# Experimental evolution reveals the synergistic genomic mechanisms of adaptation to ocean warming and acidification in a marine copepod

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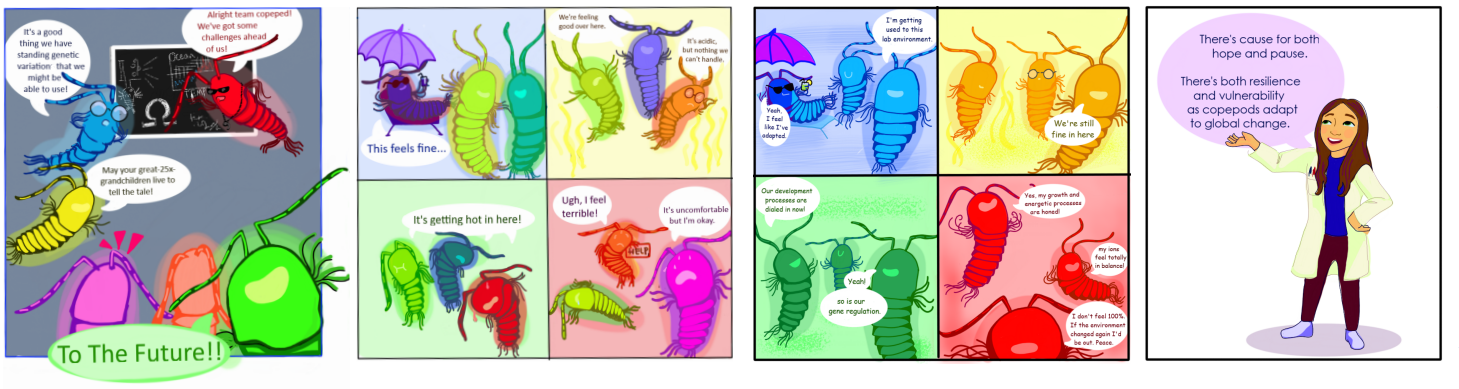
## Can copes cope?




**Yes and nope.**

- *Acartia tonsa* were collected in the Long Island Sound and first lab acclimated for three generations.
- 25 generations of experimental evolution.
- Four replicates of each of four treatments; sustained population sizes of ~3,000 copepods per replicate.
- **Preprint:** https://doi.org/10.1101/2021.11.01.466754

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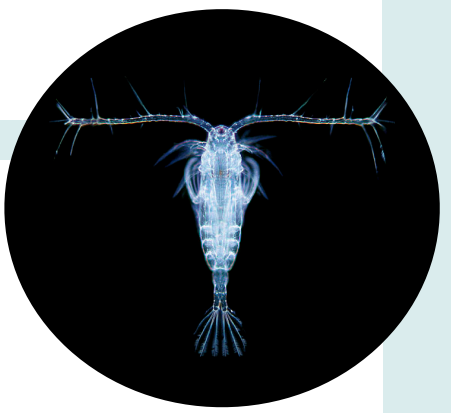
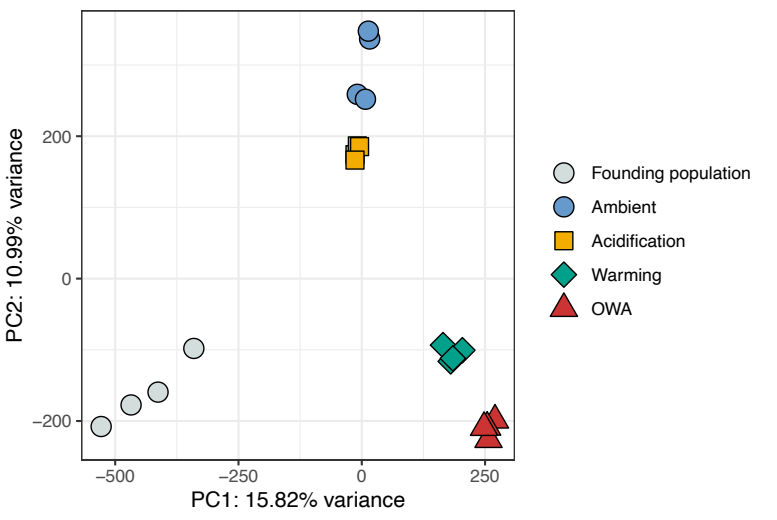
|---|---|---|
| ● | Ambient | 18˚C, 400 µatm $CO_2$ |
| ■ | Acidification | 18˚C, 2000 µatm $CO_2$ |
| ◆ | Warming | 22˚C, 400 µatm $CO_2$ |
| ▲ | OWA | 22˚C, 2000 µatm $CO_2$ |

- Conditions experienced periodically in nature.

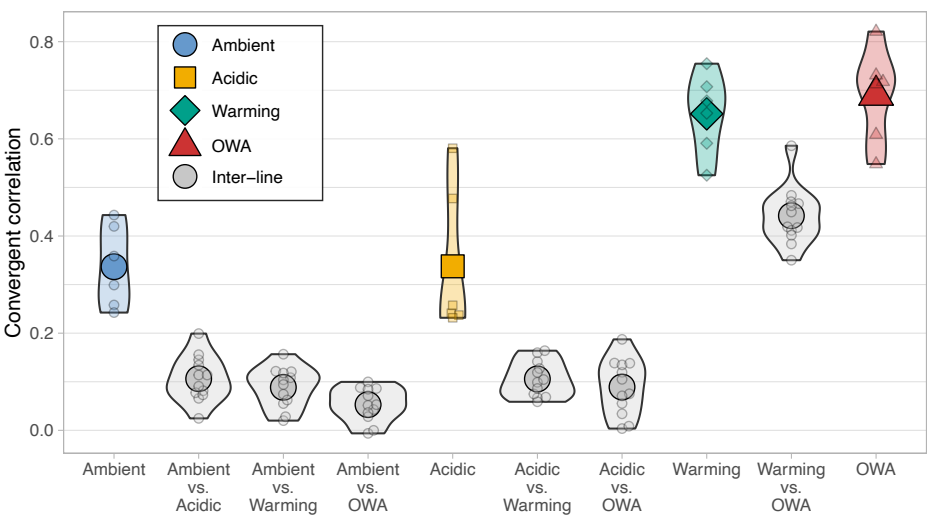


**REPLICATE POPULATIONS EXPERIMENTALLY EVOLVE OVER 25 GENERATIONS. PCA of all 394,667 SNPs. Pooled capture-sequencing of gDNA using 32,413 custom probes.**




**CANDIDATE SNPS EXCEEDING DRIFT. Warming and OWA share loci, as do all groups in response to lab conditions.**




**CONVERGENT CORRELATIONS OF ALLELE FREQUENCY CHANGE FROM F0 TO F25. Warming and OWA share variation; other treatment pairs do not.**

**_Acartia tonsa_ has standing genetic variation to adapt to a high temperature, high $CO_2$ world. High temperature was the driving selective pressure, but there was negative synergy with high $CO_2$.**

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Acknowledgements: Adrie Rumsey for artwork in the graphical abstract. Funded by NSF grants to M.H.P. (OCE 1559075; IOS 1943316) and H.G.D, H.B. and M.F. (OCE 1559180)

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