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Structure and DNA-binding of meiosis-specific protein Hop2
DONGHUA ZHOU, HEM MOKTAN, Oklahoma State University, ROBERTO PEZZA, Oklahoma Medical Research Foundation — Here we report structure elucidation of the DNA binding domain of homologous pairing protein 2 (Hop2), which is important to gene diversity when sperms and eggs are produced. Together with another protein Mnd1, Hop2 enhances the strand invasion activity of recombinase Dmc1 by over 30 times, facilitating proper synapsis of homologous chromosomes. However, the structural and biochemical bases for the function of Hop2 and Mnd1 have not been well understood. As a first step toward such understanding, we recently solved the structure for the N-terminus of Hop2 (1-84) using solution NMR. This fragment shows a typical winged-head conformation with recognized DNA binding activity. DNA interacting sites were then investigated by chemical shift perturbations in a titration experiment. Information of these sites was used to guide protein-DNA docking with MD simulation, revealing that helix 3 is stably lodged in the DNA major groove and that wing 1 (connecting strands 2 and 3) transiently comes in contact with the minor groove in nanosecond time scale. Mutagenesis analysis further confirmed the DNA binding sites in this fragment of the protein.

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