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Cheater-altruist synergy in immunopathogenic ecological public goods games

Much research has focused on the deleterious effects of free-riding in public goods games, and a variety of mechanisms that suppresses cheating behaviour. Here we argue that under certain conditions cheating behaviour can be beneficial to the population. In a public goods game, cheaters do not pay for the cost of the public goods, yet they receive the benefit. Although this free-riding harms the entire population in the long run, the success of cheaters may aid the population when there is a common enemy that antagonizes both cooperators and cheaters. Here we study models in which an immune system antagonizes a cooperating pathogen. We investigate three population dynamics models, and determine under what conditions the presence of cheaters help defeat the immune system. Our results give support for a possible synergy between cooperators and cheaters in ecological public goods games.