

Role of Serotonin in Environmental Stress Induced Sex Determination in *Daphnia*

Babür Erdem^{1*} and Meral Kence¹.

¹ Department of Biology, Middle East Technical University, Ankara, 06800, Turkey

Daphnia is a freshwater crustacean well-known for its indicative responses to environmental changes. One such response involves a switch from parthenogenesis to sexual reproduction. Non-optimal conditions including shortening of daylight duration, population crowding or food restriction lead to parthenogenetic generation of males instead of daughters, followed by sexual reproduction. However, the mechanism of environmental change-induced sex determination is not well-understood. Here we investigate how changes in the length of the light period affect sex determination. Although previous studies have suggested methyl farnesoate, a terpenoid hormone, as the causal factor leading to the generation of males, the pathway between detection of light duration and the secretion of methyl farnesoate has remained unknown. Studies in different crustaceans have demonstrated relationships between light, serotonin and methyl farnesoate synthesis. We thus hypothesized that serotonin could be the link between photoreception and methyl farnesoate secretion. We are currently testing this hypothesis by applying selective serotonin reuptake inhibitors and multiple serotonin receptor agonists and antagonists under short and long light durations. Our results are expected to reveal a novel aspect of the ecoresponsive physiology of *Daphnia*, while illuminating the evolutionary origin of the relationship between serotonin and light.