

DISSERTATION DEFENSE

# From the Brain to the Barrio: Energy and Stress Interact to Facilitate the Urbanization of Sonoran Desert Birds

by

H.Bobby Fokidis

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**Committee:** Pierre Deviche (Chair), Ananias Escalante, Dale DeNardo, Karen Sweazea, Kevin McGraw, Miles Orchinik



**Abstract:** The impact of urbanization on wildlife is becoming an important topic in conservation. However little is known concerning the proximate mechanisms involved which enable some species to persist in cities, while others perish. Adapting to novel city environments requires individuals to maintain a functional physiological response to stressful stimuli, while concurrently using the necessary resources (food) needed to persist. A primary function of the stress response is the mobilization of intrinsic energy resources, and thus both requirements (energy and stress) are explicable linked.

This dissertation investigates the interaction of energetic reserves and the physiological stress response in a native bird species, the Curve-billed Thrasher, within the context of this species' colonization of Phoenix, Arizona. This research uses a combination of comparative studies, statistical modeling, and experimental approaches conducted in field and captive settings to demonstrate how urban and desert populations of these species differ in energetic state and stress physiology.

These studies reveal that the current energetic status of an individual bird influences the secretion of glucocorticoids (primary stress hormones) and can alter how energy reserves are used for gluconeogenesis to produce energy during acute stress. In addition, this research also identifies how differing levels of a hypothalamic neuropeptide (vasotocin) may play a role in mediating differences in stress physiology between populations. The quantity of food available and even temporal variability in its abundance may alter how native birds respond to stress. It can serve as a mechanism that facilitates the successful colonization of cities by wildlife.