

Bugs Like it Hot

Except when they don't

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Biodiversity increases with temperature outside of cities

There is a paradox in modern ecology. It is a well established fact that biodiversity generally increases with temperature along a latitudinal and elevational gradient. Urbanization is closely associated with increased local temperatures. Logically, this would make urban areas hotspots for life, yet we are seeing the opposite, with rising local temperatures being inversely related to biodiversity. To understand the relationship between latitudinal temperature trends, local temperature trends, and biodiversity, we quantified species richness of a common social insect (ants) that were collected in four major cities at different latitudes on the east coast of the United States.

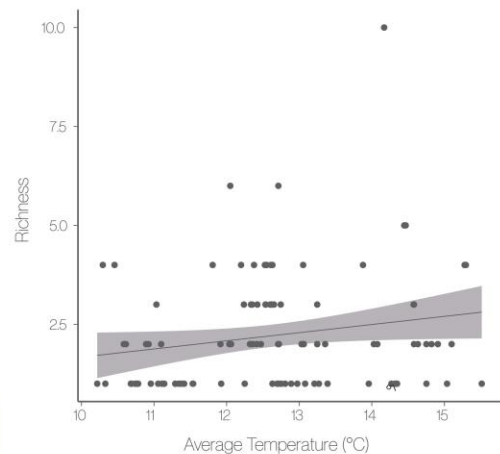


Figure 1. Plot of average temperature vs richness for Baltimore, Boston, Raleigh, and Queens combined

Biodiversity decreases as temperatures rise in cities

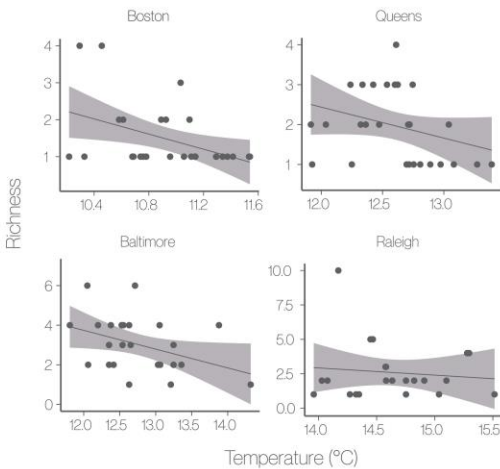
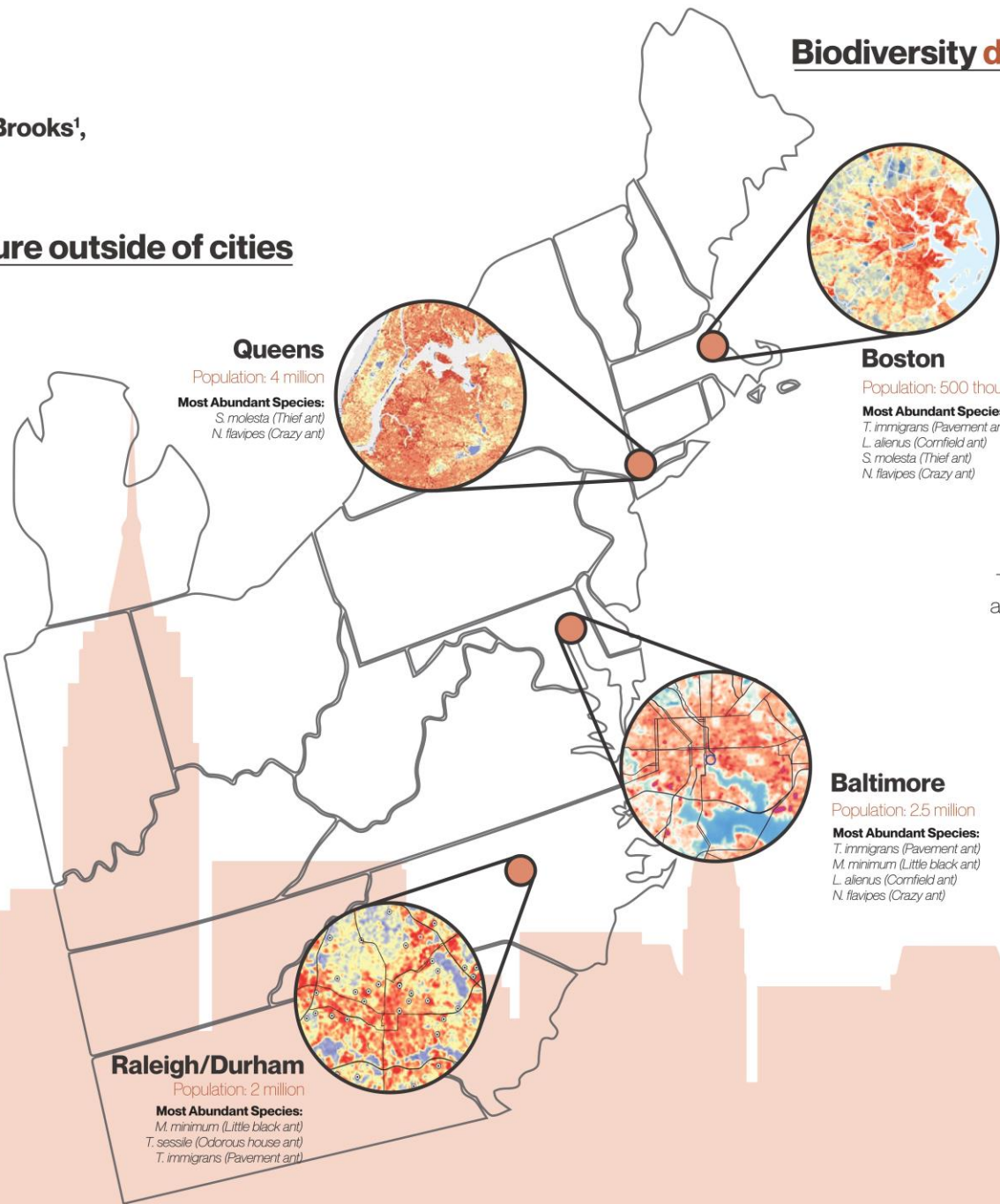


Figure 2. Plot of average temperature vs richness for four cities individually

This negative correlation seen between increasing local temperature and biodiversity is due to the urban heat island effect, a phenomenon in which an urban area is disproportionately warmer than the surrounding areas. The discrepancy in trends relating biodiversity to local temperature examined in this study adds to a growing body of evidence that suggests human development has a negative impact on local biodiversity. Additionally, these results suggest that this disruption in local temperature due to the urban heat island effect is consistent across the natural latitudinal heat gradient, and may have further effects on human inhabitants of cities as well as animal and insect populations.



Queens

Population: 4 million

Most Abundant Species:

S. molesta (Thief ant)

N. flavipes (Crazy ant)

Boston

Population: 500 thousand

Most Abundant Species:

T. immigrans (Pavement ant)

L. alienus (Cornfield ant)

S. molesta (Thief ant)

N. flavipes (Crazy ant)

Baltimore

Population: 2.5 million

Most Abundant Species:

T. immigrans (Pavement ant)

M. minimum (Little black ant)

L. alienus (Cornfield ant)

N. flavipes (Crazy ant)

Raleigh/Durham

Population: 2 million

Most Abundant Species:

M. minimum (Little black ant)

T. sessile (Odorous house ant)

T. immigrans (Pavement ant)

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