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動物磁気感受のためのクリプトクロム時空間計測

## § 1. 研究成果の概要

The first 6 months of this PRESTO (さきがけ) project established experimental apparatus and sample preparation methodologies required for the subsequent years of this research plan. Considerable progress was made during these initial 6 months, however, due to unforeseen circumstances, i.e. the global coronavirus (COVID-19) pandemic, the predicted outcome for this period was somewhat affected.

**Experimental:** A fluorescence correlation spectroscopy (FCS) / single molecule (SM) microscope was constructed for studying the structural dynamics and oligomerization of and magnetic field effects on cryptochrome proteins. Currently, the microscope is being calibrated and tested with model cryptochrome systems.

**Theoretical:** Molecular dynamics and spin dynamics simulations are currently examining the influence of cryptochrome oligomerization on the magnetic compass sensing ability of migratory birds.

**Sample preparation:** Synthesis of European robin cryptochrome 4 (ErCRY4) is underway. The plasmid was successfully introduced into *E. coli*, which is now being purified and analyzed by various analytical techniques. Once successful isolation of the protein has been achieved, the protein will be used for various experiments, including transient absorption and cavity ring down magnetic field effect spectroscopies, FCS/SM microscopy, double electron-electron resonance (DEER), and electron paramagnetic resonance (EPR). Utilization of these techniques will hopefully shed light on the conformational dynamics and magnetic field effects thereon of cryptochrome proteins and will hopefully answer some of the unanswered questions regarding animal magnetoreception.