



Robert M Raphael, PhD
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Research Interests

Membrane Biophysics/Transport
Auditory/Vestibular System

Strengths or Unique Resources

Optical Coherence Tomography
Computational Modeling

Type of collaborator you seek

Biochemistry/Structural Biology
Image Analysis/Segmentation/
Machine Learning



Publication List

<https://scholar.google.com/citations?user=wkSrhyUAAAAJ&hl=en>



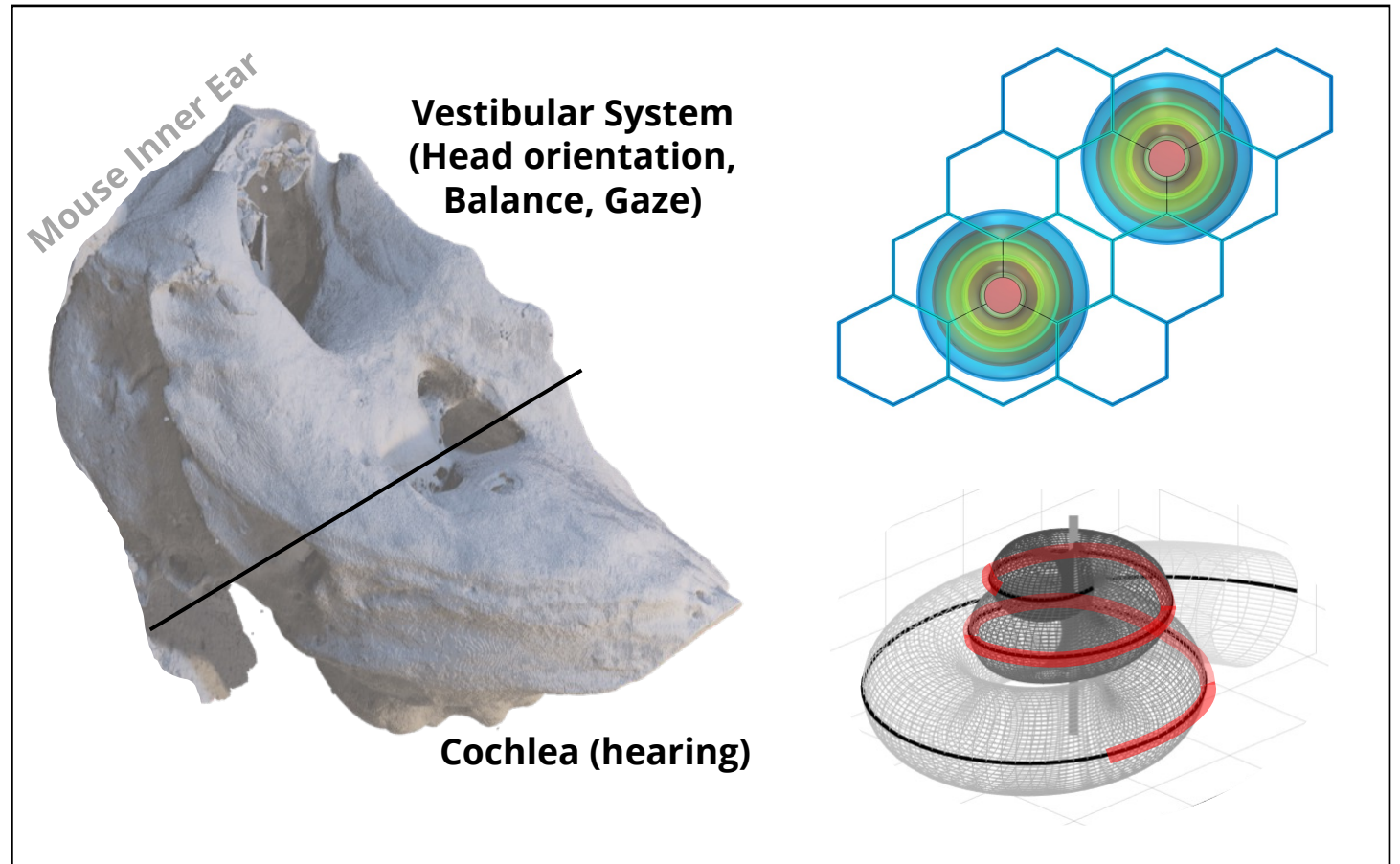
Lab or Faculty website

<https://profiles.rice.edu/faculty/robert-raphael>



LinkedIn

<https://www.linkedin.com/in/robert-raphael-86337a5>



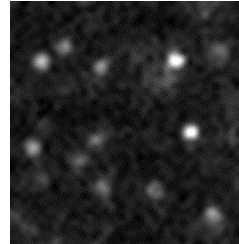
Structures and cells in the inner ear let us hear, orient, and maintain balance. We study their function.



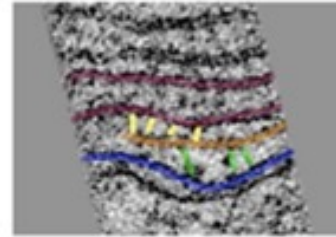
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Overview of the Raphael Lab

Molecular and Cellular Imaging

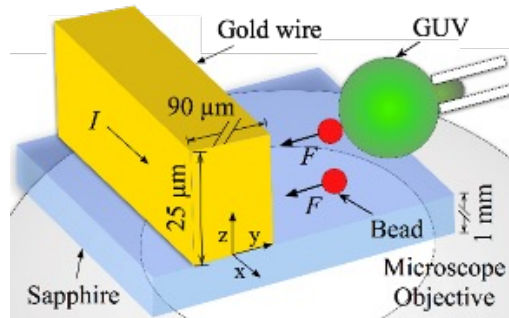


Single molecule

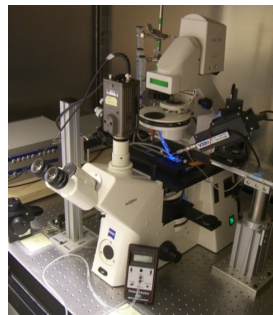


Electron Tomography

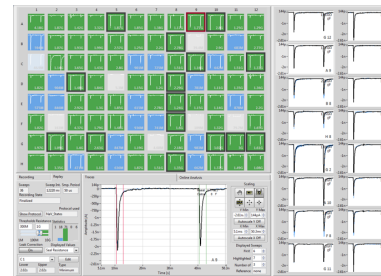
Membrane and Cell Mechanics



High-Throughput Electrophysiology

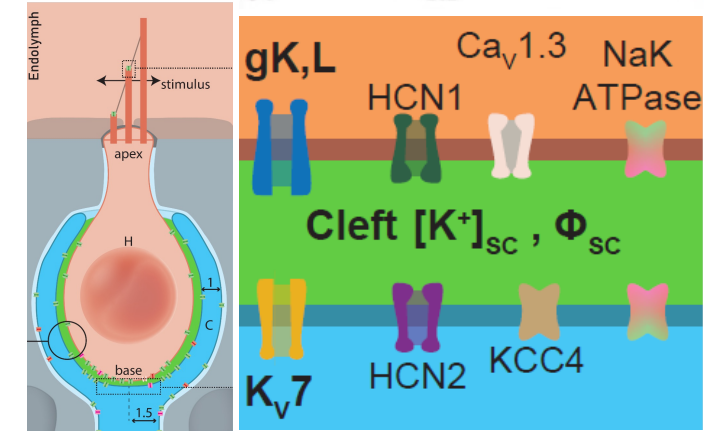


384 wells!



Models of Ion Transport and Metabolism

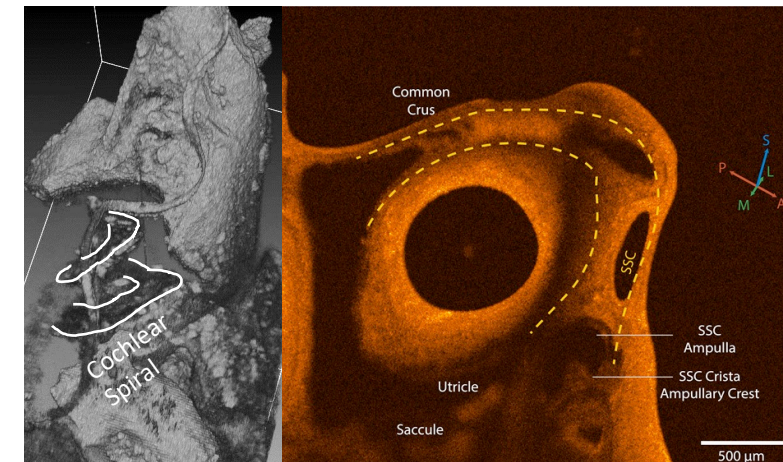
$$\frac{\partial c_i}{\partial t} = D[\nabla^2 c_i + \frac{z_i F}{RT} (\nabla c_i \nabla \phi + c_i \nabla^2 \phi)]$$



Inner Ear Optical Coherence Tomography

Cochlea

Vestibular System



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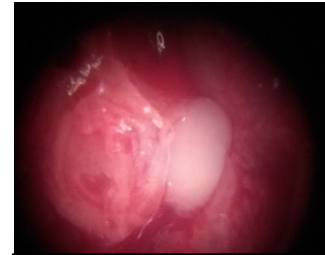
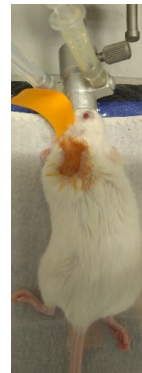
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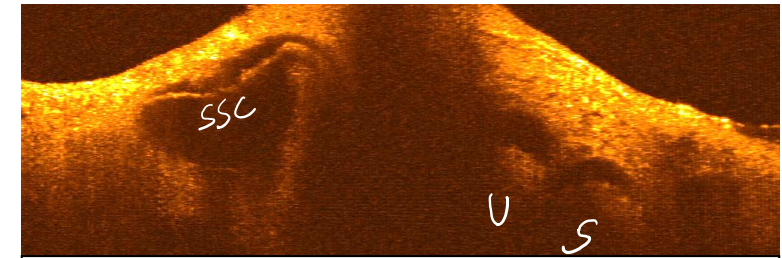
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Research Highlights and Collaborations sought

Optical Coherence Tomography



Otic capsule (top, left);
 Intact separated
 paraflocculus (top, right).



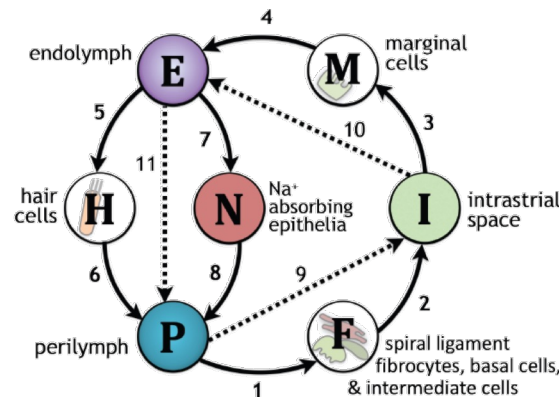
OCT image showing: the superior semicircular canal (SSC) ampulla and crista, utricle (U) and saccule (S) within vestibular compartments within otic capsule.

Goal: Study how these structures change in disease states and how they function *in vivo*.

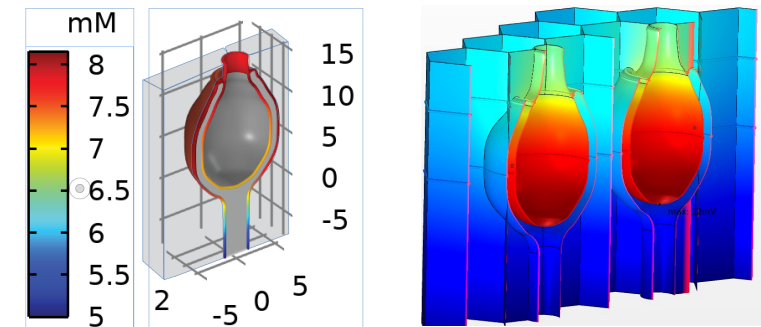
Collaborations: Image Analysis/Segmentation/Machine Learning/OCT

Computational modeling

Cochlear (Hearing)



Vestibular (orientation/balance)



Goal: Study homeostasis, disease and function in sensory epithelia.

Collaborations: Computational modelling, Electrophysiology, Imaging

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