

タイトル: **Handshake-dependent RPS-like game for
bacterial toxin transfer**

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Abstract

Myxobacteria produce a wide array of toxins alongside their cognate immunity proteins. When two myxobacterial cells possess compatible surface receptors, they engage in outer membrane exchange, during which their toxin repertoires are bidirectionally transferred. This process can lead to cellular damage if a recipient lacks immunity to incoming toxins. Thus, receptor compatibility serves as a prerequisite for intercellular interactions. Given that molecular transfer occurs under this compatibility constraint, the composition of each cell's toxin and immunity repertoire gives rise to a rock-paper-scissors (RPS)-like competitive dynamic. To capture the complexity of these interactions, I propose the concept of a handshake-dependent RPS-like game, where the "handshake" represents receptor compatibility, and the RPS-like competition emerges from the bidirectional toxin transfer. This framework provides a mechanistic explanation for the extensive toxin diversity observed in natural myxobacterial populations, thereby offering a resolution to Crozier's paradox.