

# Preface

We find ourselves in the twenty-first century with a world of disenchantment, a self-imposed return to the dark ages of medicine! Most antibiotics are unable to treat multidrug-resistant bacteria, which are causing serious diseases. Prior to the discovery of penicillin, there were fewer bacteria that caused diseases, fewer bacterial mutations, less food poisoning, less water contamination. Our own interventions have caused bacterial mutations resulting in more lethal bacteria with fewer remedies. Throughout much of the twentieth century, antibiotics have been our primary defense against bacterial diseases. The excessive and inappropriate use of antibiotics particularly in animal husbandry is at the root of this problem and threatening their efficacy. The pharmaceutical industry appears unlikely to offer the necessary countermeasures because of the objective difficulties with synthesis of new antibiotics. The inexorable rise in the incidence of antibiotic resistance in bacterial pathogens, coupled with the low rate of emergence of new, clinically useful antibiotics, have encouraged researchers to revisit the bacteriophage and the potential utility of bacteriophages in biocontrol and for preventing or treating human and animal bacterial diseases.

The proper use of lytic ‘virulent’ bacteriophages through dietary and environmental application shows promise in livestock and poultry in particular. Bacteriophages may also be used to enhance or rekindle the effectiveness of antibiotics in numerous applications. Bacteriophages are known to have some advantages associated with human therapy over the use of antibiotics. However, we urge caution since the mechanism that caused the spread of antibiotic resistance genes between bacteria occurs most often through lysogenic bacteriophage-mediated transduction. Inappropriate use of bacteriophages could similarly lead to bacterial development of bacteriophage resistance. Furthermore, bacteriophage proteins including those that are genetically modified for commercial purposes, may also integrate into human and animal society with unknown effect. Therefore, it would be wise to approach such methodologies with caution in order to avoid repeating mistakes that were made with the improper use of antibiotics.

We suggest the use of properly developed and highly virulent lytic bacteriophages for environmental biocontrol to selectively reduce or eliminate problematic

bacteria from sensitive environments. Bacteriophages can be effective in decontamination and sanitation of both natural and manmade environments, including farms, factories, in workplaces, crowded places, and healthcare settings or in the laboratory. When strategically applied, they can be used without harmful effect on and around people and animals to eliminate harmful bacteria while supporting beneficial microflora. The ability of bacteriophages to recognize precisely their target hosts, renders them as favorable antibacterial agents compared to broad-spectrum antibiotics which kill target bacteria along with other beneficial bacteria. In this book we discuss the safe use of bacteriophages as antidotes or as a biocontrol from farm to fork and as a biodefence or to prevent biotreats while recognizing the obstacles associated with their use.

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