Researchers uncover the diversity of viroids and viroid-like agents

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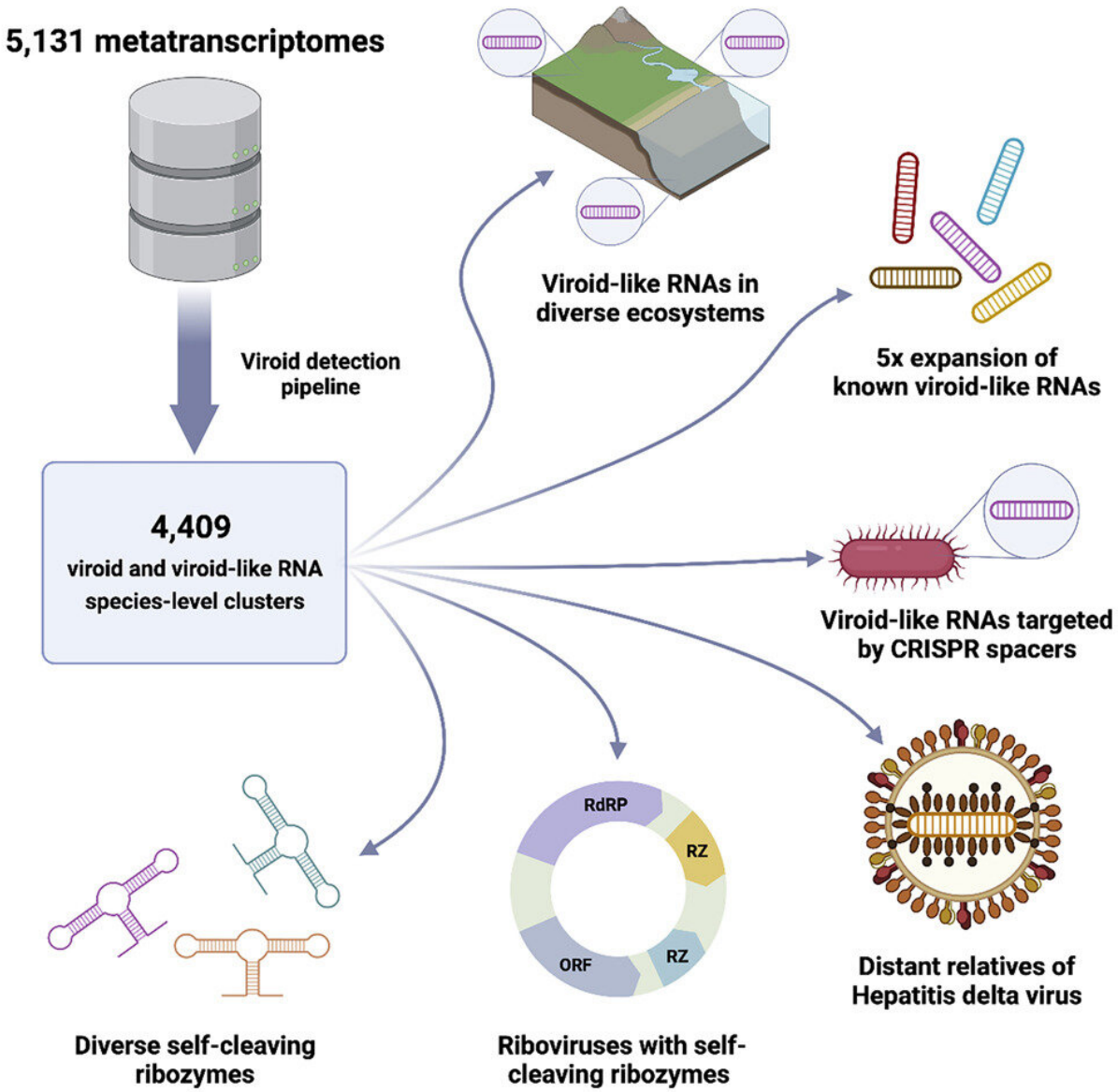

Credit: *Cell* (2023). DOI: 10.1016/j.cell.2022.12.039

A team of researchers from the National Library of Medicine (NLM) and collaborating academic research institutions have developed a computational pipeline to identify and better understand viroids and viroid-like covalently closed circular RNAs (cccRNAs, also referred to simply as circular RNAs). This is a type of single-stranded RNA, which unlike linear RNA, forms a covalently closed, continuous circle. Findings were published in the journal *Cell*.

Viroids are circular RNAs of only 250 to 400 nucleotides, and are the smallest and simplest among the known infectious agents. They have been believed to cause infections only in plants. The diversity of viroid and viroid-like RNAs has been poorly understood, which led researchers to investigate more about these sub-viral agents and their possible abundance in other environments and hosts.

By searching a collection of 5,131 metatranscriptomes and 1,344 plant transcriptomes for viroid-like cccRNAs, researchers uncovered 11,378 viroid-like cccRNAs spanning 4,409 species-level clusters. This finding was a five-fold increase compared to the previously identified viroid-like elements.

Within this diverse collection, researchers discovered that this distinct class of pathogens is not limited in its spread to a few plants as previously thought, but is common and abundant in all kinds of environments and hosts, comparable to the better-known RNA viruses. Furthermore, distant relatives of human Hepatitis Delta Virus (Hepatitis D) were discovered, shedding light on the origin of this important human pathogen, as well as completely novel types of viruses.

"This work opens up new directions for researchers worldwide," said Eugene V. Koonin, Ph.D., a co-author of the study and senior investigator in the Computational Biology Branch of NLM's Intramural Research Program. "We are currently pursuing some follow up analyses," he added.

More information: Benjamin D. Lee et al, Mining metatranscriptomes reveals a vast world of viroid-like circular RNAs, *Cell* (2023). DOI: 10.1016/j.cell.2022.12.039

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