

Abstract Submitted  
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**Phototaxis beyond turning: persistent accumulation and response acclimation of the microalga *Chlamydomonas reinhardtii*** MARCO POLIN, University of Warwick, JORGE ARRIETA, ANA BARREIRA, Mediterranean Institute for Advanced Studies, MAURIZIO CHIOCCIOLI, University of Cambridge, IDAN TUVAL, Mediterranean Institute for Advanced Studies — Phototaxis is an important reaction to light displayed by a wide range of motile microorganisms, from bacteria to ciliates. Flagellated eukaryotic microalgae in particular, like the model organism *Chlamydomonas reinhardtii*, steer either towards or away from light by a rapid and precisely timed modulation of their flagellar activity. Cell steering, however, is only the beginning of a much longer process which ultimately allows cells to determine their light exposure history. This process is not well understood. Here we present a first quantitative study of the long timescale phototactic motility of *Chlamydomonas* at both single cell and population levels. Our results reveal that the phototactic strategy adopted by these microorganisms leads to an efficient exposure to light, and that the phototactic response is modulated over typical timescales of tens of seconds. The adaptation dynamics for phototaxis and chlorophyll fluorescence show a striking quantitative agreement, suggesting that photosynthesis controls quantitatively how cells navigate a light field.

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