

"Modeling of Master and Slave Oscillators in Birds During Migratory Season"

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During migratory season, many birds are extremely active during the day and night. When these birds are kept in cages free from external stimuli and environmental cues, they still exhibit nocturnal activity during migratory season, known as Zugunruhe. The model of the sleep/wake patterns in these birds is based on Scheper's model of a system of nonlinear ordinary differential equations, originally used to model mRNA and the protein it produced. The system consists of one master oscillator (with ~6 month period) and two slave oscillators (with ~24 hour period), one modeling activity during migratory season and the other modeling activity after migratory season. The master oscillator switches between the two slave oscillators depending on the season and the graph shows the resulting change in activity. Another model introduces a forcing term into the differential equations and shows how quickly the model can adjust back to normal after it has been changed to display a given period and amplitude. An attempt is made to validate the model with data gathered from the avian lab of Dr. V Cassone.