

FACULTY RESEARCH FUND

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Proposal Title: Geographic variation in egg composition in Prothonotary Warblers (*Protonotaria citrea*)

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ABSTRACT

“Bergmann’s Rule” is a classic biogeographical principle based on the positive relationship between latitude and body size in endotherms, with the underlying mechanism being related to the fact that smaller individuals lose more heat/body mass. Although repeatedly supported over the past century, this pattern is currently under increased scrutiny as global change alters climate differentially by latitude: specifically, temperatures at higher latitudes are increasing much more rapidly than those at lower latitudes. We recently tested for Bergmann’s Rule in a migratory songbird (Prothonotary Warbler; *Protonotaria citrea*) across all developmental stages, and despite this differential increase in temperatures, we still found a positive contemporary relationship between latitude and body size during all post-embryonic life stages. However, for egg size, the relationship only existed when analyzing historical eggs; the pattern was reversed (negative) in contemporary eggs. The mechanism that allows for this reversal (and how smaller eggs can lead to larger nestlings in the north) is currently unknown but we hypothesize it is related to variation in egg composition across latitudes. To begin to address this hypothesis, we propose a large-scale, collaborative study of egg composition across the Prothonotary Warbler breeding range, leveraging existing Prothonotary Warbler collaborators that conduct breeding studies to meet two objectives. First, we aim to **quantify how egg composition varies across space**, and second, we will **evaluate if/how this variation could contribute to the patterns we documented regarding body and egg size across space and time**. To do so, we propose to collect three eggs from ten nests from across the full extent of the latitudinal breeding range (30° to 44.5° N; total of 210 eggs) and then analyze the chemical composition of these eggs. Specifically we will assess spatial variation in water content, proportion of albumen and yolk, lipid content, androgens, immunoglobulins, and carotenoids.