The Effect of Adenylyl Cyclase Activity on the Regulation of the Ultradian Rhythm of Paramecium Tetraurelia

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THE EFFECT OF ADENYLYL CYCLASE ACTIVITY ON THE REGULATION OF THE
ULTRADIAN RHYTHM OF *PARAMECIUM TETRAURELIA*

A Thesis
Submitted to the School of Graduate Studies and Research
in Partial Fulfillment of the
Requirements for the Degree
Master of Science

Rebecca S. Rosemeier
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August 2013
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Paramecium tetraurelia possess an apparent ultradian rhythm in the frequency of a spontaneous avoidance response, which involves a brief reversal of swimming direction in the absence of external stimuli. This response is initiated by an action potential resulting from the influx of calcium ions into the cell via voltage-gated channels, dependent upon the activation of protein kinase A, which is caused by the presence of cAMP. The enzyme adenyl cyclase converts ATP to cAMP, activating protein kinase. Adenyl cyclase may therefore play an important role in the regulation of the ultradian rhythms. The addition of an adenyl cyclase blocking drug and gene silencing via RNAi decreased the number of SARs recorded over a 3-hour period, but did not alter the oscillation of the ultradian rhythm. These results suggest that AC is not involved in the regulation of ultradian oscillation, but is important for action potentials that generate ciliary motor reversal.