

“Molecular mechanisms to regulate social behavior and physiological adaptation in ants”

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The social interaction with others has beneficial impact in various animals. Animals develop the flexible strategies to respond their social environment to maximize their fitness and health. By using social insects, in particular ants, we aim to investigate the regulatory mechanisms of social behavior, and to understand how the social environment affects their behavior, physiology and fitness. Ants exhibit sophisticated social organization with reproductive castes. Ant colony is composed from queens, males, and non-reproductive caste, workers. Workers show the division of labor, that is, each worker specializes in one job such as nursing, foraging or nest construction. When they switch their job depending on their age or social environment, they experience the dynamic change of their environments from the protected nests for nursing to outside for foraging and need to adapt their physiology accompanied with this social behavior. As the regulatory mechanisms of physiological adaptation related with the division of labor, I would like to introduce our study about the functions of oxytocin/vasopressin-like peptide, inotocin. From behavior quantification with tag-based tracking system and the expression and functional analysis, we showed inotocin regulates water balancing which is related with the environmental adaptation in foraging workers. I would like to discuss the regulatory mechanisms of behavioral and physiological adaptation to regulate division of labors in ants.