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# Demographic coexistence or coevolution ? Epidemiological dynamics of E.Coli during infection by bacteriophages T7

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## Résumé

Measure, describe and predict the co-evolution of bacteria and their phages is essential for the development of bacteriophages as clinical antibacterial treatments. When studying epidemiological dynamics of bacteria/phage systems, one of the main issues is to find a precise and high throughput, yet not too laborious measurement, as a proxy of the bacterial population size over time while phage infection occurs. In our study, the production of living cells and biomass of *Escherichia coli* in the presence of bacteriophage T7 were measured in parallel on a real-time basis, using several fluoro-luminometric measurement. We evaluate the ability of the main epidemiological models of type Sensitive/Infected/Phage (SIP) found in the litterature to jointly fit these distinct measured bacterial kinetics and their mutual consistency as a test of model validity. These precise kinetics allowed us to show coexistence over long term experiments (over 100 hours) between the bacteria and the bacteriophages despite no detectable resistant bacteria. These unexpected results call for more mechanistically precise epidemiological model than the classical SIP from the litterature. Such parameterization of the epidemiological dynamic opens the perspective of predicting with good confidence the kinetics of co-evolution in bacteria/phage systems.

**Mots-Clés:** Epidemiological dynamics, Coexistence, Fluoroluminometric measurement, T7

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