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Adaptive dynamics at the host interface applied to virulence and multipartitism evolution

Abstract: Mathematical modelling of infectious diseases usually has to choose between focusing on the epidemiological dynamics or concentrate on the physiopathological kinetics. Hence, less attention is paid to the inoculation and infection initiation processes, which link the two biological scales and are yet crucial for parasites' life cycles and therefore their evolution. The conjunction of elementary probabilities and differential equation models explicitly accounting for inoculation thus allow to address, within the adaptive dynamics framework, key questions about the evolutionary biology of infectious diseases, among which the adaptiveness of virulence in a multiple infection context -- viewed as the infection-related host mortality rate --, and the emerging conditions of multipartitism in viruses, that is splitting the genetic information into physically distinct particles.