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Research Roundup

Organelles in parallel

Endocytic organelles in three eukaryotic kingdoms evolved in parallel, according to Joel Dacks, Mark Field (University of Cambridge, UK), and Pak Poon (Dalhousie University, Halifax, Canada).

Unlike mitochondria and chloroplasts, the membrane trafficking system did not arise through endosymbiosis; it evolved from within. When fungi, plants, and animals split off from their last common ancestor, some parts of the system were "caught midstream in the process of becoming discrete organelles," says Dacks.

To track the development of the system, the authors performed phylogenetic analyses of three components: Rab5 and β-adaptins, which help sort cargo into vesicles, and the endocytic syntaxins, which assist vesicle fusion. The team found that in the common ancestor, each was represented by a single molecule that performed multiple functions. After divergence, the components evolved in parallel through gene duplication and specialization. For instance, syntaxin E homologues in each kingdom now include one that drives fusion at the early endosome and another that helps fuse late endosomes to the lysosome. These two sets of syntaxins arose after the eukaryotic split and independently adopted similar functions within each group.

"The distinction among the endosomes was less clear at the start and was firmed up afterward," says Field. The need for increased cargo specificity and sorting efficiency in each group seems to have driven the parallel evolution. JCB

Reference:

Dacks, J., et al. 2008. *Proc. Natl. Acad. Sci. USA*. doi:10.1073/pnas.0707318105. [Abstract]

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