Immune responses and symbiotic interactions in the pea aphid Acyrthosiphon pisum

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The pea aphid *Acyrthosiphon pisum* is a pest of a wide range of leguminous crops, and parasitoids are largely used to regulate its populations. However, there is almost no data on the immune interactions between aphid hosts and parasitoids likely because most studies have focused on the host resistance (against parasitoids, fungi, heat stress) conferred by facultative secondary symbionts (SS) [(1)]. *A. pisum* anti-microbial immunity (such as known anti-microbial peptides) has been suggested to be low or absent [(2)] and the first morphological characterization of the cellular immune system in aphids’ lines devoid of SS[(3)] is rather incomplete. Here, we present a detailed description of the morphology and function of *A. pisum* hemocytes by fluorescence and electron microscopy techniques. Both plasmatocytes and granulocytes are adherent hemocytes (i) *in vitro* (adhesion test on glass coverslips) and (ii) *in vivo* (encapsulation assays). They are also phagocytic cells able to engulf foreign particles (latex beads and bacteria) but also the SS present in the hemolymph. Interestingly, we demonstrate that the presence of SS have an effect on the immunity of their host (adherent hemocytes’ number and phenoloxidase activity), and that these effects vary according to the SS considered.

[(1)] Oliver, K.M., et al. (2010). Annual Review of Entomology 55, 247-266.
[(2)] Gerardo, N.M., et al. (2010). Genome Biology 11(2):R21
[(3)] Laughton, A.M., et al. (2011). J Insect Physiology 57(6):830-9