

SWEET ARE THE USES OF ADVERSITY: INSIGHTS INTO THE ORIGIN AND FATE OF NEW GENES USING EXPERIMENTAL EVOLUTION. E. Smith^{1*}, F. Rosenzweig¹, B. Dunn², J. Wenger², G. Sherlock² and S. D. Copley³. *david.smith@biosci.gatech.edu ¹Georgia Institute of Technology, 310 Ferst Dr., Atlanta, GA 30332; ²Stanford University, 300 Pasteur Dr., Stanford, CA 94305; ³University of Colorado, CB347, Boulder, CO, 80309

Introduction: Experimental evolution under selection dates back to the dawn of modern genetics, where it helped to shape our understanding of allele and chromosome dynamics in populations under selection. Modern experimental evolution, coupled with genomic analyses, is transforming our view of the adaptive process and the mechanisms by which major evolutionary transitions have occurred and are occurring.¹

Results and Discussion: Using whole genome sequencing and whole population sequencing in conjunction with detailed phenotypic analyses, we can now directly probe into the mechanisms that allow microbes to respond to environmental challenges, that control the origin and fate of new genes^{2,3}, and that give rise to genic interactions and pleiotropy^{4,5}. We will discuss recent insights into these phenomena afforded by experiments in which we analyze the evolutionary process in real time using *Escherichia coli* and Bakers yeast.

References: [1] Adams J. A. and Rosenzweig F. (2014) *Genomics* 104, 393-8. [2] Kershner J. P. et al. (2016) *J. Bacteriol.* 198, 2853-2863. [3] Dunn, B. et al (2013) *PLoS Genetics* 9, e1003366. [4] Wenger et al. (2011) *PLoS Genetics* 7, e1002202 [5] Chiotti, K. et al. (2014) *Genomics* 104, 431-7.