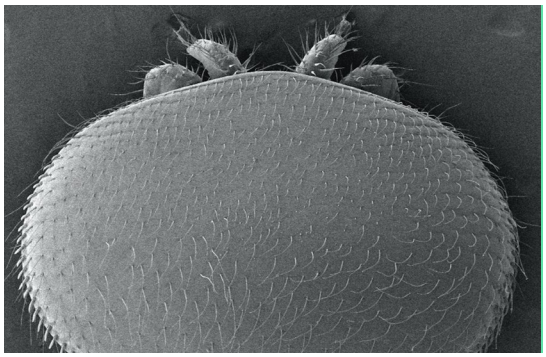
Pests & Diseases of Honeybees



Parasitic Mites and Honeybees

The social structure of honeybee colonies provides a favorable environment for intruders that can overcome their defenses. The large population of bees in each colony ensures plenty of hosts for parasitic mites, pollen and nectar storage provide nutrition for scavenger mites, and finally, the bees regulate the colony's internal temperatures, which allows for continued mite survival during the winter months. Consequently, it is not surprising that there are over 100 species of mites associated with honeybees worldwide; of those, three species are parasites of economic importance to Apis mellifera, they include Varroa destructor (varroa mites), Acarapis woodi (tracheal mites), and Tropilaelaps clareae (tropilaelaps mites).

Bee mites are easily dispersed across great geographical distances through human movement of managed hives. In the 1980's the US beekeeping industry was dramatically changed by the introduction of two mites: varroa and the tracheal mite. The state of Hawai'i however, remained free of these bee pests until 2007, when varroa was first recorded on the island of Oahu. The following year the mite was found to have dispersed to the Big Island of Hawaii. As of the time of writing, the varroa mite was the only pest mite that was present in Hawai'i, and the islands of Maui, Kauai, Molokai, and Lanai remained mite free. The tropilaelaps mite is currently only found in Asia.

The biology and life cycle of these three mite species exhibits some similarities and important differences. All three species complete their life cycles within the colony and in close association with their bee hosts (Table 1). The tracheal mites spend the great majority of their lives inside the adult bee body, feeding and reproducing in the respiratory tubes of the bees (trachea). In contrast, varroa and tropilaelaps mites reproduced inside capped bee cells, laying eggs and feeding on the bee pupae. Both of these mites are capable of attaching to the adult bees and can pierce their tissues to feed on their blood (haemolymph), this stage is called phoretic, and is much shorter on tropilaelaps compared to varroa. Tropilaelaps mites have a much shorter life cycle and their numbers can increase very rapidly in a colony.

The damage potential from parasitic mites increases if the species can act as vectors for diseases. Varroa has long been associated with the spread of the Deformed Wing Virus in Apis mellifera, and the subsequent global colony losses. There is evidence that tropilaelaps mites, much like varroa, may also be able to carry a variety of viral diseases that affect bees (Dainat et al. 2009).

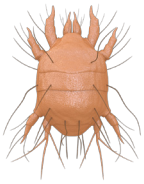
Mite Species	Site of reproduction	Adult mite movement	Bee stage – caste preferred	Disease transmission	Distribution
Acarapis woodi 	Inside tracheal tubes	Stays inside host most of its life	Prefers young adult bees, especially drones	No	Present in the mainland USA
Tropilaelaps clareae 	External parasite of bee pupae	Females can feed on adult bees while locating new brood	Reproduction is limited to bee pupae	Possible viral transmission	Restricted to Asia
Varroa destructor 	External parasite of bee pupae	Females can feed on adult bees (phoretic stage) and can be transported between hives in this manner	Reproduction is limited to bee pupae, strongly prefers drones over worker pupae	Yes, multiple viral diseases, and associated immune system weakening	Present in the mainland USA, on Oahu and the Big Island of Hawaii.

Table 1- Comparative life cycles of three parasitic bee mites, modified from Samataro et al. 2000