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Mitochondria generate energy needed to power cells and multicellular organisms. Wrinkles in the inner mitochondrial membrane, known as cristae, concentrate molecular motors for energy production. However, it is unclear how the wrinkly cristae are formed. Dr. Michelle Fry will use a clever approach to investigate cristae formation in cells. She will introduce candidate protein/protein complexes into parasitic protist mitochondria. These mitochondria are smooth, making them amenable for testing with proteins are sufficient to generate cristae. Dr. Fry will use advanced electron microscopy techniques to image changes in mitochondrial morphology. Fry will conduct these studies in Dr. Luke Chao's lab at Massachusetts General Hospital. These experiments will provide fundamental insights into mitochondrial biology and may provide clues for mitochondrial pathological dysfunction.

As a graduate student in Dr. Bil Clemons lab at the California Institute of Technology, Fry used structural biology to study the targeting of membrane proteins to the endoplasmic reticulum. Specifically, Dr. Fry captured several structural conformations of a protein chaperone, Get3. Fry demonstrated how conformational flexibility is important for Get3 to integrate multiple regulatory signals (binding partners, client proteins, nucleotide binding and hydrolysis). Dr Fry is now excited to use cryo-electron tomography to capture the conformational landscape of proteins that regulate mitochondrial cristae formation in cells.

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