

Fig. S1. Probability density functions (PDFs) for tracer displacements. Overlaid PDFs of displacements of tracer particles associated with various algal densities on far-field Gaussian core behavior (A, C) and near-field exponential-tails behavior (B, D) with a slope $k = -0.30$ and $k = -0.22$ respectively. The statistical distances take the threshold at $35 \mu\text{m}$ (about 2-fold body sizes) relative to the center of spinner circles. (A, B) Time interval $\Delta t = 1.2$ sec and (C, D) $\Delta t = 2.4$ sec.

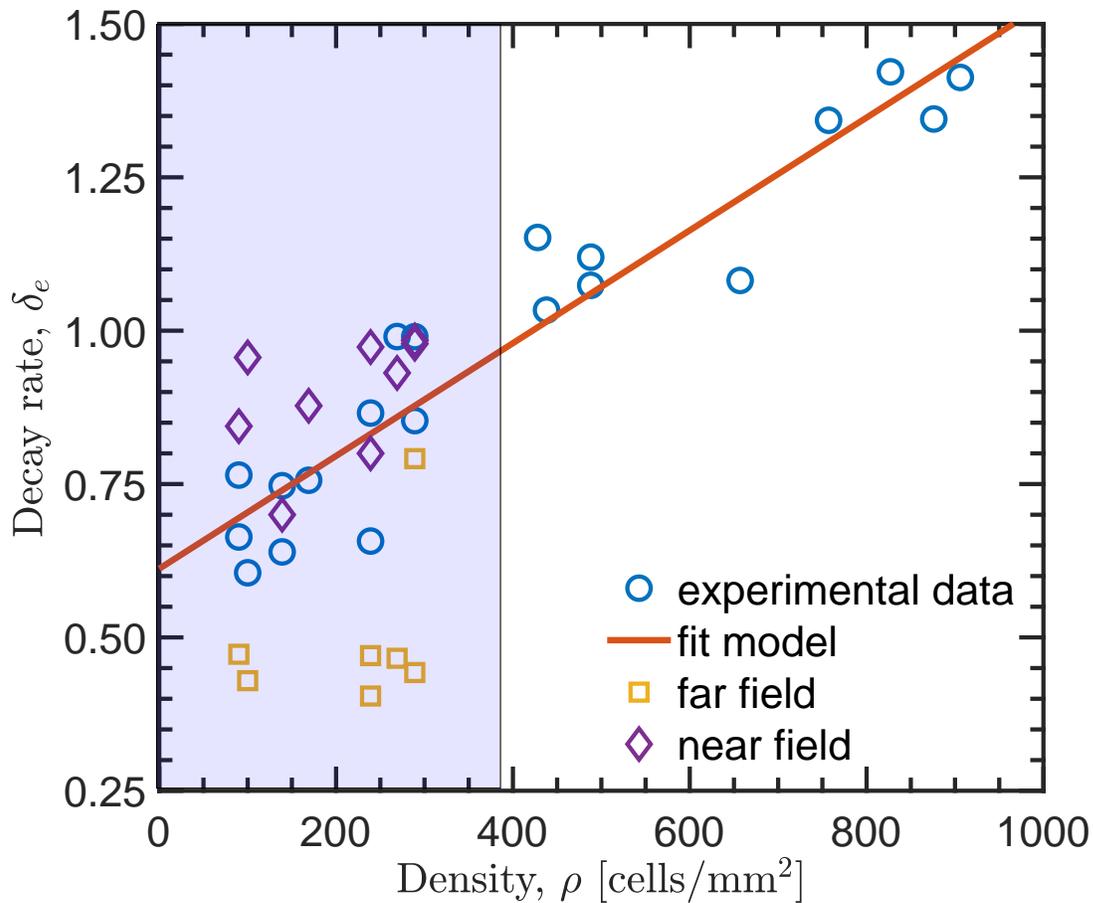


Fig. S2. Spatial decay rates of turbulence caused by the 'algal bath'. The relationship of decay rate of long exponential-tail PDFs with increasing packing density of active algal cells. The solid line represents a best linear fit to the data with a slope 7.689. The regressions curve is statistically significant ($p < 0.001$) and has R^2 value corresponding to 0.900.

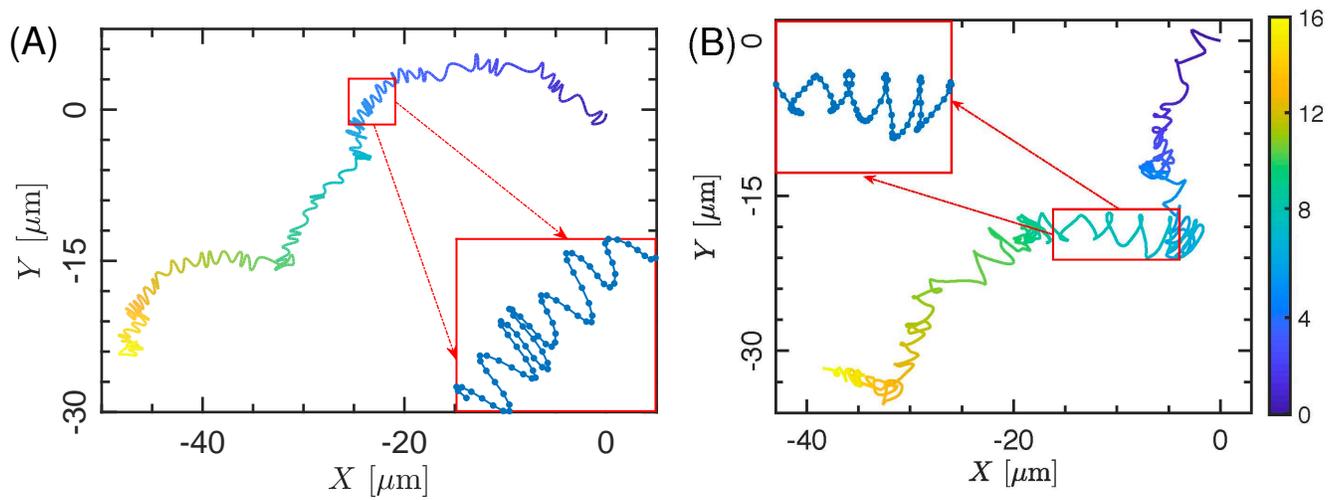
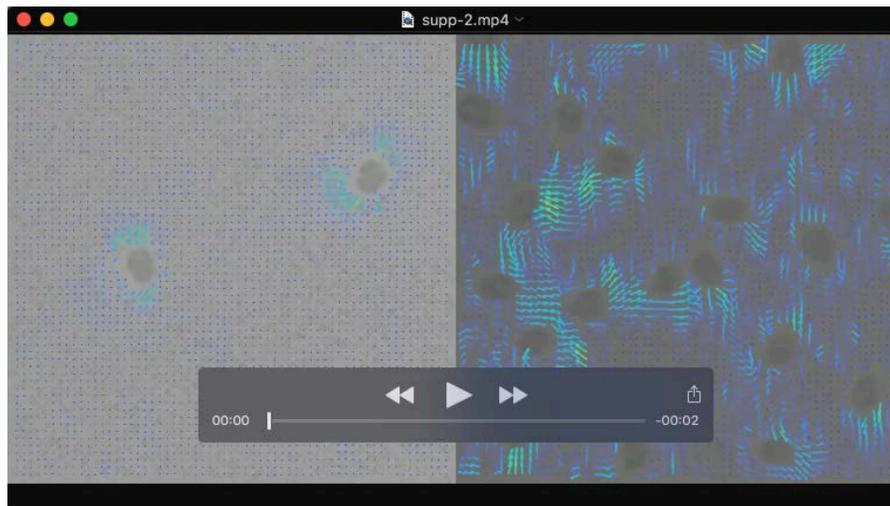


Fig. S3. Trajectories at high algal density. (A) The results of simulation solved by the stochastic differential equation (2) comparison with the real experiment trajectories (B). The model well captures the transport behavior, and suggest that the enhanced transport understand with the interage of Brownian motion and Poisson events entrainments.



Movie 1. Instant velocity field analyzed by PIVLAB package. The size of the visual fields is $165 \mu\text{m}$ by $165 \mu\text{m}$ and the coarse graining length $\Delta l = 2.64 \mu\text{m}$. The video is played 3.5 times slower. (left) and (right) corresponding to Fig. 1(A) and (B) in the main context.



Movie 2. Tracer's trajectories influenced by the swimmers. At low algal density (left, two times slower) in contrast to the high algal density (right, normal speed).