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**Borrowing building blocks from bacteria and eukarya: a three-component DNA segregation machine in archaea**

The precise distribution of newly replicated genomes to progeny cells is vital for stable maintenance of genetic information. In contrast to eukarya and bacteria, the fundamental biological question of DNA segregation remains virtually unexplored in archaea. We have investigated the molecular machinery and assembly mechanism of the partition system harboured by a low copy number plasmid in a *Sulfolobus* species from acidic hot springs in the island of Hokkaido, Japan.

The toolkit for the stable inheritance of this plasmid is a unique three-component machine borrowing building blocks from bacteria and eukarya. This system encodes a Walker-type ParA, a chimaeric adaptor ParB and a unique centromere-binding factor, AspA. The AspA protein spreads on the DNA generating a helical template or docking platform onto which ParB N-terminus domain subunits assemble into a second superhelix, fitting in a lock-and-key fashion into the AspA-DNA structure. Surprisingly, the ParB C-terminus, which binds DNA non-specifically, exhibits a structural fold similar to the CenpA histone variant, which is involved in assembly of the kinetochore segregation machinery in eukaryotic cells. This unique multi-protein superstructure merges prokaryotic and eukaryotic elements, suggesting the conservation of DNA segregation principles across the three domains of life.