

Supplementary Information:

Supplementary Tables:

Table S1: Length (L), width (W), surface area (SA), volume (V), and SA/V ratio of K-12, MR-1, and *M. aquaeolei* cells from the Low-Frequency Experiment. Error intervals indicate standard deviation of 10-20 cells measured per time point.

	Day	Shape	L (μm)	D (μm)	SA (μm^2)	V (μm^3)	SA/V (μm^{-1})
K-12	0.8	rod	3.0 ± 0.6	1.1 ± 0.1	10.1	2.4	4.2
	3.9	sphere		1.7 ± 0.4	9.1	2.6	3.5
	6.7	sphere		1.6 ± 0.3	8.0	2.1	3.8
	15	sphere		1.9 ± 0.3	11.1	3.5	3.2
	26	sphere		1.9 ± 0.4	11.7	3.7	3.1
	33	sphere		1.7 ± 0.4	8.7	2.4	3.6
	43	sphere		1.4 ± 0.2	6.3	1.5	4.2
	48	sphere		1.6 ± 0.4	8.3	2.2	3.7
MR-1	61	sphere		1.5 ± 0.3	7.5	1.9	3.9
	0.8	rod	3.6 ± 0.7	0.9 ± 0.1	10.6	2.2	4.7
	3.9	rod	2.6 ± 0.6	0.7 ± 0.2	5.7	0.9	6.3
	6.7	rod	2.5 ± 0.4	0.7 ± 0.1	5.5	0.9	6.2
	15	rod	2.4 ± 0.5	1.0 ± 0.2	7.8	1.7	4.5
	26	rod	2.7 ± 0.9	0.9 ± 0.2	7.3	1.4	5.2
	33	sphere		2.1 ± 0.4	13.7	4.8	2.9
	43	sphere		2.1 ± 0.4	13.8	4.8	2.9
<i>M. aquaeolei</i>	48	sphere		1.8 ± 0.6	9.7	2.8	3.4
	61	sphere		1.8 ± 0.5	10.4	3.2	3.3
	0.8	rod	3.6 ± 0.4	1.2 ± 0.2	13.5	3.6	3.8
	3.9	rod	2.7 ± 0.6	1.1 ± 0.2	9.3	2.2	4.2
	6.7	sphere		1.8 ± 0.4	10.1	3.0	3.4

Supplementary Figures:

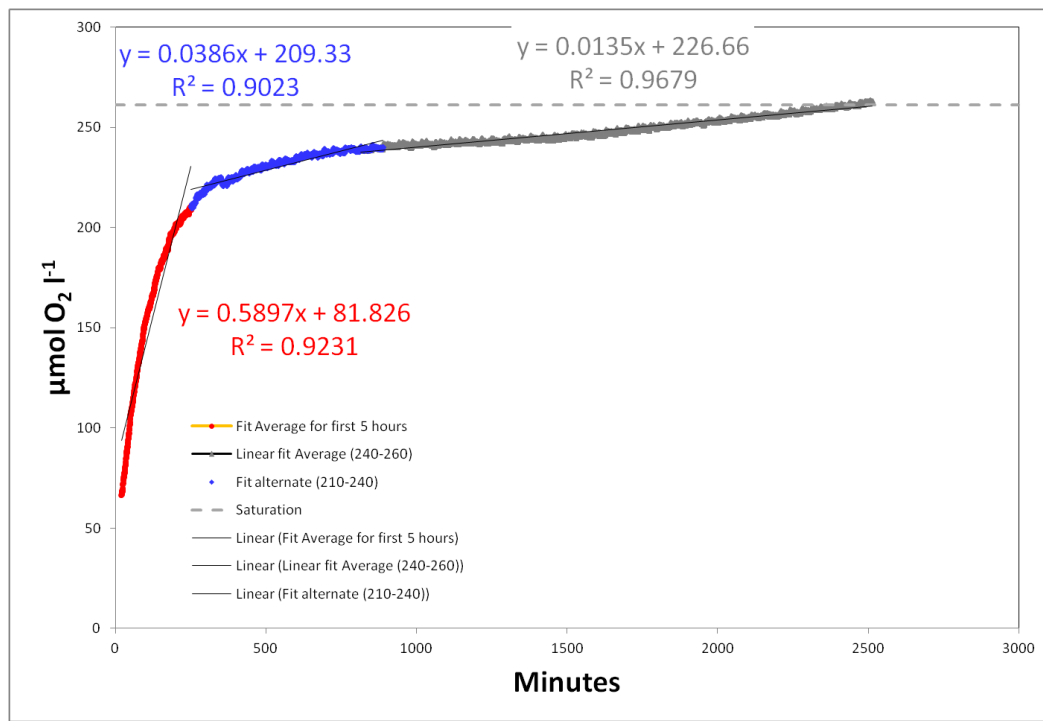


Figure S1. Leak rate of oxygen into water degassed with N_2 bubbles loaded into a Tube Respirometer. The water was actively stirred with a Teflon stirbar. The increase of DO is from diffusion through the overlaying oil, and any out-gassing from the stir bar or chamber. Fits used for leak rate corrections over specific DO concentration intervals are indicated in red, blue and black.

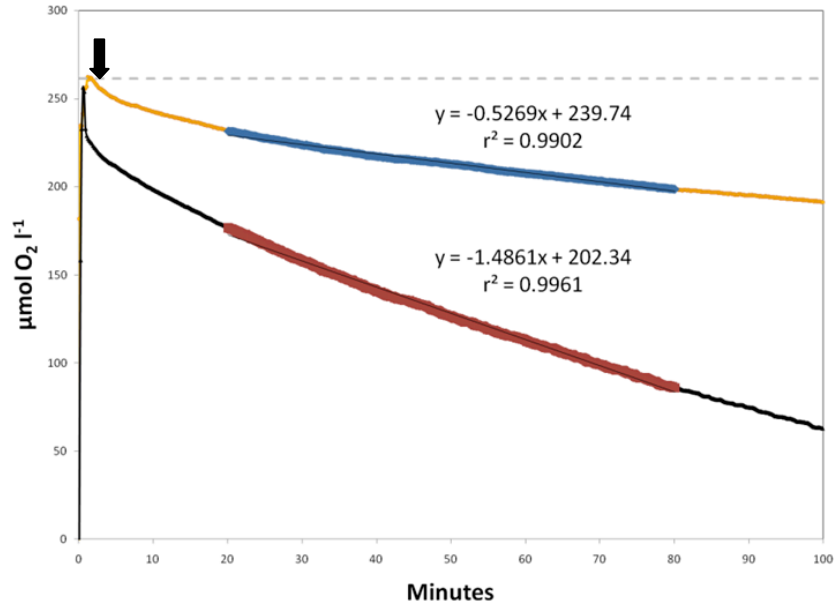


Figure S2: Typical oxygen concentration declines for tube respirometers loaded with samples. The timing of the insertion of the oxygen microsensor for the orange data set is indicated by the arrow. Linear fits (blue and red regions) are applied to the concentration profiles 20 to 30 minutes after the insertion of the probe (to allow for equilibration of the electrode). The slopes of these fits (m) are a function of the oxygen consumption rates ($OURs$) slowed by the leakage rate (LR) of oxygen into the respirometer. The grey dashed line indicates the atmospheric saturation concentration.

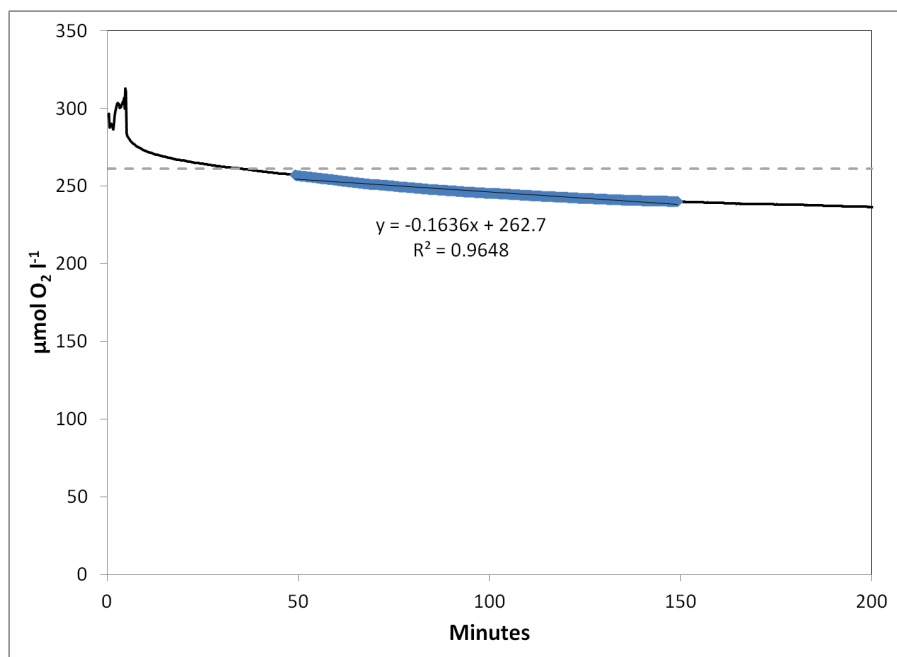


Figure S3: Typical oxygen concentration declines for capillary respirometer loaded with sample.