

Single stranded-DNA-binding proteins from *Thermus thermophilus* and *Thermus aquaticus* – application and new arrangement of binding domains

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Single-stranded-DNA-binding proteins (SSBs) play essential roles in DNA replication, recombination and repair in bacteria, archaea and eukarya. We have performed the identification and characterization of the SSB-like proteins of the thermophilic bacteria *Thermus thermophilus* and *Thermus aquaticus*. These proteins (*TthSSB* and *TaqSSB*), in contrast to their known counterparts from mesophilic bacteria, archaea and eukarya, are homodimers, and each monomer contains two ssDNA-binding domains with a conserved OB (oligonucleotide/oligosaccharide-binding) fold, as deduced from the sequence analysis. The N-terminal domain is located in the region from amino acid 1 to 123 and the C-terminal domain is located between amino acids 124 and 263 or 264 in *TthSSB* and *TaqSSB*, respectively. Purified *TthSSB* or *TaqSSB* binds only to ssDNA and with high affinity. The binding site size for *TaqSSB* and *TthSSB* protein corresponds to 30–35 nucleotides. It is concluded that the SSBs of thermophilic and mesophilic bacteria, archaea and eukarya share a common core ssDNA-binding domain. This ssDNA-binding domain was presumably present in the common ancestor to all three major branches of life. We have applied the use of *TthSSB* and *TaqSSB* protein to increase the amplification efficiency with a number of diverse templates. The use of SSB-like protein may prove to be generally applicable in improving the PCR efficiency.