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Dear Dr. Dantzer,  
Associate Editor at the Journal of Animal Ecology,   
British Ecological Society, 42 Wharf Road, London, UK  
  
Please find attached our manuscript entitled “Thermal flexibility is a repeatable mechanism to cope with environmental stressors in a passerine bird”, to be considered for publication as a research article in the Journal of Animal Ecology. I confirm that this manuscript is original and has not been submitted for consideration elsewhere.

Stress-induced changes in biological processes (e.g. reproduction, immunity, thermoregulation) are commonly viewed as adaptive mechanisms that serve to balance energetic expenditure in challenging environments, and thus reduce ones risk of entering allostatic overload. Curiously, however, whether the magnitude of such stress-induced changes in biological processes vary between individuals from environments with differing energetic demands appears largely unknown. Moreover, whether such responses satisfy the basic tenants of evolution by natural selection - and therefore may be considered adaptations at all – remains unclear.

Previously, we have shown that in response to repeated acute stressors, passerine birds adjust their surface temperatures to balance energetic expenditure toward thermoregulation. In the current study, we extend this work to test whether the stress-induced thermal response is augmented among individuals from high-cost urban environments relative to those from low-cost rural environments. Furthermore, we tested whether this thermal response satisfy two critical criteria for evolution by natural selection: (1) variable influence on fitness among individuals (here, estimated by perceived expenditure toward thermoregulation), and (2) variability among, and consistency within, individuals (e.g. repeatability). Using the black-capped chickadee (*Poecile atricapilus;* a small, temperate endotherm) as a model species, we show that the magnitude of stress-induced changes in peripheral heat-loss do not differ between individuals captured from urban or rural ecotypes. However, we do show that chronic changes in peripheral heat-loss that accompany the stress response: (1) likely hold meaningful effects on efficiency of energy-use in challenging environments, but only for some individuals, (2) are highly repeatable (R = 0.67), and: (3) display early signatures of stabalising or direction selection. Given that stress-induced changes in peripheral heat-loss may well be governed by heritable variation in physiological processes (discussed in our study), we therefore propose that this trait may be an adaptive component of the endotherm stress response that enhances ones capacity to cope with concurrent thermal and physical stressors in challenging environments.

We think that this research will be of broad interest to the readers of Journal of Animal Ecology for two reasons. First, we report a potentially adaptive and repeatable mechanism by which endotherms may balance energy expenditure toward two common environmental challenges: temperatures outside of thermoneutrality, and unpredictable acute stressors. Second, we challenge the dominant technique used to test the repeatability of traits among the physiological ecology community, and propose a new method to do so which accounts for error attributable to experimental or observational conditions .

Thank-you for your time and consideration of our manuscript, and please address correspondence regarding this manuscript submission to myself (Joshua K Robertson; contact information below). No conflicts of interest are disclosed. On behalf of myself and co-authors,

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