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ABALONE LARVAE IN A MULTI-STRESSOR OCEAN

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Survival and fitness of meroplanktonic larvae determine population dynamics of benthic invertebrates. With increasing anthropogenic stressors affecting the world's oceans, it is crucial to understand how combined pressures can affect these sensitive early life stages. Here, we investigated the impacts of different types of chemical pollution in combination with a simulated marine heatwave on early and late larval stages of the abalone *Haliotis tuberculata coccinea*. Larvae were exposed to a range of concentrations of crude oil, leachates of car tire particles, or leachates of beached microplastics for two days. Exposure experiments were performed with larvae that were less than one day old as well as with competent larvae three days after fertilization. In early larvae, we analyzed effects on development and survival, while potential effects on metamorphosis were studied in late larvae. Early larvae were sensitive to all tested pollutants as shown by increased mortality. However, leachates of car tire particles induced the strongest effects as all surviving larvae showed signs of abnormal development. This was rarely observed for the other pollutants. The heatwave treatment had a significant negative effect on survival. In late larvae, the heatwave markedly reduced metamorphosis. In contrast, this process was only slightly affected by pollution, though in different directions (indicating reduced as well as enhanced metamorphosis). The results indicate different sensitivities of larvae depending on their age and the combination of stressors.