles Sturt University, School of Animal and Veterinary Sciences, Australia. His research focuses on avian circoviruses. He is a lecturer in Pathology in the University of Rajshahi, Bangladesh.