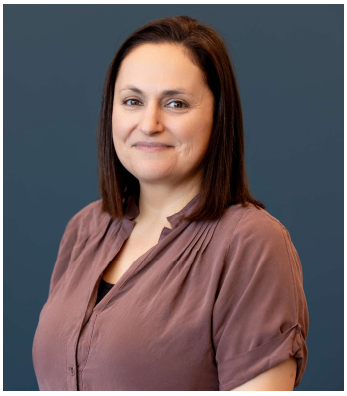
COLLEGE OF
Engineering, Computer Science, and Technology

Seminar in Interdisciplinary STEM Research

November 20th – Thursday, 3:05-4:20 PM PST

Location: ASCB 132

HOSTED BY CREST-CATSUS AND SIKAND SITI CENTERS



Susan Cohen, Ph.D.

Associate Professor of Biology at Cal State LA

Susan Cohen is originally from Cerritos and did her undergraduate work at UC Santa Barbara, where she was first exposed to research. She did her graduate work at MIT, where she studied mechanisms of DNA repair in bacteria. She moved back to California to complete her postdoctoral work at UC San Diego studying the molecular details of the cyanobacterial circadian clock. She started her lab at Cal State LA in 2017 and continues to study the details of the cyanobacterial circadian clock with her students!

A day in the life of a cyanobacterium

Circadian rhythms, regulated by a 24-h biological clock, are vitally important for controlling temporal programs of cellular physiology. The *Synechococcus elongatus* circadian oscillator, encoded by the *kaiA*, *kaiB* and *kaiC* genes, drives global rhythms of gene expression and compaction of the chromosome, and regulates the timing of cell division and natural transformation. While the KaiABC posttranslational oscillator can be reconstituted *in vitro*, the Kai-based oscillator is subject to several layers of regulation *in vivo*. Specifically, the oscillator proteins undergo changes in their subcellular localization patterns, where KaiA, KaiB and KaiC are diffuse throughout the cell during the day and localized as a focus at or near the pole of the cell at night. We identified proteins associated with KaiC in different localized states and found that loss of RNA binding protein 2 (Rbp2), found to be associated with localized KaiC, results in decreased incidence of KaiC localization and long-period circadian phenotypes, suggesting that Rbp2 plays a previously unrecognized role in regulating the circadian clock. We find that Rbp2 similarly localizes to cell poles at night and co-localizes with KaiC. The expression of RNA binding mutant variants of Rbp2 result in a decreased in Rbp2 localization and long period rhythms of gene expression, suggesting that RNA binding is critical for Rbp2's role in regulating the circadian clock. Rbp2 and KaiC do not associate *in vitro* suggesting that other factors are required to mediate their association. Through Co-immunoprecipitation (Co-IP) we discovered that KaiC and Rbp2 associate rhythmically with peak association occurring at dusk, in a manner that is independent of RNA binding. Taken together our data suggest a model where KaiC and Rbp2 associate, detected via Co-IP, in an RNA-independent manner and then migrate to the poles of cells in a manner that is RNA-dependent and suggests a model where RNA is used as a guide to promote protein complex assembly at the poles of cells.

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