

# Deterministic factors that influence the community ecology of picobirnaviruses among wild rhesus macaques in human-impacted environments

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## Abstract

Ecologists are increasingly interested in the deterministic factors that influence microbial communities. Yet in comparison to other microbes, our understanding of viral community ecology is limited. Here we investigated the factors influencing the community ecology of picobirnaviruses among wild rhesus macaques (*Macaca mulatta*) in Bangladesh. Using co-occurrence networks and species distribution models, we found that macaques' social organisation and anthropogenic factors (human and livestock densities) had the greatest impact on picobirnavirus communities. Virus phylogenetic relationships, host demographics (sex, age), and host physiological stress (cortisol levels) had less of an impact. We also found a few significant biotic virus-virus associations that impacted community composition, more so at lower host social organisational levels (individual macaques within groups) compared to higher levels (macaque groups within sites). These findings advance our understanding of the deterministic factors shaping viral communities, and contribute to changing perceptions of viruses as embedded components of human-natural ecosystems.

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