SUPPLEMENTARY FIGURES

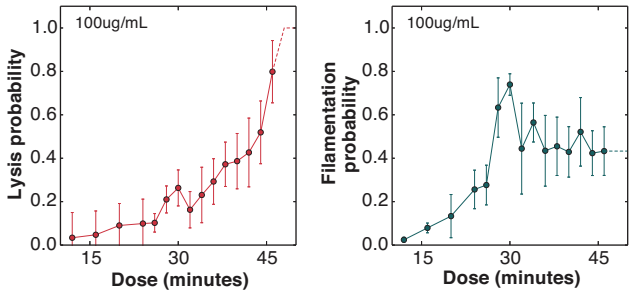

FIG. S1: Average lysis rate (a) and elongation rate (b) in response to different doses of 100μg/mL of carbenicillin antibiotics (mean $\pm$ std. dev., n = 10 populations). Note here that cells were allowed to fully recover in pure LB for 3h between treatments.

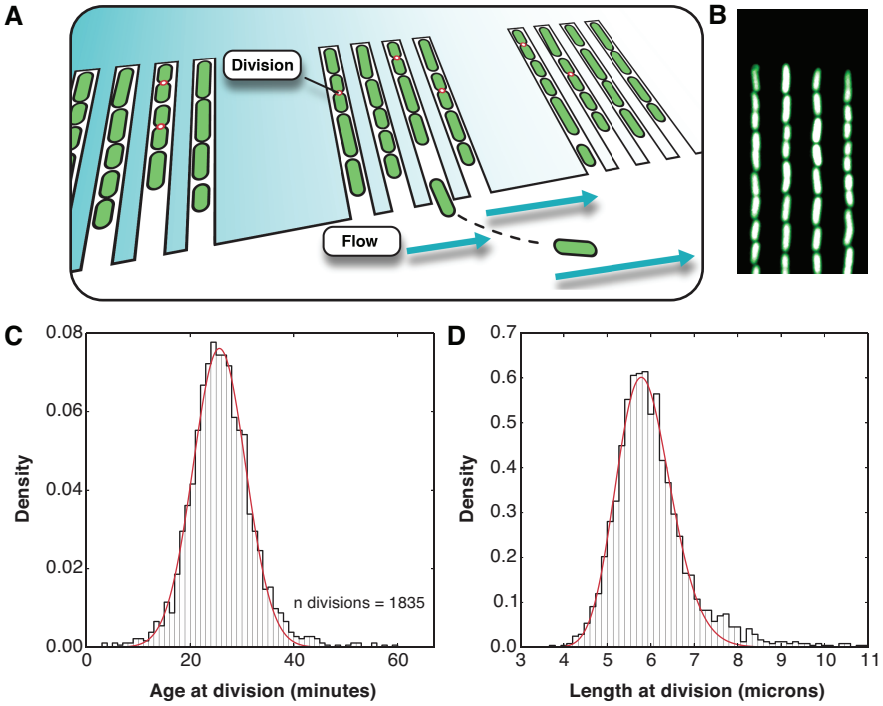

FIG. S2: a) Schematic representation of the devices used to extract single-cell growth statistics presented in Fig. 3a and e. b) Fluorescence micrograph of cells growing under constant conditions inside the single channel device. c) Distribution of the average age at division. d) Distribution of the average length at division.

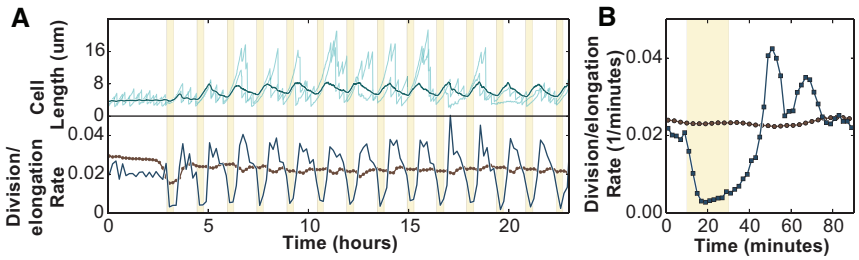

FIG. S3: a) Average length of the cells over time in response to the carbenicillin treatments. A few representative lineage histories are also shown. Bottom panel: average division rate (blue) and elongation rate (brown) in response to the carbenicillin treatments. b) Elongation rate (brown) and division rate (blue) averaged over a single carbenicillin treatment. Note that the elongation rate remains constant over time, while the division rate is highly affected by the carbenicillin treatments.

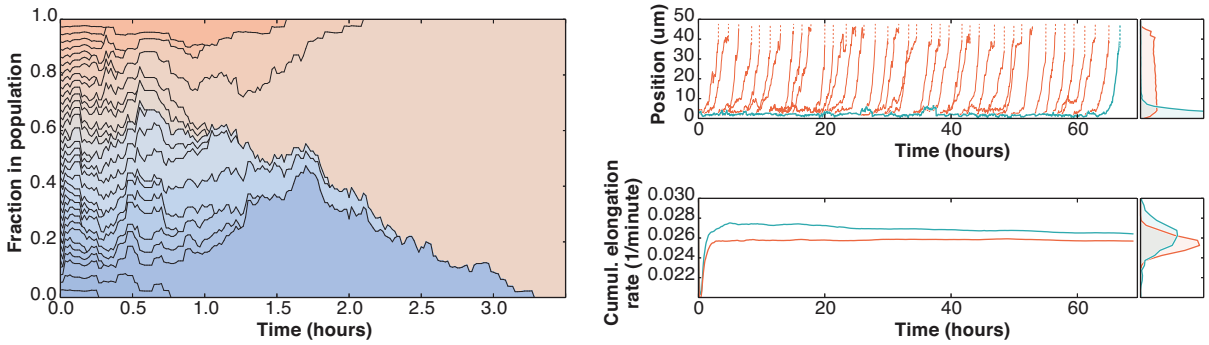

FIG. S4: a) Propagation of a single cell to complete fixation inside the growth chamber in the absence of selection. b) Position distribution of single cells within a population (orange) and the lineage histories (teal) under constant conditions. The position denotes the distance from the bottom of the growth chambers. Note that position of the surviving lineage is narrowly distributed near $x = 0\ \mu m$ (away from the main flow channel), suggesting from the optimal lineage relation $\delta\Lambda = \rho_s(x)\delta f(x)$ that cells would benefit the most from an increase in fitness near the bottom of the growth chambers. c) The cumulative elongation rate distribution in the absence of selection is higher for the lineage histories (teal) than for the population average (orange), indicating that faster elongating cells have an additional fitness advantage and are selected for in the surviving lineage.