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**“The Unusual Electron-transfer Dynamics of
Photosynthetic Bacterial Reaction Centers”**

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Abstract: The initial electron-transfer step in photosynthetic bacterial reaction centers has several puzzling features. Already very fast at room temperature, it becomes even faster at cryogenic temperatures. The reaction is surprisingly directional in view of the symmetrical structure of the protein, and the product forms in a stepwise or possibly oscillatory manner. Most attempts to rationalize the temperature dependence of the reaction have assumed that the vibrational levels of the excited electron donor equilibrate rapidly relative to the rate of electron transfer, which clearly is not the case. We therefore have sought to develop multidimensional, quantum mechanical model in which electron transfer occurs on the same time scale as vibrational relaxations and dephasing. Remarkably, almost all the information needed for this can be obtained from classical molecular dynamics simulations. The model appears to account well for most of the observations.