Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Downsides and benefits of unicellularity in budding yeast[1] GABOR BALAZSI, The Louis Beatrice Laufer Center for Physical and Quantitative Biology, Stony Brook University, Stony Brook, NY, USA, LIN CHEN, JENNIE KUZDZAL-FICK, The University of Texas MD Anderson Cancer Center, Houston, TX, USA — Yeast cells that do not separate after cell division form clumps. Clumping was shown to aid utilization of certain sugars, but its effects in stressful conditions are unknown. Generally speaking, what are the costs and benefits of unicellularity versus clumping multicellularity in normal and stressful conditions? To address this question, we evolved clumping yeast towards unicellularity by continuously propagating only those cells that remain suspended in liquid culture after settling. Whole-genome sequencing indicated that mutations in the *AMN1* (antagonist of mitotic exit network) gene underlie the changes from clumping to unicellular phenotypes in these evolved yeast cells. Simple models predict that clumping should hinder growth in normal conditions while being protective in stress. Accordingly, we find experimentally that yeast clumps are more resistant to freeze/thaw, hydrogen peroxide, and ethanol stressors than their unicellular counterparts. On the other hand, unicellularity seems to be advantageous in normal conditions. Overall, these results reveal the downsides and benefits of unicellularity in different environmental conditions and uncover its genetic bases in yeast.

[1]This research was supported by the NIH Director's New Innovator Award Program (1DP2 OD006481-01), by NSF/IOS 1021675 and the Laufer Center for Physical Quantitative Biology.

Gabor Balazsi
Stony Brook University

Date submitted: 10 Nov 2016 Electronic form version 1.4