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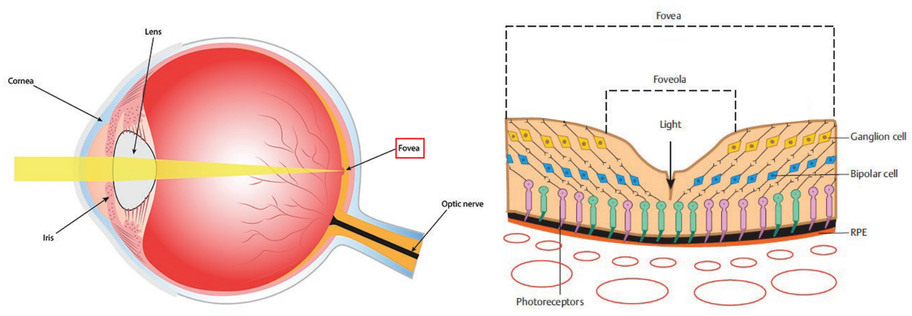
Using reptiles to uncover how pigmentation shapes eye development

By comparing eye development in pigmented and albino reptiles, my work investigates how pigmentation shapes the fovea, the retinal region responsible for sharp vision, and why vision is impaired in albinism.

Our high-acuity color vision is facilitated by the **fovea**



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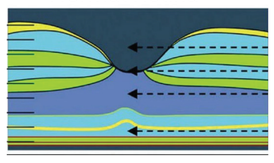
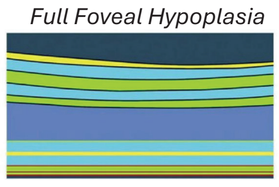
In patients with albinism, failure of fovea formation results in lifelong visual impairment

Normal Retina



Full Foveal Hypoplasia



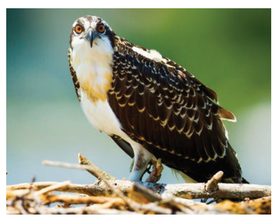


Adapted from Shenoy et al., *Diagnostics*, 2025

Only a select subset of animals possesses a fovea

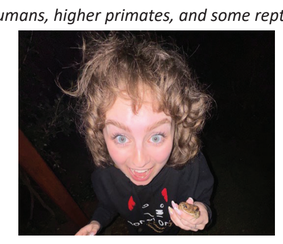


“Bird-like” fovea
Birds of prey and some reptiles





“Human-like” fovea
Humans, higher primates, and some reptiles

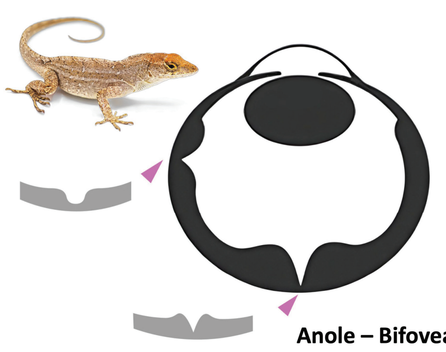




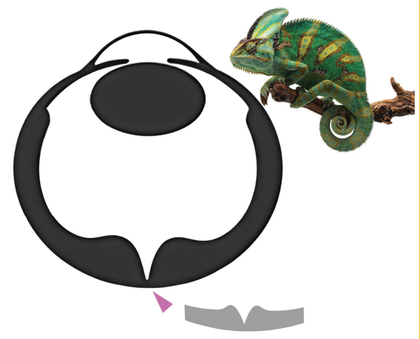
No fovea
All traditional model organisms



Foveated and genetically tractable reptiles are ideal for studying fovea development

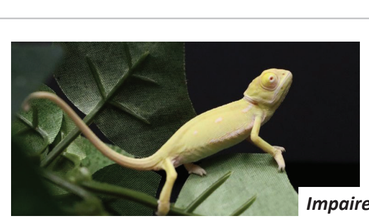


Anole – Bifoveated
Bird-like central fovea
Human-like temporal fovea

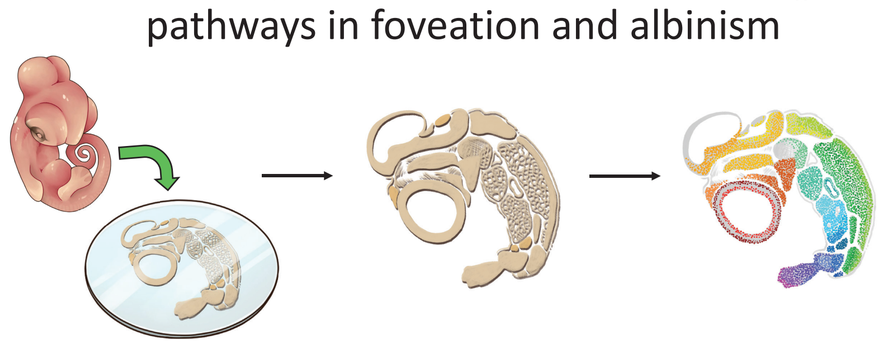


Chameleon - Foveated
Bird-like central fovea

Albino reptiles as models for visual impairment in albinism

	Brown Anole	Veiled Chameleon
Wild-Type	 *Normal vision*	 *Normal vision*
Albino	 ***Impaired vision***	 ***Impaired vision***

Spatial transcriptomics will uncover altered genetic pathways in foveation and albinism



Tissue sectioned and adhered to specialized slide

Hybridize probes for up to 1000 genes of interest

Genes shown at single-cell resolution in spatial context

Art by Anna Iouchmanov

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