PENNATE DIATOM VIRUSES ARE SIMILAR TO CENTRIC DIATOM VIRUSES

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Diatoms constitute one of the major lineages of photosynthetic eukaryotes on earth. Their contribution to global biogeochemical cycling is significant and accounts for a large part of marine primary production. Based on morphological features, diatom species are composed of 2 groups: centric and pennate. Marine virus studies have revealed the significance of viruses to host population dynamics. Diatom viruses are also considered to be important for the understanding of the impact of diatoms on biogeochemical cycling. So far, isolations of several viruses infecting centric diatoms, *Rhizosolenia* and *Chaetoceros*, have been reported. However, viruses have not been isolated from pennate species. Here, we report isolations and characterizations of 2 distinct pennate diatom viruses, AglaRNAV and TnitDNAV infecting *Asterionellopsis glacialis* (Castracane) Round and *Thalassionema nitzschioides* (Grunow) Mereschkowsky, respectively. AglaRNAV is a lytic virus and its infection is species specific. The virions are icosahedral in shape and 31 nm in diameter, and randomly accumulated in its host cell cytoplasm. The genome of AglaRNAV is a single-stranded RNA (ssRNA) of 8842 nt encoding two open reading frames (ORFs), putative replication-related proteins and capsid proteins. Phylogenetic analysis based on the deduced amino acid sequence of the RNA-dependent RNA polymerase domains strongly supported the monophyly of AglaRNAV and centric diatom ssRNA viruses with a bootstrap value of 99%. The phylogenetic tree also showed the possibility that AglaRNAV is an ancestor of centric diatom ssRNA viruses. The relationship between diatoms and ssRNA viruses might be originated from an ssRNA virus infecting a pennate diatom species. The infection of TnitDNAV is lytic, and the viral particles are icosahedral in shape and 35 nm in diameter. The virions are accumulated in the host cell nucleus with a crystalline array formation. The genome of TnitDNAV is a closed circular single-stranded DNA (ssDNA) of 5573 nt encoding at least two ORFs. Phylogenetic analysis based on a putative replication-related protein showed that TnitDNAV is most similar to CdebDNAV infecting *Chaetoceros debilis*, of which genome is ssDNA but its structure is unknown. The studies for pennate diatom viruses are just started. To elucidate the ecological and evolutionary relationships between centric and pennate viruses, further isolations of diatom viruses are necessary in future studies.