Navigating the Mite Spectrum in Honey Bee Colonies:
From Harmful *Tropilaelaps* to Harmless Counterparts

Introduction

There are over 290 species of mites associated with honey bees (*Apis mellifera* Linnaeus) (Klimov et al. 2017) but only a few are considered harmful, such as tracheal mites, *Varroa destructor*, and *Tropilaelaps* spp. (Sammataro et al. 2000). Tracheal mites (*Acarapis woodi*), and *V. destructor* were introduced to the United States in the 1980s. Tracheal mites are endoparasitic mites that puncture through the walls of honey bee breathing tubes (tracheae) and feed on the hemolymph (insect "blood"). Tracheal mite infestations can lead to reduced honey bee lifespan, impaired flight ability, and colony decline or death in extreme cases. While tracheal mites are less of a concern for beekeepers now, *Varroa destructor*, an ectoparasitic mite, is considered a major threat to honey bee colonies due to detrimental feeding on adults and immature bees (brood) while vectoring viruses. As *Varroa* can rapidly reproduce inside capped honey bee brood cells, their populations peak with increased brood production. Deformed wings or bee bodies can be overt signs of damage from infestations, but other signs such as brood damage, impaired immunity, or reduced colony population can be indicative of *Varroa* infestations and can lead to colony collapse if left untreated.

Another parasitic mite that threatens honey bees and has not spread to North America yet belongs to the genus *Tropilaelaps*. *Tropilaelaps* spp. also feed on honey bee brood (Figure 1), causing malformation and subsequent colony decline. *Varroa destructor* and *Tropilaelaps* spp. have coexisted in Asia for decades, though reproducing in the same brood cells is less likely (Buawangpong et al. 2015). There are at least four species of mites in the genus *Tropilaelaps* that are known to feed on honey bee brood: *T. clareae*, *T. koenigerum* Delfinado and Baker, *T. mercedesae*, and *T. thaii* Anderson and Morgan. While all four species are closely associated with the giant honey bees (*Apis dorsata* and *Apis laboriosa*), two of these

Figure 1. *Tropilaelaps* spp. mites on honey bee brood next to a dead, malformed honey bee adult. Photo courtesy: Denis Anderson, CSIRO, Wikimedia Commons.

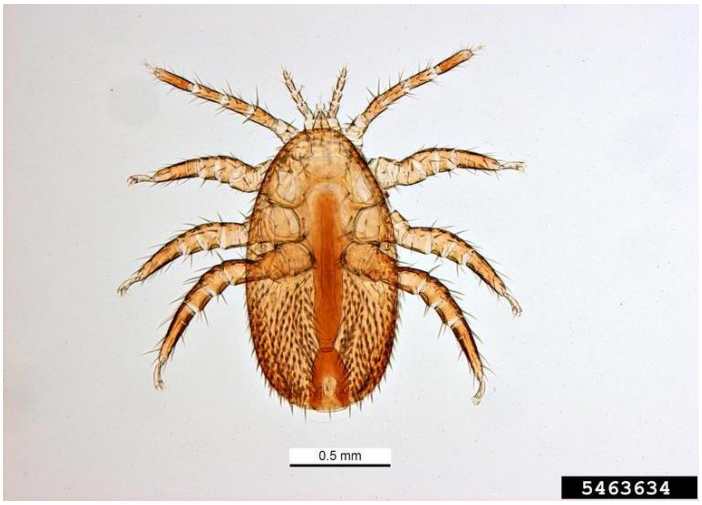

Figure 2. Adult female *Tropilaelaps mercedesae*. Photo courtesy: Pest and Diseases Image Library, Bugwood.org.

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species, *T. clareae* and *T. mercedesae*, have successfully adapted to parasitizing the western honey bee, *Apis mellifera*, as a host (de Guzman et al. 2017; Chantawannakul et al. 2018). While *Tropilaelaps* causes less harm to the giant honey bees, *T. mercedesae* (Figure 2) is considered a major pest of western honey bees managed by beekeepers in Asia, since this honey bee species lacks evolved defenses to combat *Tropilaelaps* infestations.

While *Tropilaelaps* spp. have not been introduced to North America to date, the possible introduction would intensify colony health issues and losses that beekeepers already experience with *Varroa* infestations. The United States has strict regulations on the importation of honey bees, with the Honey Bee Act (7 US Code 281-286) specifically prohibiting importation of honey bee colonies, all life stages of honey bees (including germplasm), used beekeeping equipment, and untreated beeswax or honey. While enforcement of this act greatly lowers the chances of *Tropilaelaps* introduction, the Animal Plant Health and Inspection Service (APHIS) has been employing the annual National Honey Bee Pests and Diseases Survey to surveil for *Tropilaelaps* in the United States since 2009. Caution must be taken when importing bees (queens and packages) in Canadian provinces to prevent inadvertent introduction of *Tropilaelaps* spp.

In recent years, *Tropilaelaps* range has expanded (Figure 3), and there is a growing concern about their potential arrival to North America (Ramsey 2021). Many other non-predatory and predatory mites are known to inhabit honey bee hives, and they mainly feed on pollen, detritus, or other mites. Beekeepers may notice these harmless mites and suspect them to be the harmful *Tropilaelaps* spp. This Extension publication thus aims to educate beekeepers about *Tropilaelaps*' spp. current known distribution, life history, and damage to honey bee colonies, while comparing two other harmful mites, *Varroa* and tracheal mites. In addition, this publication will provide a short overview of examples of harmless mites that have been found through recent surveys and describe how to report suspicious mites to the Washington State Department of Agriculture (WSDA) or to the Washington State University Honey Bee Program.

Tropilaelaps spp.

Distribution

Tropilaelaps spp. is a native pest in tropical and subtropical Asia, and their range has been expanding over the past 50 years. Their current range is not well defined but is likely to be in areas where giant honey bees (*A. dorsata* and *A. laboriosa*) are located. *T. mercedesae* is the species known to widely infest *Apis mellifera* colonies. A map from 2024 *shows their present, confirmed distribution* (Figure 3). The range distribution shown was collected from peer reviewed sources that used molecular or morphological techniques to document *T. mercedesae* associated with western honey bee colonies (Janashia et al. 2024; Brandorf et al. 2024; Mohamadzade et al. 2024). The occurrence of *Tropilaelaps* spp. in surrounding regions is actively being surveilled by researchers and apiary inspectors.

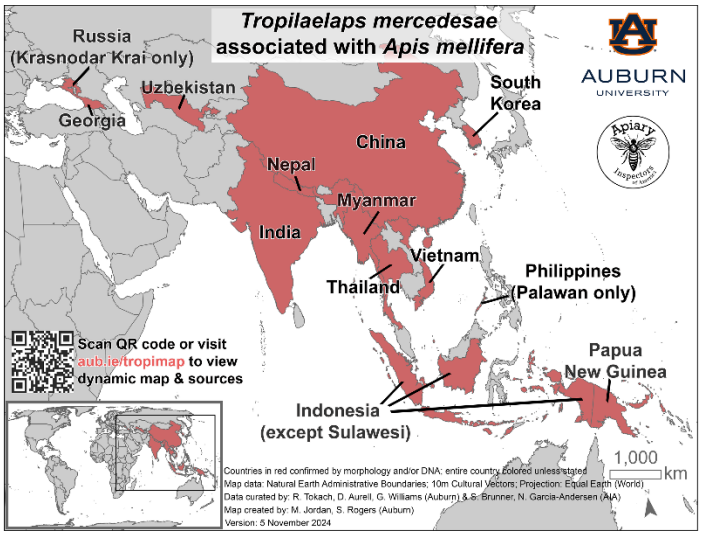

Figure 3. Current estimated distribution of *Tropilaelaps mercedesae* associated with *Apis mellifera,* based on molecular and morphological confirmations by peer reviewed studies. Image courtesy: Auburn University and Apiary Inspectors of America, 2024.

Biology

Much like *Varroa*, the life cycle of *Tropilaelaps* is dependent on honey bees. *Tropilaelaps* feed on honey bee brood and vector diseases, but unlike *Varroa* that can stay attached to honey bee adults, it is believed that the small mandibles on *Tropilaelaps* limit them to feeding on honey bee brood only. Therefore, *Tropilaelaps* requires regular access to honey bee brood to survive and reproduce; this reliance was previously thought to be a barrier to their range expansion beyond tropical areas, where honey bees can have year-round brood production. However, *T. mercedesae* can locally overwinter in *A. mellifera* colonies (Brandorf et al. 2024) and survive without brood at least three days in dry pollen and six days in empty honey comb (Khongphinitbunjong et al. 2019). Gill et al. (2024) hypothesized that *Tropilaelaps* could potentially survive in a broodless colony scenario by receiving food during trophallaxis via live adult honey bees, on decaying brood, or on adult honey bees that have died during transportation. Recently, Tokach et al. (2025) observed phoresy of *Tropilaelaps* on honey bees exiting their colonies and suggest that these mites could spread to other locations through natural movement of *A. mellifera* colonies.

Figure 4. *Tropilaelaps mercedesae* adult (*left*) next to *Varroa destructor* adult (*right*). *Tropilaelaps* females are slightly larger (0.97 mm long × 0.54 mm wide) than males (0.92 mm × 0.52 mm) and are about one-third the size of *Varroa* (de Guzman et al. 2017). *Varroa destructor* females are about 1.1 mm × 1.5 mm, and males are about 0.7 mm × 0.9 mm. Photo by Riley Reed, WSU.

Tropilaelaps females are slightly larger (0.9 mm long × 0.5 mm wide) than males and are about one-third the size of *Varroa* (Figure 4) (de Guzman et al. 2017). *Tropilaelaps* are further differentiated from *Varroa* by their more elongated body shape (Figure 5) and their more rapid locomotion. *Tropilaelaps* spp. do not require a feeding period on adults like *Varroa*. Instead, they can emerge from one brood cell and immediately enter another cell to reproduce again. Due to a high reproductive rate, quick development time, and short time outside brood cells, *Tropilaelaps* populations grow very quickly.

The mature *Tropilaelaps* females (foundresses) lay from one to four eggs on a honey bee larva shortly before the brood cell is capped (Figure 5). Multiple foundress mites can invade a brood cell simultaneously. The mites' offspring feed on the bee brood as they develop, and maturation is achieved in nearly one week. The average sex ratio of mite offspring is one male to every three females. The adult mites, including the foundress female(s), emerge with the adult honey bee and invade new brood cells (de Guzman et al. 2017).

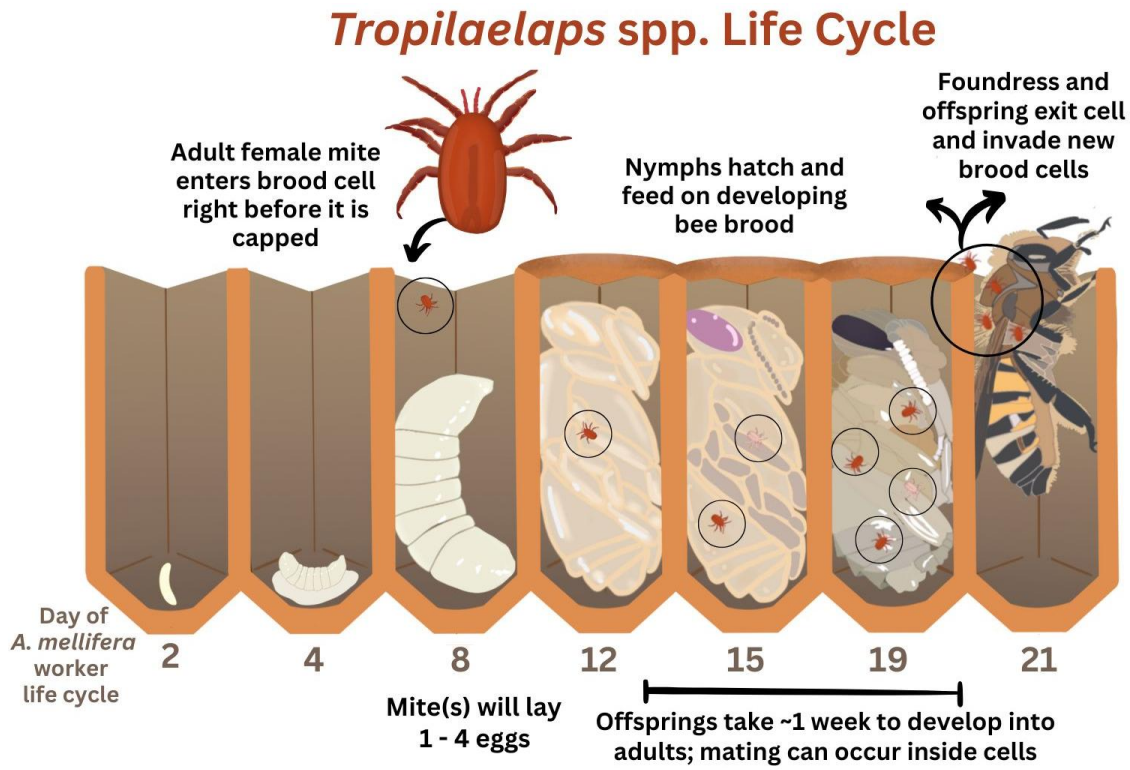

Figure 5. A mature *Tropilaelaps* spp. female (foundress) enters a honey bee brood cell right before it is capped and lays one to four eggs on the honey bee larva. The mite's offspring feed on the bee brood as they develop. Mating occurs within the cells. Mite offspring development takes around one week. Average *Tropilaelaps* sex ratio of offsprings is one male to every three females. Adult mites, including the foundress female, emerge with the adult honey bee, and invade new brood cells. Multiple foundress mites can invade a brood cell simultaneously; thus, more than four offspring can be found inside a cell at the same time. Illustration by Nicole Bell and Briana Price, 2025.

Damage

Tropilaelaps spp. feed on honey bee brood and vector viruses such as deformed wing virus (Khongphinitbunjong et al. 2015). This causes stunted or deformed growth; newly emerged bees may have misshapen wings, bodies, or missing legs. *Tropilaelaps* spp. infestation also leads to lower bee immunity, irregular brood patterns or perforated brood cell cappings, and impaired brood production and development (de Guzman et al. 2017). In severe cases, infestations can cause the colony to collapse or honey bees to abscond from the hive.

Detecting Mites in Honey Bee Colonies

Signs of *Tropilaelaps* infestations can closely resemble infestation by *Varroa*, such as spotty brood patterns or misshapen wings. Infestation can similarly be indicative of *Varroa* or tracheal mite impacts, such as decreased colony performance and reduced immunity. Proper sampling methods can help beekeepers find the causative issue in their colonies (Table 1) (Pettis et al. 2013; Dietemann et al. 2013; Sammataro et al. 2013; Gill et al. 2024). Some sampling methods could be combined to improve efficacy of *Tropilaelaps* monitoring—for example, brood uncapping followed by the bump test (described below).

Sticky Boards

Sticky boards are typically placed under the hive on a bottom board, sticky side up, and naturally catch mites as they fall from the frames in a hive space. Natural mite drop on sticky boards can be a reliable way to detect *Tropilaelaps* (Gill et al. 2024). Most sticky boards have a grid printed on them to make counting mites easier. Sticky boards can be examined under a microscope or with an illuminated magnifying glass. Since *Tropilaelaps* and *Varroa* are small, this can be a time-consuming detection method, especially if you are monitoring a large number of colonies.

Bump Test

The bump test was developed by Pettis et al. (2013) and this method is currently used by APHIS as part of its annual National Honey Bee Pests and Diseases Survey. It involves bumping a brood frame that contains older larvae or emerging bees onto a collection tray eight times to dislodge mites. The contents can be examined in the field with a magnifying glass or temporarily preserved in a cheesecloth and alcohol for later examination under a microscope. This method has been described as "moderately sensitive and moderately fast" for *Tropilaelaps* detection in the *Tropilaelaps Mites 2024 United States Primer: Where We Are, What You Can Do, and Where We Are Going* publication.

Examining Brood Cells

Examining brood cells or brood removal is a method used to measure and manage *Varroa* or *Tropilaelaps* infestations in honey bee colonies. This method can involve randomly removing 100–200 capped brood from the frame or removing large portions with an uncapping fork to observe the number of brood infested. Mite populations can be estimated by counting the number of mites found in the brood cells. Using an uncapping fork to remove small, sporadic areas of capped drone or worker brood has been effective for measuring *Varroa* mite levels (Dietemann et al. 2013).

For *Tropilaelaps* detection, Gill et al. (2024) found that uncapping infested brood with tweezers was more effective than using an uncapping fork, as published in their study. However, during certain stages of brood development, the mites tended to stay within the cell and could be dispersed by blowing over the brood or using a paintbrush to "sweep the cell." Additionally, Uzunov et al. (2024) published a novel method, "rapid brood decapping," which uses cosmetic wax strips and 60 seconds of videotaping to document emerging mites. They reported that this method improved ease of sampling and time efficiency for beekeepers and produced results comparable to the traditional brood cell examination method by Dietemann et al. (2013), with approximately 90% similarity.

Table 1. Suitable sampling methods for harmful mites in honey bee colonies.

Diagnostic Test	***Tropilaelaps* Mites**	***Varroa* Mites**	**Tracheal Mites**
Sticky Boards	***	***	X
Bump Test	***	***	X
Examining Brood Cells (removal or uncapping)	***	***	X
Alcohol Wash	X	***	X
Powdered Sugar Shake	*	*	X
Microscopic Dissection	X	X	***

Sources: Extrapolated from work by Pettis et al. (2013), Dietemann et al. (2013), Sammataro et al. (2013), and Gill et al. (2024).
Notes: *** = most suitable, * = suitable, X = least suitable or not applicable.

Alcohol Wash

Alcohol washes are an extremely effective way to monitor for *Varroa* (Dietemann et al. 2013) since the mites cling to adult honey bees and feed on their fat body and hemolymph (insect blood). Although, for *Tropilaelaps,* it may not be the best option since *Tropilaelaps* do not stay on honey bee adults. This method is most appropriate for detecting *Varroa.* To perform an alcohol wash, honey bees are collected from brood frames with older larvae or emerging bees, placed into a jar containing 70% alcohol, and shaken for one minute. The honey bees and wash solution are poured through a mesh screen into a collection bin. Any mites transferred to the collection bin can be counted or observed.

Powdered Sugar Shake

Powdered sugar shakes are another popular monitoring method for *Varroa* since the mites cling to adult honey bees. Although, for *Tropilaelaps,* it may not be the best option since *Tropilaelaps* do not stay on honey bee adults. Like the alcohol wash, this method is most appropriate for detecting *Varroa*. In this method, honey bees are collected from brood frames with older larvae or emerging bees, placed into a jar with a screened lid, and gently rolled around for one minute. The powdered sugar dislodges mites from the bees and mites can be shaken from the jar into a collection bin. Using a spray bottle, the contents in the collection bin can be sprayed to dissolve the powdered sugar, which makes it easier to find any dislodged mites, then the number of mites can be counted or observed.

Microscopic Dissection

Since tracheal mites live inside the honey bees' tracheal system, they are difficult to detect externally; therefore, microscopic techniques such as dissecting honey bees is the ideal diagnostic method for tracheal mite detection (Sammataro et al. 2013). Tracheal mites are more attracted to young honey bees, so honey bees are collected from brood frames and dissected to examine their tracheal system for the presence of mites. Typically, at least 20 bees are dissected to determine presence or absence of tracheal mites at the colony level. This method requires some training to avoid damaging the trachea and to accurately identify the mites and is not recommended for detecting *Tropilaelaps* or *Varroa* mites.

Management

The APHIS has been employing the annual National Honey Bee Pests and Diseases Survey to surveil for *Tropilaelaps* in the United States since 2009. Each year, beekeepers with at least eight colonies in their apiary can participate for free, contribute to national surveillance of any exotic pests like *Tropilaelaps* mites, and receive information about their apiary's health, including the presence or absence of common honey bee viruses as well as populations of *Varroa* and *Nosema,* a common microsporidian parasite.

If you would like to volunteer to participate in the National Honey Bee Pests and Diseases Survey for Washington State, please contact the WSU Bee Program at entomology.bees@wsu.edu.

Management efforts are currently being researched in regions where *Tropilaelaps* is already established. The United States Department of Agriculture (USDA) and Environmental Protection Agency (EPA) assert that existing registered chemicals for *Varroa* control may be effective options for *Tropilaelaps* control. As stated in the *Tropilaelaps Mites 2024 United States Primer: Where We Are, What You Can Do, and Where We Are Going*: "Under FIFRA Section 2(ee), a federal statute for EPA regulation of pesticides, it is not required to have *Tropilaelaps*, specifically *T. mercedesae,* listed as a specific mite on the label in the United States. Any miticide products that are used properly in accordance with label directions (i.e. are labeled for use in bee colonies to kill mites), restrictions, and application parameters, could be used to control Tropilaelaps." Note that while at the federal level, FIFRA 2(ee) ensures the legal use of registered products that list honey bee colonies as a use site, regardless of target pest, state regulations may be more restrictive.

A current list of federally registered pesticide products for *Varroa* control that include formic acid, oxalic acid, hops beta acids, amitraz, tau-fluvalinate, and coumaphos can be found at the EPA website. Thus far, research has shown formic acid and brood breaks to be the most promising methods, but research is still being conducted to determine the efficacy of *Varroa* control products for efficacious *Tropilaelaps* control (Tokach et al. 2024). Additionally, since *Tropilaelaps* likely do not feed on adults, using cultural control methods, such as brood breaks or removing frames of developing bees from a colony, will likely be a powerful control tool in reducing *Tropilaelaps* infestations. Canada's Pest Management Regulatory Agency (PMRA) may have additional guidelines on efficacy standards and registered use of different products.

Other Mites Associated with Honey Bee Colonies

Honey bee nests are suitable habitats for nonparasitic, omnivorous, or pollen-feeding mite species. Many live on the hive floor, feeding on bee debris or fungi (Sammataro et al. 2000). Given the high diversity of bee-associated mites, some may resemble *Tropilaelaps*. With increased vigilance about potential *Tropilaelaps* introduction to North America, beekeepers may notice mites inhabiting the

bottom boards or hive crevices and become concerned. While beekeepers are always encouraged to report sightings of suspicious mites, this section aims to inform beekeepers about the potential mite diversity within a honey bee colony.

One example is the pollen mite (*Mellitiphis alvearius*), which is light brown and similar in size to *Tropilaelaps* (Figure 6), but pollen mites are not destructive to honey bees and do not impact colony health. Another example of a look-alike mite is the house fly mite (*Macrocheles muscaedomesticae*; Figure 7). This species has been long considered harmless to honey bee colonies, but a recent case of high-density phoresy on *A. mellifera* was observed to detrimentally impact the honey bees' ability to fly in Texas, USA (Fulton et al. 2025).

Some samples from the APHIS National Honey Bee Pests and Diseases Survey have contained harmless mites collected by bump tests in the Pacific Northwest region of the United States. In 2023, a suspicious mite was flagged, but it was identified as *Hypoaspis lubrica* (Figure 8), a soil-dwelling predatory mite that feeds on other mites and can be found in bee colonies when there are certain conditions such as excess hive debris, tall grass, or poor ventilation. Other mites passively captured in the bump tests were identified as *Macrocheles* sp. (Figure 9), *Neocypholaelaps* sp. (Figure 10), or *Parasitellus* sp. (Figure 11). *Macrocheles* sp. live in a variety of habitats, including manure, dung, litter, decaying organic substances, and nests of social bees, where they feed on small invertebrates. *Neocypholaelaps* sp. (Figure 10) and *Parasitellus* sp. (Figure 11) normally live on flowers of various plants and feed on pollen and nectar, and can feed on provisioned pollen in honey bee nests.

Figure 6. Pollen mite (*Mellitiphis alvearius*). Photo courtesy: Pavel Klimov, Bee Mite ID, USDA APHIS PPQ, Bugwood.org.

Figure 7. House fly mite (*Macrocheles muscaedomesticae*). Photo courtesy: Pavel Klimov, Bee Mite ID, USDA APHIS PPQ, Bugwood.org.

Figure 8. *Hypoaspis lubrica* found in APHIS National Honey Bee Pests and Diseases Survey bump test sample contents from Washington State. Photo courtesy: Kensie Olson, University of Maryland Bee Lab.

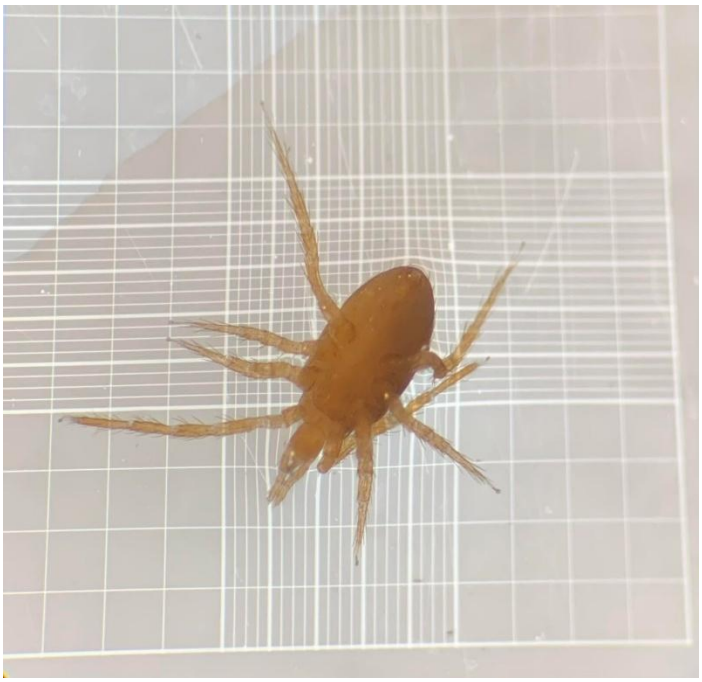

Figure 9. *Macrocheles* sp. found in APHIS National Honey Bee Pests and Diseases Survey bump test sample contents from the Pacific Northwest. Photo courtesy: Kensie Olson, University of Maryland Bee Lab.

Figure 10. *Neocypholaelaps* sp. found in APHIS National Honey Bee Pests and Diseases Survey bump test sample contents from the Pacific Northwest. Photo courtesy: Kensie Olson, University of Maryland Bee Lab.

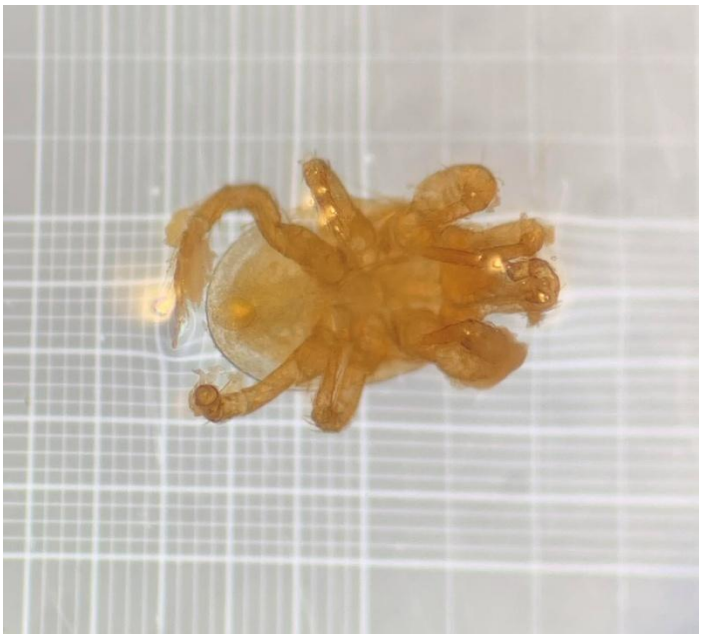

Figure 11. *Parasitellus* sp. found in APHIS National Honey Bee Pests and Diseases Survey bump test sample contents from the Pacific Northwest. Photo courtesy: Kensie Olson, University of Maryland Bee Lab.

Reporting Suspicious Mites

If you think you may have *Tropilaelaps* in your hive(s) or see any suspicious mites, report them to the Washington State Department of Agriculture's (WSDA) Pollinator Program immediately. To report a possible sighting of *Tropilaelaps*, please visit the Report Invasive Pest Sightings webpage in addition to contacting the WSDA Pollinator Health Coordinator and WSU Bee Program.

Submit a photo of the suspected mite along with the report, and if possible, collect specimen(s) in alcohol by gently picking up the mite(s) with a paintbrush and submerging the brush in alcohol to dislodge the mite(s). A site visit by WSDA or WSU Bee Program staff will likely occur for sample collection; potential *Tropilaelaps* sightings will be taken very seriously. Confirmation of a positive *Tropilaelaps* mite infestation will involve a response from the USDA.

The response to a positive *Tropilaelaps* mite infestation will vary depending on how widespread the infestation is upon investigation. In the past, attempts to control the spread of *Varroa,* when it was first introduced, involved quarantines and hive destructions; this proved to be unsuccessful. It's more likely that the response to a positive *Tropilaelaps* infestation will involve an immediate and widespread education and outreach campaign on identification and control options. However, the potential arrival of this pest to North America will be detrimental to the beekeeping and agricultural industries in the United States, and exhaustive efforts will be made to prevent *Tropilaelaps* from becoming established in North America.

WSDA Contact Information

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360-480-0602

WSU Bee Program Contact Information

entomology.bees@wsu.edu

Other Useful Resources About *Tropilaelaps* spp.

- *Tropilaelaps* fact sheet—*Tropilaelaps* A Growing Threat to Honey Bees What You Need to Know by the Apiary Inspectors of America, Auburn University, Honey Bee Health Coalition, Pollinator Partnership, Project *Apis m.*, US Department of Agriculture Animal and Plant Health Inspection Service and US Department of Agriculture Agricultural Research Service
- *Tropilaelaps* Training 2024 Documentary Series and 2024 *Tropilaelaps* Training in Thailand Trailer—Project *Apis m.*
- Tropi STOP webpage—Pollinator Partnership and partners
- *Tropilaelaps* Mites—Honey Bee Pests from Apiary Inspectors of America
- *Tropilaelaps*: What Beekeepers Need to Know—webinar recording with Dr. Samuel Ramsey
- *Tropilaelaps* Infestation of Honey Bees—case definition publication by US Department of Agriculture
- Featured Creatures Collection: *Tropilaelaps* mite—publication from University of Florida

References

Brandorf, A., M.M. Ivoilova, O. Yañez, P. Neumann, and V. Soroker. 2024. First Report of Established Mite Populations, *Tropilaelaps mercedesae*, in Europe. *Journal of Apicultural Research* 1–3.

Buawangpong, N., L. De Guzman, K. Khongphinitbunjong, A. Frake, M. Burgett, and P. Chantawannakul. 2015. Prevalence and Reproduction of *Tropilaelaps mercedesae* and *Varroa destructor* in Concurrently Infested *Apis mellifera* Colonies. *Apidologie* 46.

Chantawannakul, P., S. Ramsey, D. vanEngelsdorp, K. Khongphinitbunjong, and P. Phokasem. 2018. *Tropilaelaps* Mite: An Emerging Threat to European Honey Bee. *Current Opinion in Insect Science* 26: 69–75.

de Guzman, L.I., G.R Williams, K. Khongphinitbunjong, and P. Chantawannakul. 2017. Ecology, Life History, and Management of *Tropilaelaps* Mites. *Journal of Economic Entomology* 110(2): 319–332.

Dietemann, V., F. Nazzi, S.J. Martin, et al. 2013. Standard Methods for Varroa Research. *Journal of Apicultural Research* 52(1): 1–54.

Fulton, J.C., S.J. Bolton, M.R. Moore, S. Kyles, P. Klimov, and J.D. Ellis. 2025. *Macrocheles muscaedomesticae*, a First Record of Phoresy on *Apis mellifera*. *Journal of Apicultural Research* 1–3.

Gill, M.C., B. Chuttong, P. Davies, et al. 2024. Assessment of the Efficacy of Field and Laboratory Methods for the Detection of *Tropilaelaps* spp. *PLoS ONE* 19(9): e0301880.

Janashia, I., A. Uzunov, C. Chen, C. Costa, and G. Cilia. 2024. First Report on *Tropilaelaps mercedesae* Presence in Georgia: The Mite Is Heading Westward! *Journal of Apicultural Science* 68(2).

Khongphinitbunjong, K., L.I. de Guzman, M.R. Tarver, T.E. Rinderer, and P. Chantawannakul. 2015. Interactions of *Tropilaelaps mercedesae*, Honey Bee Viruses and Immune Response in *Apis mellifera*. *Journal of Apicultural Research* 54(1): 40–47.

Khongphinitbunjong, K., P. Chantawannakul, O. Yañez, and P. Neumann. 2019. Survival of Ectoparasitic Mites *Tropilaelaps mercedesae* in Association with Honey Bee Hive Products. *Insects* 10(2): 36.

Klimov, P.B., B.M. OConnor, R. Ochoa, G.R. Bauchan, and J. Scher. 2017. Bee Mite ID—an Online Resource on Identification of Mites Associated with Bees of the World. *Journal of Acarological Society of Japan* 26(1): 25–29.

Mohamadzade, N., O. Joharchi, S. Aryal, et al. 2024. Exploring Genetic Variation and Phylogenetic Patterns of *Tropilaelaps mercedesae* (Mesostigmata: Laelapidae) Populations in Asia. *Frontiers in Ecology and Evolution* 21(12).

Pettis, J.S., R. Rose, E.M. Lichtenberg, et al. 2013. A Rapid Survey Technique for *Tropilaelaps* Mite (Mesostigmata: Laelapidae) Detection. *Journal of Economic Entomology* 106(4): 1535–1544.

Ramsey, S.D. 2021. Foreign Pests as Potential Threats to North American Apiculture: *Tropilaelaps mercedesae*, *Euvarroa* spp, *Vespa mandarinia*, and *Vespa velutina*. *Veterinary Clinics: Food Animal Practice* 37(3): 545–558.

Sammataro, D., U. Gerson, and G. Needham. 2000. Parasitic Mites of Honey Bees: Life History, Implications, and Impact. *Annual Review of Entomology* 45: 519–548.

Sammataro, D., L. de Guzman, S. George, R. Ochoa, and G. Otis. 2013. Standard Methods for Tracheal Mite Research. *Journal of Apicultural Research* 52(4): 1–20.

Tokach, R., B. Chuttong, D. Aurell, L. Panyaraksa, and G.R. Williams. 2024. Managing the Parasitic Honey Bee Mite *Tropilaelaps mercedesae* Through Combined Cultural and Chemical Control Methods. *Scientific Reports* 14: 25677.

Tokach, R., D. Aurell, B. Chuttong, and G.R. Williams. 2025. Observation of *Tropilaelaps mercedesae* (Mesostigmata: Laelapidae) on Western Honey Bees (*Apis mellifera*) Exiting Colonies. *Journal of Economic Entomology* 118(2): 966–969.

Uzunov, A., I. Janashia, C. Chen, C. Costa, and M. Kovačić. 2024. A Scientific Note on "Rapid Brood Decapping"—a Method for Assessment of Honey Bee (*Apis mellifera*) Brood Infestation with *Tropilaelaps mercedesae*. *bioRxiv.*

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