195d Discovery of a Filamentous Chaperone from a Hyperthermophile: Molecular Function and Potential Applications

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Many molecular chaperones are oligomeric complexes comprising 14 or more subunits. However, most assemble in a globular manner. We report the discovery of a hyperthermophilic molecular chaperone, a prefoldin from *Methanococcus jannaschii*, which assembles as a filament. To our knowledge, this is the first known functional filamentous chaperone. Dimensions of the chaperone are quantified by size exclusion chromatography, atomic force microscopy, and transmission electron microscopy measurements. The filaments show remarkable stability against common denaturants, temperature, and salts. Further, it is functional as a chaperone *in vitro*. Comparisons to the α/β prefoldin are shown, and differences highlighted. In light of the recently solved crystal structure of α/β prefoldin from a thermophile, we present a molecular model for filament assembly. Potential applications for bioprocessing will be discussed.