QUANTITATIVE AND SYSTEMS BIOLOGY COLLOQUIUM:
Exploring the mechanisms of visual perception and novelty in the four-eyed fish Anableps anableps

Patricia Schneider
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Date:

4/10/2025

Time:

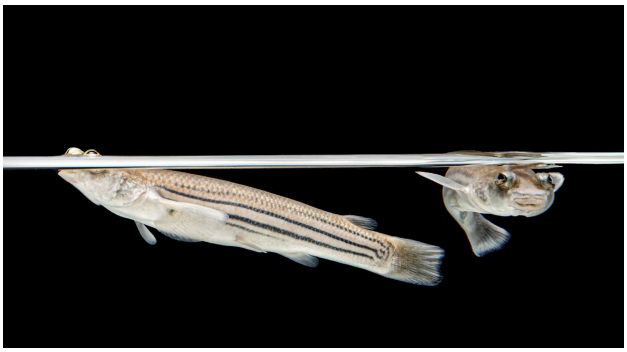
10:30 AM - 11:45 AM

Location:

COB 1 114

About the Speaker:

Patricia Schneider is an Assistant Professor at Louisiana State University, Baton Rouge, LA. Her primary research interest is studying the evolutionary innovations of the visual system using the four-eyed fish, Anableps anableps, as a research model. This species features a partially duplicated eye, allowing for simultaneous aerial and aquatic vision, all connected through a single optic nerve. Anableps serves as a unique model for investigating the developmental and genetic foundations of evolutionary novelty. Her expertise in developmental biology techniques together with her experience in working with non-model species place her team in the ideal position to investigate the cellular and molecular mechanisms underlying innovations to the visual system. Patricia earned a biology degree from the Federal University of Para, Brazil, followed by Graduate training at the University of Iowa, in the Genetics PhD Program. Her postdoctoral training was at the University of Chicago and Northwestern University, in Chicago.



Abstract:

Morphological innovations allow organisms to adapt to new niches and exploit new ecological opportunities, yet how such innovations arise has been a longstanding problem in evolutionary biology. In my lab, we exploit the unique features of the four-eyed fish Anableps anableps as a model for investigating innovations of the visual system. The Anableps inhabit the waterline and are capable of simultaneous above and below water vision. Light from above or below the waterline enters the eye through a uniquely duplicated set of corneas, and traverses a single pear-shaped lens, to finally reach the retina. The Anableps dorsal and ventral corneas are functionally different, consistent with their distinct morphology; In the Anableps retina, dorsally or ventrally restricted expression of photosensitive proteins are associated with detection of light from below or above the waterline, respectively. We combine bulk and spatial RNA-seq to epigenetic profiling via ATAC-seq, to identify candidate cis-regulatory elements (CREs) near genes that control regionally restricted expression in the retina. Furthermore, we use zebrafish transgenesis to functionally assess enhancer activity of high confidence candidate CREs.

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