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### Education and training

- PhD, Biochemistry Department, Tel Aviv University, Israel
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### How cryo-EM revolutionizes the exploration of planetary biology: focus on the evolution of mitochondrial bioenergetics

Visualizing the structures of biological molecular machines is essential for understanding their mechanisms. Electron cryo-microscopy (cryo-EM) has emerged as a crucial technique in structural and cell biology, enabling the determination of structures and conformational dynamics across a wide range of specimens. This allows for comparative analysis and exploration in planetary biology. Researchers can now enhance their biological insights with technical breakthroughs that provide high-resolution structural data and unprecedented clarity in cellular ultrastructure characterization. This talk will focus on how recent advances in instrumentation, software development, and data processing are enabling the investigation of fundamental biological questions, such as mitochondrial energy conversion and protein synthesis. These advancements offer deeper insights into mitochondrial nanoarchitecture and its evolutionary and functional complexity.

### References

1. Structure of the II2-III2-IV2 mitochondrial supercomplex from the parasite *Perkinsus marinus*. *bioRxiv* (2024).
2. Structural basis of mitochondrial membrane bending by the I-II-III-IV supercomplex. *Nature* 615, 934–938 (2023).
3. Mechanism of mitoribosomal small subunit biogenesis and preinitiation. *Nature* 606, 603-608 (2022).
4. Mechanism of membrane-tethered mitochondrial protein synthesis. *Science* 371 846-849 (2021).