Patterns and potential mechanisms of phenotypic changes in urban small mammals

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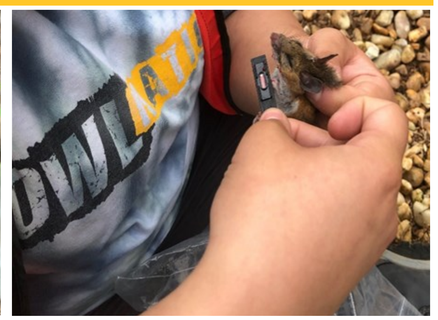
Background

- We investigated how urbanization might affect small mammal morphology and physiology.
- Urbanization: increasing human population density, artificial land use types, and habitat fragmentation, presenting novel environmental challenges.
- We hypothesized that urban animals would have altered mass, triglycerides, and blood cholesterol because of access to artificial and human-origin foods.

Methods



Top left: Drawing blood from a white-footed mouse (*Peromyscus leucopus*).

Top right: Collecting blood for a lipid panel.

Bottom left: Measuring total length of a white-footed mouse.

- Trapped small mammals along urban-rural gradient centered on Atlanta, Georgia, USA.
- Recorded species, sex, reproductive status, body mass, body length, and measured blood lipids in the field.
- Analyzed body morphology (length and mass-length residuals) and lipid parameters in relation to individual and environmental characteristics.

Preliminary Results

Mass:Length Allometry by Species

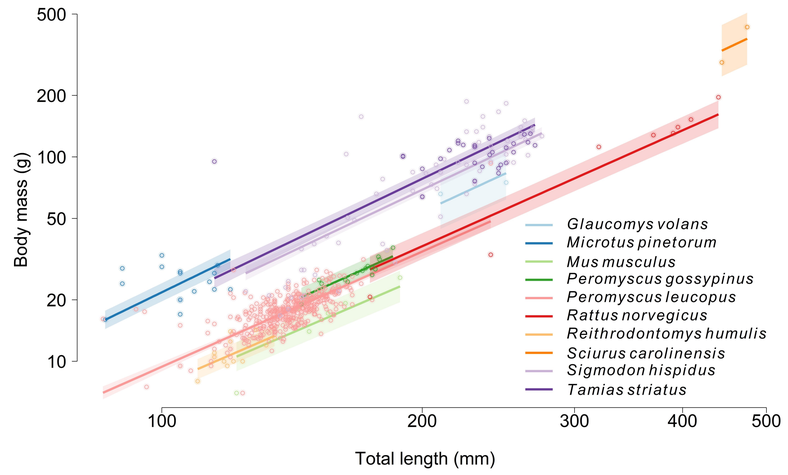


Figure 1. Fitted power law of body mass as a function of body length, with species-specific slopes. Model R^2 = 0.91 (omnibus $F_{10,557}$ = 575.60, P < 0.01).

Urbanization affected TRIG

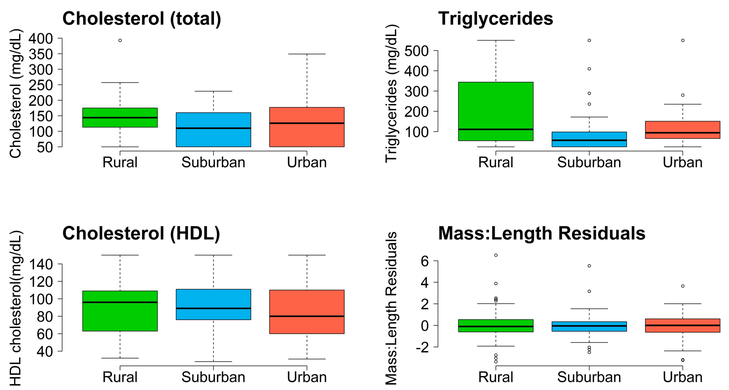


Figure 2. Only TRIG varied with site type (Kruskal-Wallis χ^2 = 11.8, 2 d.f., P < 0.01). CHOL was correlated with HDL (Spearman's ρ = 0.51, P < 0.01) and TRIG (ρ = 0.54, P < 0.01).

Urbanization affected total length

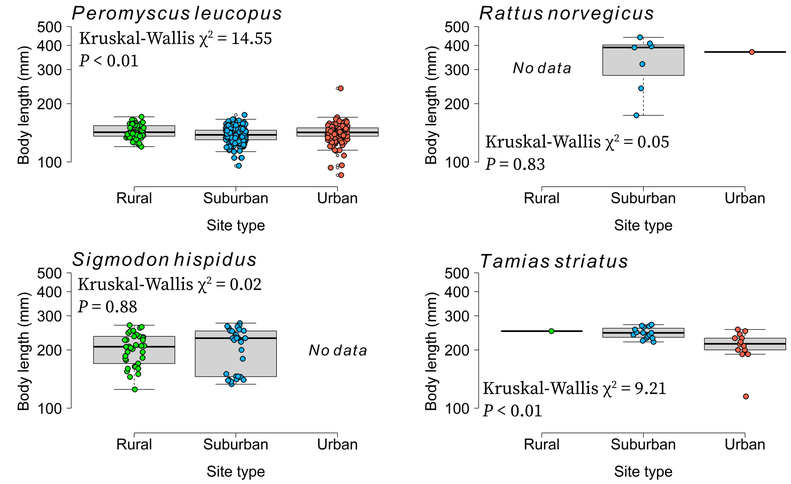


Figure 3. White-footed mice (*P. leucopus*) were significantly smaller at suburban sites; chipmunks (*T. striatus*) were significantly smaller at urban sites.

HDL decreased with length

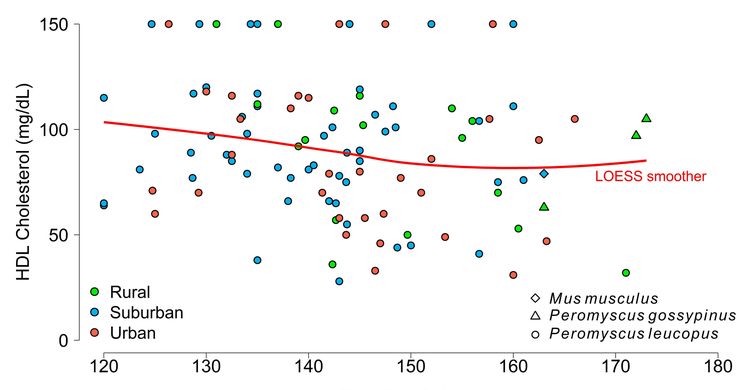


Figure 4. HDL cholesterol was weakly negatively correlated with total body length for the 3 species for which data were available (Spearman's ρ = -0.21, P = 0.02) .