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Author(s): Rachel L. Malison, Bonnie K. Ellis, Amanda G. DelVecchia, Hailey Jacobson, Brian K. Hand, Gordon Luikart, H. Arthur Woods, Maribet Gamboa, Kozo Watanabe and Jack A. Stanford

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REMARKABLE ANOXIA TOLERANCE BY STONEFLIES FROM A FLOODPLAIN AQUIFER

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Study Description

Under the floodplain surface, alluvial aquifers have anoxic zones where methane-derived carbon provides a subsidy to aquifer stoneflies. However, most stoneflies require highly oxygenated water and foraging in zones of anoxia would require special adaptations. We measured survival, movement, and metabolic rates of aquifer and benthic stonefly taxa exposed to anoxia and hypoxia. Compared with their surface-dwelling relatives, aquifer stoneflies performed better surviving and even remaining ambulatory in anoxia. They also had elevated metabolic rates at lower oxygen levels. It is a discovery that suggests that aquifer stoneflies can exploit rich carbon sources in anoxic zones by having novel anoxia-tolerant phenotypes.

Malison, R. L., B. K. Ellis, A. G. DelVecchia, H. Jacobson, B. K. Hand, G. Luikart, H. A. Woods, M. Gamboa, K. Watanabe, and J. A. Stanford. 2020. Remarkable Anoxia Tolerance by Stoneflies from a Floodplain Aquifer. Bull Ecol Soc Am 101(4):e01767. https://doi.org/10.1002/bes2.1767

Photo 1. Grant Marshall, a 2019 intern at the Flathead Lake Biological Station (Montana, USA), collects aquifer stoneflies from the Nyack floodplain using a gas-powered diaphragm pump. Photo credit: Julia Cotter.

Photo 2. Mesh pouches holding aquifer stoneflies in anoxic water (bubbled with nitrogen gas) during an experimental trial. Photo credit: Rachel Malison.

Photo 3. Sorting freshly collected aquifer stoneflies in the field at the Nyack floodplain. Photo credit: Michael MacDonald.

Photo 4. A close-up of a *Paraperla frontalis*, one of the most common aquifer stoneflies in the Nyack floodplain. Photo credit: Michael MacDonald.

These photographs illustrate the article "Remarkable anoxia tolerance by stoneflies from a floodplain aquifer" by RL Malison, BK Ellis, AG DelVecchia, H Jacobson, BK Hand, G Luikart, HA Woods, M Gamboa, K Watanabe, and JA Stanford published in *Ecology*. https://doi.org/10.1002/ecy.3127