

**W0346**

**EcoRI-DNA Complexes: Structures of a Divalent Cation Series and Their Biological Implications.**

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Like many nucleases, EcoRI endonuclease requires  $Mg^{2+}$  in order to cleave DNA. However, if the radius and/or preferred coordination of the divalent cation are altered, for example, using calcium instead of magnesium, DNA cleavage is inhibited to varying degrees depending on the cation. We determined the structures of a divalent cation series (EcoRI-DNA complex with cation) to examine the structural changes that occur with cation radius and geometric coordination changes. We have data from EcoRI-DNA complexes using the following cations:  $Mg^{2+}$  to 1.79Å resolution,  $Ca^{2+}$  to 2.38Å,  $Mn^{2+}$  to 2.20 Å, and  $Co^{2+}$  to 1.97Å. Structures and their biological implications will be presented and discussed.