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Influence of the physico-chemical environment on early development of the hydrothermal vent polychaete *Alvinella pompejana*

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Dispersal and colonisation processes at deep-sea vents are still not fully understood, essentially because early-life stages of vent species remain unknown. The polychaete worm *Alvinella pompejana* forms colonies on chimney walls at East Pacific Rise vent sites where temperature can frequently exceed 20˚C. I*n vitro* studies in pressure vessels showed that the early embryos tolerate temperatures in a lower range (10-14˚C), suggesting that they would have to escape the colony to develop. Pressure vessels offer the advantage that each parameter can be independently controlled, but they do not simulate the more complex and dynamic conditions naturally encountered at vent sites. Accordingly, in addition to incubations in pressure vessels, we incubated embryos directly at a vent site, in different habitats along a gradient of hydrothermal influence. Embryos incubated on an adult *A. pompejana* colony where temperature and H_2S concentrations where relatively high showed a very low survival and did not develop, whereas embryos incubated in a *Riftia pachyptila* clump environment with a lower hydrothermal signature, or at the base of the chimney where the influence of the hydrothermal activity was very weak, survived well and developed. Although the average temperature recorded in the *A. pompejana* colony was within the range tolerated by embryos (13˚C), frequent peaks above 20˚C were recorded. Estimated sulphide concentration at this site reached 200 μM. Punctuated exposure to both high temperature and elevated sulphide probably explain low survival of embryos within the *A. pompejana* colony. The *in situ* experiments further support the idea that embryos require conditions with moderate hydrothermal influence not generally found within

an adult colony. However, as much more benign physicochemical conditions can be found within a few tens of centimetres apart from adult colonies, embryos do not necessarily have to leave their vent of origin to develop. Further analyses are needed to pinpoint the specific factors that affect the survival and development of embryos at vents.