Malaria has devastating impacts on human health and economic development throughout the world. Caused by Plasmodium parasites, the transmission of malaria requires the bite of an infected mosquito of the genus Anopheles. The innate immune system of the mosquito is an integral determinant in shaping malaria parasite infection, thus impacting the ability of a mosquito to transmit disease. With a long-term goal to understand the mechanisms of malaria parasite killing in the mosquito host, our research has demonstrated the important role of mosquito immune cells, known as hemocytes, in limiting parasite survival. We describe how parasite invasion triggers a multi-modal immune response targeting Plasmodium ookinetes and oocyst via different immune mechanisms that require mosquito hemocyte function. Using chemical- and reverse-genetics approaches, we provide new insight into innate immune cell function in response to wound healing and parasite infection. Together, these research outputs have potential translational applications to modulate mosquito immunity and vector competence.