

**OR234***Molecular mechanism of self-sacrificing gall repair by soldier aphids***Mayako Kutsukake**, Shuji Shigenobu, Xian-Ying Meng, Takema Fukatsu

Together with bees, wasps, ants and termites, aphids contain many social species with individuals altruistic to their colony mates, called soldiers. Their primary social role is colony defense against predators, but some gall-forming social species also perform such altruistic tasks as gall cleaning and gall repair. Gall repair is a unique social behavior reported from the social aphid, *Nipponaphis monzeni* (Aphididae: Hormaphidinae) that forms a completely closed gall on the host tree. Since the wall of the growing gall is soft in early spring, gall-feeders such as lepidopteran larvae often invade the gall by tunneling through the wall. When a hole was bored in the gall wall, the soldiers immediately gathered around the hole, discharged a large amount of body fluid from their cornicles on the damaged area, and mixed the fluid with their legs. The discharged fluid soon became viscous and solidified, whereby the hole was filled up completely. In an attempt to understand the molecular basis of the gall repair, especially the mechanism of the body fluid solidification, we analyzed protein components of the secretion. We found that the secretion contained six major components, one of which was phenoloxidase, a key enzyme involved in melanization and scab formation in insects. The phenoloxidase was expressed in peculiar, soldier-specific large globular cells that occupied the body cavity of soldiers. RNAseq analysis of the large globular cells revealed that many genes involved in the process of melanization were predominantly expressed in these cells. We suggest that aphid's innate immune and wound-healing mechanisms might have been enhanced and recruited to the social task, gall repair, in the lineage leading to *N. monzeni*.