



## ISOLATION AND CHARACTERIZATION OF *Serratia marcescens* NBL 1001 BACTERIOPHAGES FROM SEWAGE WATER

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**ABSTRACT** – *Serratia marcescens* has been recognized as an opportunistic nosocomial pathogen. The emergence of multidrug-resistant *S. marcescens* strains, which pose threats to public health, prompts actions to control their growth and dissemination. One of the leading control strategies which has the potential to be used as either an alternative or a supplement to antibiotic treatment is phage therapy. This study was performed to isolate bacteriophages that can be used against *S. marcescens*, and characterize the isolated phages based on lytic activity and particle morphology. The bacteriophages were obtained from raw sewage through phage enrichment followed by double agar overlay plaque assay. Plaques exhibiting varying morphologies were isolated and purified. Phage isolates designated as P1, P2, P3 and P4 formed turbid plaques while phage P5 formed clear circular plaques surrounded by a large halo. Assessment of the lytic activity of the phages showed that the *S. marcescens* wild type and seven *S. marcescens* Tn5-insertional mutants were susceptible to the five phage isolates. Phages P1, P2 and P3 were able to infect *Escherichia coli* while only phage P4 was able to infect *Salmonella enterica* subsp. *enterica*. Unrelated genera which included *Bacillus megaterium*, *B. subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Micrococcus luteus* were not susceptible to all the phages. Based on the virion size and morphology as revealed by electron microscopic analysis, the possible identity of the phage isolates was deduced following the classification scheme of the International Committee on Taxonomy of Viruses. The five phages may belong to Order *Caudovirales*. Phages P1 and P2 having icosahedral-isometric heads with thin, long, non-contractile, flexible tail, may belong to Family *Siphoviridae*. Phage P3 has icosahedral-isometric head with no visible tail which may indicate that it belongs to Family *Podoviridae*. Phage P5 possesses an icosahedral-isometric head with a neck that is connected to a rigid contractile tail, which may classify it under Family *Myoviridae*. The results of this study suggest the possible use of the phages as bactericidal agents. Further characterization of the identified phages can be done to fully understand their potential application as biocontrol agents against *S. marcescens*.

**Keywords:** bacteriophages, electron microscopy, phage therapy, plaques assay, *Serratia marcescens*



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