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# The Dichotomy of the Poly(ADP-Ribose) Polymerase-Like Thermozyme from *Sulfolobus solfataricus*

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## Abstract

The first evidence of an ADP-ribosylating activity in Archaea was obtained in *Sulfolobus solfataricus* (strain MT-4) where a poly(ADP-ribose) polymerase (PARP)-like thermoprotein, defined with the acronymous PARPSso, was found. Similarly to the eukaryotic counterparts PARPSso cleaves beta-nicotinamide adenine dinucleotide to synthesize oligomers of ADP-ribose; cross-reacts with polyclonal anti-PARP-1 catalytic site antibodies; binds DNA. The main differences rely on the molecular mass (46.5 kDa) and the thermophily of PARPSso which works at 80 °C. Despite the biochemical properties that allow correlating it to PARP enzymes, the N-terminal and partial amino acid sequences available suggest that PARPSso belongs to a different group of enzymes, the DING proteins, an item discussed in detail in this review. This

finding makes PARPSso the first example of a DING protein in Archaea and extends the existence of DING proteins into all the biological kingdoms. PARPSsohas a cell peripheral localization, along with the edge of the cell membrane. The ADP-ribosylation reaction is reverted by a poly(ADP-ribose) glycohydrolase-like activity, able to use the eukaryotic poly(ADP-ribose) as a substrate too. Here we overview the research of (ADP-ribosyl)ation in *Sulfolobus solfataricus* in the past thirty years and discuss the features of PARPSso common with the canonical poly(ADP-ribose) polymerases, and the structure fitting with that of DING proteins. [View Full-Text](#)

*Keywords:* [Archaea](#); [Crenarcheota](#); [DING proteins](#); [PARG](#); [PARP](#); [PARPSso](#); [poly\(ADP-ribosyl\)ation](#); [Sulfolobus solfataricus](#)

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Figure 1

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