A Narnavirus in the Trypanosomatid Protist Plant Pathogen Phytomonas serpens

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We describe here a new RNA virus (PserNV1) from the plant protist parasite Phytomonas serpens (family Trypanosomatidae, Kinetoplastida, supergroup Excavata). The properties of PserNV1 permit assignment to the genus Narnavirus (Narnaviridae), the first reported from a host other than fungi or oomycetes.

Viruses within the family Narnaviridae are composed of a positive single-stranded RNA segment (2.3 to 3.6 kb) encoding a single protein, the RNA-dependent RNA polymerase (RDRP) (1–3). Narnavirus derives from “naked RNA,” reflecting the absence of a capsid or envelope, and narnaviruses do not form infectious viral particles. Two genera are recognized: Mitivirus, found in the mitochondrion of fungi and translated using the mitochondrial genetic code, and cytoplasmic Narnavirus, comprising the 20S/23S elements of Saccharomyces cerevisiae and one from the oomycete Phytophthora infestans (3–5). Here, we report the discovery and complete genome sequence (including termini) of Phytomonas serpens narnavirus 1 (PserNV1).

Total cellular RNA from P. serpens isolate 9T (6) was extracted using TRIzol reagent (Thermo Fisher), treated with DNase I (Thermo Fisher) at 37°C for 45 min, and purified with RNA Clean & Concentrator-25 (Zymo Research). Replicative viral double-stranded RNAs (dsRNAs) were visualized following treatment with S1 nuclease (Thermo Fisher), separation by agarose gel electrophoresis, and visualization by ethidium bromide staining (7). A prominent dsRNA band of about 4 kb was observed, eluted, and used as a template to generate a cDNA library, with fragment sizes ranging from 200 to 600 nucleotides (nt). A multiplexed TruSeq RNA library was sequenced (2 × 101 cycles, paired-end reads) on the HiSeq 2500 (Illumina). A total of 64,373 reads were obtained, of which 47,690 were assembled into a single contig, which was confirmed by reverse transcriptase PCR tests of this strain acquired independently from another source did not reveal PserNV1 (the authenticity of this strain was confirmed by sequence accession number).

The full-length viral genomic sequence of PserNV1 from Phytomonas serpens 9T strain was deposited in GenBank under the accession no. KU882057.

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