Application for OVPR Revise and Resubmit Seed Grant

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Project: Mechanisms of de novo membrane assembly

Summary:

The ability to rearrange vesicular traffic to create new membrane compartments *de novo* is a fundamental cell biological process important for many aspects of cellular physiology. Two examples of this phenomenon are the creation of autophagosomes and the generation of the ciliary sheath. In both cases, vesicles coalesce on a protein substrate to create a small double membrane that subsequently expands into a distinct organelle. Defects in these processes are associated with a variety of diseases, highlighting the importance of this aspect of cellular physiology to human health. Prospore membrane formation during the process of sporulation in budding yeast is another example of a *de novo* membrane formation event. Prospore membrane formation occurs on the microtubule organizing center of the cell, analogous to the ciliary sheath in higher cells, and the prospore membrane expands to encapsulate cytoplasmic components, analogous to an autophagosome. These similarities reflect parallels at the molecular level that make yeast sporulation a powerful model to explore the underlying mechanisms of membrane assembly. The experiments in this proposal are focused on two aspects of this process: 1) how precursor vesicles coalesce to create the prospore membrane, and 2) how the Vps13 lipid transfer protein promotes membrane expansion.