

Diversity and Distinctive Traits of the Global RNA Virome in Urban Environments

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Abstract

RNA viruses are the primary catalysts for infectious disease outbreaks, epidemics, and pandemics across multiple hosts including humans. The role of RNA viruses in urban areas remains largely unexplored. This study analyzed the metatranscriptome of 3,326 urban samples from 102 cities in 31 countries, uncovering 84,438 RNA viral units, 85% previously unknown. Two new phyla were discovered, enhancing our understanding of RNA virome phylogenetic diversity. The research also supports the polyphyletic nature of Duplornaviricota and identifies 104 amino acid sites in RNA polymerase that affect virus replication and host interaction. A distinct biogeographical pattern of RNA viruses was observed, indicating potential transmission routes in cities. The study revealed interactions between RNA viruses and antibiotic-resistant ESKAPE pathogens, highlighting urban areas as significant reservoirs for RNA viruses. These findings underscore the need for continuous surveillance and mapping of urban environments to track RNA virus prevalence and dynamics, crucial for public health.



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