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Pest Management and Insect Identification Series
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Acarapis woodi, Honeybee Tracheal Mite

(Trombidiformes: Tarsonemidae)

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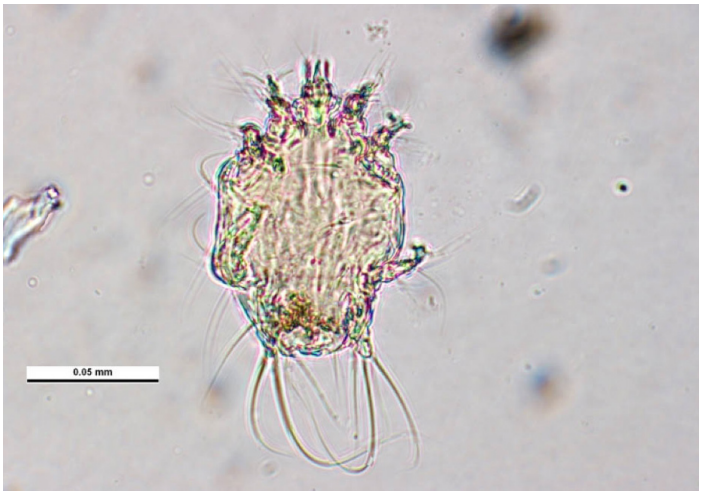
Description

The honeybee tracheal mite, *Acarapis woodi*, is an internal parasite that infects the tracheal respiratory systems of all subspecies of the western honeybee (*Apis mellifera*), Africanized honeybee (a hybrid of *Apis mellifera* and east African lowland honey bee [*A. m. scutellata*]) and Asian honeybee (A. ceranae). Adult female mites are 0.005-0.007 inches (120-190 micrometers) in length, and about 0.003 inches (77-80 micrometers) in width. Adult males are slightly smaller. Adults are oval, slightly glossy and white. They possess bristly hairs (setae) that project away from the body. Uniform bumps are present on the top of the body and are small and round in males and more elongate in females. Adult tracheal mites possess four pairs of legs, typical of all mites, with males lacking some structures at the ends of the fourth legs. Both sexes possess single claws on each of the first pair of legs and paired claws on the second and third pairs. Due to their minute sizes and internal parasitic mode of life, direct observation of mites can only be accomplished by microscopic examination of tracheal tubes of bees.

Larvae are similar in shape and color to adults but are smaller and possess three pairs of legs. The first pair of legs in larvae is well developed with paired claws. Tracheal mites, like other mites and ticks, possess a gnathosoma, a part of the body that comprises the mouth and appendages associated with feeding, the palpi and chelicerae.

Life Cycle

After mating, female tracheal mites disperse to young (less than four days after emergence) adult honeybees of all castes (queen, worker, drone). She enters the trachea via the spiracle and lays five to seven eggs in the span of three to four days. Larvae feed on bee hemolymph (insect analogue to blood), which they obtain by piercing the walls of the trachea and associated air sacs inside the bee's body using their



Microscopic view of a female tracheal mite (Pest and Diseases Image Library, Bugwood.org, Creative Commons 3.0).

Tracheal mites inside honeybee tracheal tube (Pest and Diseases Image Library, Bugwood.org, Creative Commons 3.0).

piercing appendages (chelicerae) located in the gnathosoma. Males mature in 11-12 days and females in 14-15 days. Adults also feed on bee hemolymph. Approximately two weeks are required for a new generation of mites to mature, so infesting young adult bees is crucial, especially during summer. Once mature and mated, females, stimulated by outflowing air through the prothoracic spiracle and specific pheromones from the bees' cuticle, disperse from their now-foraging host (if the infested host is a worker bee) to other young bees. Intercolony spread of tracheal mites occurs as a result of drone and worker bee drift between colonies, swarming or through robbing behavior. Intracolony spreading occurs through bee-to-bee contact. Adult and immature mites may then travel into the trachea via air currents during bee respiration.

Ecological Significance and Pest Status

Tracheal mites were first described scientifically during 1921 based on samples from the Isle of Wight in the United Kingdom. They were detected in the U.S. during 1984, in Weslaco, Texas. The first documented occurrence of the mites in Louisiana was in August 1984, a month after they were found in Texas. Movement of colonies via mobile pollination services, sales of managed honeybees and natural dispersion of feral honeybees facilitated the spread of tracheal mites northward, with many eastern and central U.S. states reporting infestations by October 1984.

Damage to honeybee colonies by tracheal mites varies widely, depending on local conditions, season and overall health of the colony. Bee losses may be the result of the combined effects of tracheal mite infestation and other stressors. Symptoms in honeybees include excessive crawling, inability to fly, disorientation, holding wings at odd angles (K wing), lack of foraging and, in extreme cases, mass mortality. The characteristic crawling and odd wing posture are the result of damage to wing muscles caused by the mites. Tracheal mite infestations may not exhibit clinical symptoms and, in such cases, can only be detected via dissection and microscopic examination of the tracheae of honeybees, a technique that is widely used for screening colonies for mites.

Control

Some honeybee stocks, such as Russian honeybees, are naturally resistant to tracheal mite infestation. Developing resistant stocks is an active area of research to help limit infestations and mitigate losses. Such stocks are growing in numbers, alleviating the reliance on other commonly used methods such as exposing colonies to the sun and chemical control to reduce tracheal mite infestation. Chemical control includes fumigating colonies with menthol crystals or formic acid. In addition, grease patties containing vegetable oil and sugar can be used to coat bees and make them unattractive to mated female mites.

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