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The ParABs and Cs of novel A15 Gordonia phage Nebulosus

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Bacteriophages are the viral predator of bacteria and have industrial applications as environmental bactericidal agents, but perhaps hold the most promise as an alternative to antibiotics in treating drug-resistant bacterial infections. Actinobacteria are a diverse group of Gram positive bacteria that include important pathogenic mycobacteria and non-pathogenic genera, such as Gordonia. Novel bacteriophage, Nebulosus, was directly isolated from a sample of compost in Orono, ME on the host G. terrae. Nebulosus is a siphovirus and belongs to subcluster A15, the only group of Gordonia phages that are members of a larger cluster composed of mycobacteriophages. Nebulosus is temperate and forms stable lysogens that are resistant to superinfection by cluster A15 phages. Its genome is 52,175 bp long, has 62% GC content and encodes 97 putative protein-coding genes and 3 tRNAs. The genome is organized like other cluster A phages with forward-transcribed structural genes on the left arm and reverse-transcribed early lytic genes on the right arm. Gp82 encodes the immunity repressor and like other cluster A15 phages, it encodes a ParABs system (gp33, gp34) rather than an integrase in order to maintain lysogeny. Comparative genomics among the A15 phages and cluster A phages will be conducted to better understand the relationship between Nebulosus and the cluster A Gordonia and Mycobacterium phages.