

A Big Bang or small bangs? Effects of biotic environment on hatching

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ABSTRACT

*The beginning and end of diapause are two important transition points in cladoceran life history. The influence of environmental variables on the dynamics of these processes still deserves attention, especially as concerns the role of biotic factors. In this paper we focus on emergence from diapause, testing (1) whether ephippia of *Daphnia obtusa* Kurz can assess the presence in the water of typical planktivorous fish or ostracods, and (2) whether such an assessment results in changes in hatching strategy. Total number of hatchlings from *D. obtusa* ephippial eggs did not differ between the control and the treatments in which the presence of fish or ostracods could be detected (ANOVA, $P = 0.884$). However, hatching dynamics were different: most of the eggs hatched synchronously at day 4 (83.3% of the total hatchlings number) in the control, while only a low proportion of eggs hatched on day 4 in the fish (38.3%), and ostracod treatments (24.0% of the total). Mean hatching time was longer, and variability larger, in the treatments than in the control; differences resulted statistically significant (ANOVA, $P = 0.005$). With respect to the control, representing a simple microcosm controlled by abiotic variables only, the treatments may be regarded as relatively complex environments, in which *Daphnia* is also exposed to biotic cues. Under these more complex conditions, the same number of hatchlings is obtained through different hatching dynamics. In the treatments, the first hatchlings appeared later and the hatching rate was more variable than in the control. These observations confirm previously observed patterns from laboratory experiments which tested the effect of competition and fluctuating environmental conditions (light:dark, temperature regimes) on *D. obtusa* reproductive and demographic parameters. They are also in agreement with recently obtained evidence concerning the importance of biotic cues for hatching of ephippial eggs. Overall, the evidence suggests that *Daphnia* can detect infochemicals during dormancy. Specifically, we propose that the presence in the water medium of potential predators and competitors results in a short-term hatching asynchrony of ephippial eggs.*

Key words: infochemicals, gape-limited predator, resting eggs, hatching dynamic, life strategy
