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Cheaters and Cooperators: A Study of Bacterial Conflict on a Chip[1] GUILLAUME LAMBERT, PETER GALAJDA, JUAN KEYMER, ROBERT AUSTIN, Princeton University — We study the interaction of cheating and cooperating *escherichia Coli* metapopulations under selective pressure on chip designed to create a landscape of metabolic pressures. Using micro- and nano-fabrication techniques, we create microfluidic chips with an effective 'fitness landscape' for the bacterial cells at the population level in which we can tune their access to spatial and energetic resources. Our custom-made micro habitats allow us to study the local density distribution and subpopulation dynamics of bacterial cells subjected to social pressure. We show that the microscopic collective behavior of the cheaters and cooperators differ greatly depending on the fitness landscape they evolved in. Locally, subpopulations emerge and compete in a 'tug-of-war' fashion. Globally, metapopulations rise, fall, evolve and adapt to their hostile environment.

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