

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The emergence of cooperation from a single cooperative mutant JONAS CREMER, University of California, San Diego, ANNA MELBINGER, ERWIN FREY, Ludwig-Maximilians University Munich, Germany — Population structure is one central condition which promotes the stability of cooperation: If cooperators more likely interact with other cooperators (positive assortment), they keep most of their benefit for themselves and are less exploited by non-cooperators. However, positive assortment can only act successfully if cooperation is already well established in the population such that cooperative individuals can successfully assort. But how can cooperation emerge when starting with a single cooperative mutant? Here we study this issue for a generic situation of microbial systems where microbes regularly form new colonies and show strong population growth. We show how and when the dynamical interplay between colony formation, population growth and evolution within colonies can provoke the emergence of cooperation. In particular, the probability for a single cooperative mutant to succeed is robustly large when colony-formation is fast or comparable to the time-scale of growth within colonies; growth supports cooperation.

- [1] A. Melbinger, J. Cremer, and E. Frey, Evolutionary game theory in growing populations, *Phys. Rev. Lett.* **105**, 178101 (2010)
- [2] J. Cremer, A. Melbinger, and E. Frey, Evolutionary and population dynamics: a coupled approach, arXiv:1108.2604

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Date submitted: 19 Nov 2011

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