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Dear Dr. Craig Franklin:

Please consider our manuscript, “Manipulation of a social signal affects DNA methylation of a stress-related gene in a free-living bird” for publication in Biology Letters. In this study we document epigenetic changes in free-living tree swallows in response to manipulation of plumage color, a key social signal in birds.

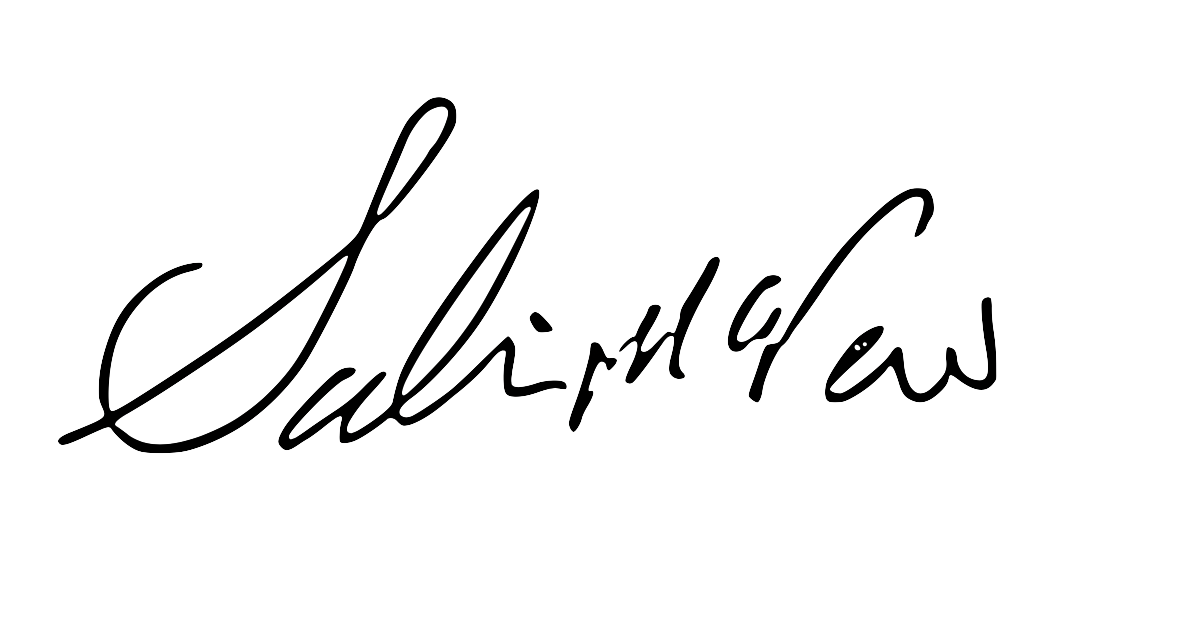
Social status is a determinant of health in humans and other animals. Low status individuals have shorter lifespans and a greater disease burden. However, exactly how the social environment mediates health effects is not well understood. Epigenetic processes, including DNA methylation, are sensitive to the environment and have physiological consequences. Thus, epigenetic mechanisms could link social stressors to heath.

Here, we manipulate plumage, a key social signal in tree swallows, and measure its effects on DNA methylation. We focus on methylation in four candidate genes involved in the HPA-axis, the neuroendocrine pathway that activates in response to stressors. Epigenetic dysregulation of the HPA-axis is linked to disease in humans, primates, and laboratory models. We found that plumage manipulation affected DNA methylation in one gene, CRHR1, and that methylation of this gene was correlated with corticosterone levels. Although methylation in the other three genes was unrelated to treatment, we found that methylation levels in two genes changed over the course of the study. Thus, our results show that DNA methylation in stress-related genes is labile over short time periods and may be sensitive to environmental conditions, including the social environment.

Even though many bird species are highly social, the epigenetic markers of their social environment have been little investigated. Our study experimentally tests whether changes to a key social signal has effects on DNA methylation and stress physiology. Moreover, our repeat sampling of the same individuals shows that DNA methylation can be variable over short periods in adult birds. Although other recent studies have shown that environmental stressors can affect DNA methylation in free-living birds, most other studies have focused on developing birds. Our study is novel and important because it shows that DNA methylation is sensitive to the environment even into adulthood.

Thank you for your consideration of our manuscript. We look forward to your response.

On behalf of all authors,

Sincerely,

Sabrina McNew