

Supporting Information

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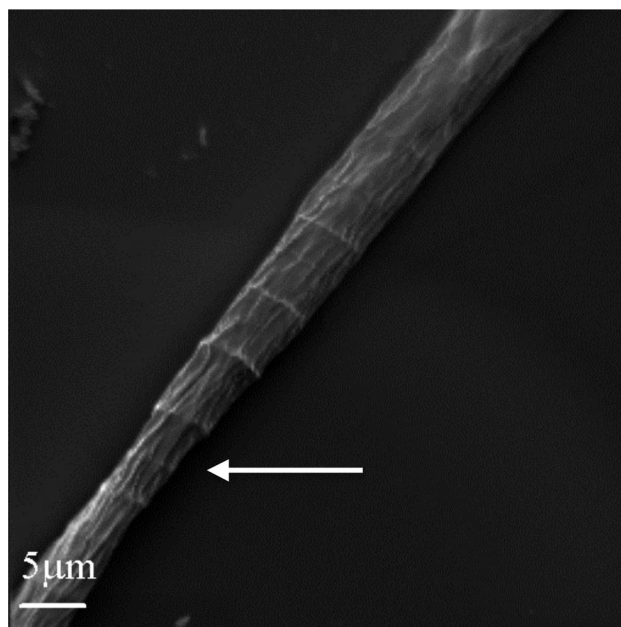


Fig. S1. Nanometer-scale secondary ion mass spectrometry (NanoSIMS) secondary electron image ($50 \mu\text{m}^2$) of a *Trichodesmium* trichome. The arrow indicates a potential "break point," a region of thinning cells with relatively low uptake activity.

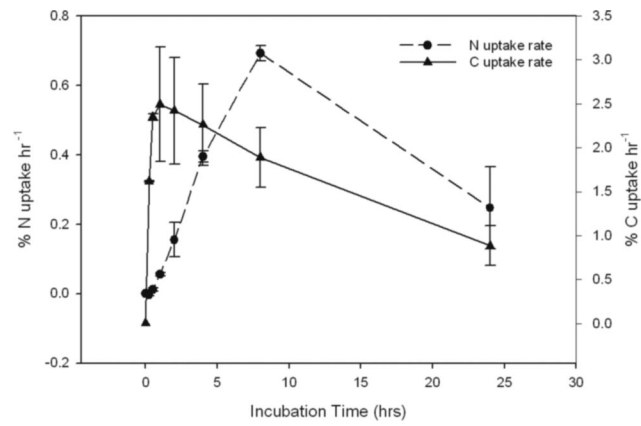


Fig. S2. ^{15}N and ^{13}C fixation rates (percentage uptake hour^{-1}) in *Trichodesmium* cells during a 24-h isotope labeling experiment. Data are generated from bulk IRMS analysis of pelleted cells sampled at 8 time points. Error bars represent 2 sigma error.

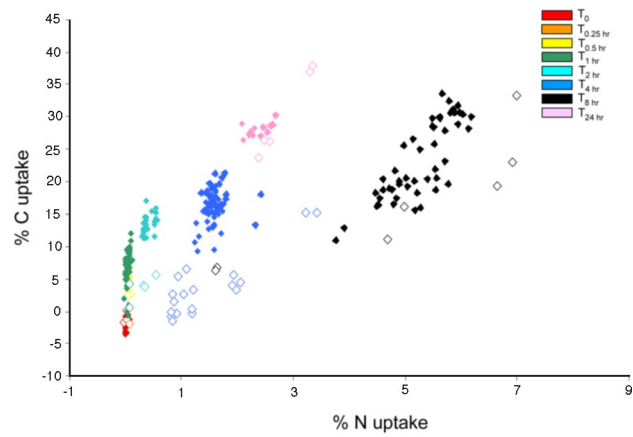


Fig. S3. Percentage ^{13}C and ^{15}N uptake at 8 time points in *Anabaena oscillarioides* cells analyzed by NanoSIMS, following stable isotope labeling with H^{13}CO_3 and $^{15}\text{N}_2$. Data points represent average values for individual cells measured along a single trichome by NanoSIMS. Time points are shown for both vegetative cells (filled diamonds) and heterocysts (open diamonds).