Chronic heat stress resistance in Caenorhabditis remanei

Sally Claridge
Christine O’Connor
Dr. Patrick Phillips Laboratory
Institute of Ecology and Evolution
Convergent Evolution and Divergent Selection

Figure 1: Aerial photograph of the Tularosa Basin of southern New Mexico with photographs of lizards from different substrate color environments. The blanched color morphs found at White Sands (indicated by the white bar) are compared to the wild-type color morphs found throughout the rest of the species' ranges (indicated by the black bar). On the map, black, white, and gray circles represent collecting localities with dark soil, white sand, and ecotonal habitats, respectively. Population letter designations are used throughout and correspond to the following geographic localities:

A, Alkali Flats, White Sands National Monument;
B, Range Road 10, White Sands Missile Range;
C, Big Dunes, White Sands National Monument;
D, Observatory, White Sands Missile Range;
E, Experimental Range, Jornada Long-Term Ecological Research Station;
F, Mockingbird Pass, White Sands Missile Range;
G, Rita Site, White Sands Missile Range;
H, Taylor Draw, Three Rivers;
I, Visitor's Center, White Sands National Monument;
J, Otero Mesa, Fort Bliss.

These narrow bands of habitat are found either at the margin of the large dune system or at small satellite dunes just removed from the primary dune field. The movement of the dunes over time and the temporal layering of gypsum deposition cause greater variability in substrate color in ecotonal areas. These transition zones are extremely restricted, and the boundary of the white sand is abrupt and...
Research Question

How do migration-selection dynamics affect population divergence?

$m < s \rightarrow \text{divergence}$

Caenorhabditis remanei

Sexual reproduction

Rapid generation time

Large populations

Freeze and thaw

Research Question

How do migration-selection dynamics affect population divergence?

$m < s \rightarrow \text{divergence}$

$m > s \rightarrow \text{no divergence}$

Experimental Evolution
Female fecundity: Generation 30 at 31°C

Experimental Evolution

Female fecundity: Generation 30 at 31°C

Experimental Evolution

Female fecundity: Generation 30 at 31°C
Female fecundity: Generation 30 at 31°C

Significant effect of selection

Female fecundity: Generation 30/40 at 31°C

Christine O'Connor
Female fecundity: Generation 40 at 20°C

Potential adaptation to the laboratory environment

Potential cost to adaptation to the novel environment
Female fecundity: Generation 40 at 20°C

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Summary

5% migration rate slowed the rate of adaptation

Populations can diverge despite gene flow

Genomic analysis is forthcoming

Questions?

Christine O'Connor
Dr. Patrick Phillips
Dr. Tyler Hether
Dr. Samantha Hopkins
Dr. Cristin Hulslander
Paula Berry
Phillips Lab Group

Full Citations


Velema G. Vananda Creek Limnetic male (top left) and female (top right) and Benthic male (bottom left) and female (bottom right) sticklebacks. Figure <https://www.registrelepisararegistry.gc.ca/default.asp?lang=En&n=42F1C425-1#Toc264979557>. Accessed 2017 Apr 25.