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The Selective Elimination of Avian Violet Photoreceptors

Henry Lather

Washington University in St Louis

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It has been speculated that violet cone photoreceptors mediate the magnetic sense in chickens; a conclusive test for this suggested pathway would be to test chickens lacking violet photoreceptors for magnetoreception. The goal of this project was to use a violet photoreceptor-specific promoter to drive the expression of the diphtheria toxin (DT) gene solely in chicken violet cone photoreceptors, killing those cells and selectively eliminating the violet photoreceptor cell population. A plasmid containing the DT gene was co-electroporated into dissected embryonic chicken retinas with a loading control plasmid constitutively expressing DsRed (a red fluorescent protein) and a reporter construct expressing GFP, driven by the same violet cone-specific promoter. Mixed results were achieved; while the normalized GFP expression level did not significantly decrease, a decrease in fluorescence was observed for both the loading control and the reporter construct. These results may be attributable to leakiness in the promoter, resulting in widespread expression of DT and subsequent cell death.