

P013 Archaeal homologues of eukaryotic ESCRT proteins play a significant role in cell division

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The absence of both FtsZ and actin homologues in Crenarchaea elicits the intriguing question: what is the machinery responsible for cell division in this kingdom of life? We report evidence that homologues of eukaryotic ESCRT proteins, responsible for membrane manipulation events in higher eukaryotes such as endosomal sorting, cytokinesis, and viral egress, play a pivotal role in *Sulfolobus* cell division. Homologues of the ESCRT III family of proteins as well as the Vps4 AAA+ ATPase protein are conserved in Crenarchaea. Transcription of these genes is regulated throughout the cell cycle in *Sulfolobus acidocaldarius* and the proteins are found to localize at the midbodies of dividing cells. The archaeal ESCRT III-like protein has been shown to interact with the archaeal Vps4 MIT domain via a minimal region in the C-terminal tail. Six key residues are likely to be involved in this interaction, as demonstrated in the co-crystal structure of the ESCRT III interacting region with the Vps4 MIT domain. The involvement of these ESCRT homologues in crenarchaeal cell division is further supported by the gross cell division defects observed in cells overexpressing catalytically dead Vps4 proteins. We therefore propose a model involving the interplay of these critical cell division proteins with other members of the archaeal cytokinesis and mitotic machinery.