



Tetramorium tsushimae ants transfer information about a mutualistic aphid via trophallaxis

Author(s): Masayuki Hayashi, Masayuki Hayashi , Masaru K. Hojo , Masashi Nomura , Kazuki Tsuji

Institution(s): Faculty of Agriculture, University of Ryukyus, Japan ; School of Science and Technology, Kwansei Gakuin University, Japan ; Faculty of Horticulture, Chiba University, Japan ; Faculty of Agriculture, University of Ryukyus, Japan ; Faculty of Agriculture, University of Ryukyus, Japan

In mutualistic interactions between different organisms, partner discrimination is often the important challenge for interacting organisms. Interaction between ants and aphids is a model system of such mutualism; many aphids provide ants with honeydew as a nutrition-rich food source and, in return, ants offer several beneficial services to aphids, such as protection from natural enemies. On the other hand, there also are non-mutualistic aphid species which do not give honeydew to ants. To establish and maintain the mutualistic associations, ants have to correctly discriminate mutualistic aphids. However, the mechanism by which ants recognize aphids as their partners had been poorly understood, despite its ecological and evolutionary importance. We here present the evidence that interaction with nestmates that have tended aphids (*Aphis craccivora*) allows ants (*Tetramorium tsushimae*) to learn to recognize the aphid species as their partner. When ants had previously tended aphids, they moderated their aggressiveness toward aphids. In addition, ants that had interacted with aphid-experienced nestmates also reduced their aggressiveness toward aphids, even though they had never directly experienced them, indicating that aphid information was transmitted from aphid-experienced ants to inexperienced ants. Furthermore, inhibition of mouth-to-mouth contact (trophallaxis) from aphid-experienced ants to inexperienced ants by providing the inexperienced ants with artificial honeydew solution caused the inexperienced ants to become aggressive toward aphids. These results, with further supporting data, strongly suggest that ants transfer information on their mutualists during trophallactic interactions.