

## Organelle Dynamics

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**Research Summary.** The complexity and resilience of cellular phenotypes are possible because of the specialized compartmentalization of cellular functions to organelles, such as mitochondria, peroxisomes, and chloroplasts. Despite the essential role organelles play in living organisms, our knowledge of the machinery and regulatory processes that control biogenesis and destruction of organelles remains far from complete. Rice University has an unusual strength in this research area, with faculty engaged in various aspects of organelle biogenesis and destruction and the regulatory processes that control these dynamics. Deep expertise exists in the genetic basis of peroxisome biogenesis, cellular and biochemical bases for endoplasmic reticulum morphology and function, and the regulation of autophagic destruction of diverse organelles, in addition to tremendous capabilities in high-resolution spatial imaging. Efforts to foster collaboration and develop synergies will strengthen the group and enable broader impact. Furthermore, the ongoing fundamental research on organelle dynamics will inform synergistic efforts on campus in the areas of systems and synthetic biology, especially that concerned with subcellular organization and eukaryotic organisms, and will drive translational application through interactions with other institutions of the TMC.

**Investments.** (i) Collaborative work could be supported through shared student/postdoc salaries and/or research facilities among the research groups with the goal of increasing competitiveness for large center grant support. (ii) Faculty hiring in areas that are synergistic with existing faculty and extend our specialized expertise further.

**Impact.** Building upon the existing strengths and fostering collaboration will bring additional recognition and reputation to Rice in this unusual research area and enhance success of garnering program project, research center, and student training grant support. Furthermore, fundamental discovery science will inform both engineering and clinical approaches to further broaden the impact of the research.