Redband Trout (Oncorhynchus mykiss gairdneri)

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Mechanisms of thermal adaptation in Redband Trout (Oncorhynchus mykiss gairdneri)

Summary

- Desert redband trout have superior thermal performance.
  - Tolerate higher temperatures
  - Maintain performance across broader thermal ranges
  - Better cardiac performance

- “Winners” of future climate change may need a “strong” heart to deliver O₂ for sustained aerobic metabolism.

- Putative genomic regions (e.g. CERK gene) for thermal tolerance and adaptation are identified

Collections and Study Area

- Desert
  1) Desert:
     - Little Jacks Creek, Duncan Creek; William Creek
  2) Cool Montane:
     - Keithley Creek; Whiskey Jack Creek; Dry Creek
  3) Cold Montane:
     - Callahan Creek; Fawn Creek; Upper Mann Creek

Habitat characterization

Stream temperature

- Critical thermal maximum (CT_max)
  - Desert
  - Cool Montane
  - Cold Montane

Thermal tolerance

- RMR: routine metabolic rate
- MMR: maximum metabolic rate

Desert redband trout have superior thermal performance:

1. Higher critical thermal maximum
2. Broader thermal window for optimum aerobic activities.

Cardiac function

- Desert redband trout have better cardiac performance:
  - 10°C
  - 15°C
  - 20°C

Genomic markers of thermal adaptation

- Over 5 million SNPs
- Over 50% genome coverage
- Chromosome 4: 8.2M (CERK gene) associated with cardiac function

Future Work and Work in Progress

- Include more acclimation temperatures to study phenotypic plasticity
- Examine adaptive traits related to growth and reproduction

Reference and acknowledgments

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The authors thank Jeongwhui Hong, Tim Boyle, Seunghan Lee, Hossain Sakhawat and Yang Gang for their help in the field.