

Inward rectification in Limulus ventral photoreceptors

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We examined inward rectification in Limulus ventral photoreceptors using the two-microelectrode voltage clamp. Hyperpolarization in the dark induced an inward current whose magnitude was distinctly dependent on extracellular K^+ concentration, $[K]_o$. The $[K]_o$ dependence resembled the characteristic $[K]_o$ dependence of other inward rectifiers. The inward current was not dependent on extracellular Ca^{2+} or Na^+ and it was unaffected by intracellular injection of Cl^- . The hyperpolarization induced currents had two phases, an early nearly instantaneous phase and a slowly developing late phase. The currents were sensitive to extracellular barium and cesium. In voltage-pulse experiments, the magnitudes of the inwardly rectifying currents were variable from cell to cell, with some cells exhibiting negligible inward currents. Large hyperpolarizations (to membrane potentials more negative than about -140 mV) caused unstable inward current recordings, irreversible desensitization, and irreversible elevat