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**Multiplication of virulent bacteriophage: Interactions with the host****Arieh Zaritsky and Avinoam Rabinovitch**  
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Dependence of virulent (bacterio) phage multiplication on the physiological state of its host, conceived in the 1940's, was refined for the T4/*Escherichia coli* model system. The known kinetic parameters (adsorption rate, eclipse and latent periods, ripening-rate, and consequent burst size) are related solely to the host's physiological state expressed by the bacterial growth rate before infection. Numerical models were advanced to explain (a) dependence of phage multiplication dynamics on host's physiology, (b) co-existence of phage and its susceptible bacteria based on phage suicide and (c) kinetics of cell lysis based on materials corrosion, statistics of extremes and updated knowledge on bacterial physiology and phage biology. A mathematical model (d) was devised to maximize phage titers by adjusting values of bacterial doubling time and initial multiplicity of infection (MOI). Results display a range of possible values along a golden strip in the relevant plane, and times to achieve these maxima and gains were evaluated. Resolution of the adsorption kinetics was refined (e) by frequent ( $\sim 5 \text{ min}^{-1}$ ) sampling at MOI=1 during the first 6 min. The observed fast drop in free phage and bacteria is consistent with a relatively simple model. The sharper reduction in viable cells indicates that adsorption is more complex than thought to be. The consistencies of the various models with existing experimental results support predictability and potential use to improve phage therapy.

**Biography**

Arieh Zaritsky obtained a distinguished MSc in Genetics at the Hebrew University, Israel in 1967. He completed his PhD from Leicester University, UK in 1971 and Post-doctorate at University Institute of Microbiology, Copenhagen, Denmark in 1972. During his career, he has instructed over 50 graduate students/scientists and was awarded numerous research grants. He visited higher education institutions around the world and delivered invited lectures at international meetings. He is a recognized expert in Bacterial and Bacteriophage Physiology, on which he has published about half of his 130 peer-reviewed articles, and was awarded (1994) Burroughs-Wellcome/ASM Visiting Professorship.

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