

The role of 13-*cis* and all-*trans* retinal in the proton pumping mechanism of bacteriorhodopsin

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In bacteriorhodopsin the retinal exists in two conformations: all-*trans* and 13-*cis*. Light-adapted bacteriorhodopsin contains only all-*trans* retinal. It has an absorption maximum at 568 nm and pumps a proton across the membrane upon light excitation going through a photocycle. Dark-adapted bacteriorhodopsin contains both retinal conformations and displays an absorption maximum at 558 nm. The bacteriorhodopsin containing 13-*cis* retinal also goes through a photocycle on light excitation but does not pump protons. Both types of protein (bacteriorhodopsin containing all-*trans* and 13-*cis* retinal) exhibit an electric response signal excited by a laser flash. These provide information about the charge motions inside the membrane during the photocycle. The dependence of these signals on different external conditions (temperature, humidity, etc) may serve as a tool for investigation of the roles of 13-*cis* and all-*trans* retinal in the charge motions in the bacteriorhodopsin and the processes of light- and dark-adaptation. Here we present some results of this study.