BEE VET

Tropilaelosis

Dr. Tracy **Farone**

Zoonotic Disease and Public Health is a course I have had the joy of teaching to pre-health students for over 10 years. The course's content covers all types of infectious diseases and how they affect ***and*** connect humans, animals, and the environment. Some of my students affectionately call it "Zoo" or even the "poo" class, because so many diseases can be transferred through fecal/oral contamination. Eww, but true! Many students are amazed to discover how many diseases surround us, how the health of our world is so interrelated, and under normal circumstances, how most of us are blessed with a wonderful immune system. Certainly, these same observations apply to honey bees and their health.

Emerging infectious diseases is one topic we cover during the "zoo" course. Emerging infectious diseases are infections that have recently appeared in a population of humans or animals. Emerging diseases often arise when they are brought into new geographical ranges and/or species. Some causes of emerging disease may not have been previously known, while others may already be known, and pose a serious threat, if they are able to increase their geographic range. Ebola, Zika, Rocky Mountain Spotted Fever, Varroosis, and COVID-19 are all examples of emerging diseases. Many emerging diseases often originate from "foreign" or "exotic" diseases (or newly named "transboundary diseases"). Foreign, exotic or transboundary diseases are diseases that naturally exist in a certain country, continent, or areas of the world, but may cross borders, continents and/or oceans to infect new regions. If allowed to move into new geographical areas, foreign diseases can emerge in a population with little natural immunity against the disease agent. Therefore, these diseases can cause high morbidity and/or mortality when introduced to the new population of animals or humans. In our modern world, international trade and travel often accommodates hitch-hiking diseases and pests. To safeguard animal health in the U.S., a list of foreign animal diseases (FAD) is continuously monitored by the USDA and accredited veterinarians.

But what about bees? Do they have a current "FAD"? They do. It is a parasitic disease of honey bees that does not always make the headlines, but mirrors examples of other disease processes we see highlighted in our world. No, it is not the "murder" or Asian hornet, but a disease that is and should be on beekeepers', entomologists' and veterinarians' radar: Tropilaelosis.

Tropilaelosis is a mite infestation of *Apis mellifera (European honey bee)* caused primarily by two major species: *Tropilaelaps clareae* or *Tropilaelaps mercedesae*. These mites' natural honey bee hosts (*Apis dorsata, Apis laboriosia, and Apis breviligula, "giant" honey bees*) are better adapted host species of honey bees compared to *Apis mellifera.* Their natural range is found in Asia, Indonesia, and the Philippines. The mites have also been reported in parts of Africa, including Kenya and the Republic of the Congo. Tropilaelosis is currently a disease regulated world-wide and monitored by the OIE (The World Health Organization of Animals) as a notifiable disease and the USDA as a reportable disease. These mites are one reason why honey bee importation is limited in the U.S.

The lifecycle of the mite is somewhat like *Varroa* with the reproductive cycle involving a gravid foundress mite invading a brood cell, egg laying, developing mites parasitizing and often killing the larvae/pupae, and re-emergence of new adult mites. Compared to *Varroa*, the reproductive cycle is relatively short, only about one week, and all mites emerge from the brood cell including the males. This feature allows the *Tropilaelaps* mites to

populate a colony much faster than *Varroa* and therefore, take down a colony quickly. *Tropilaelaps* mites are unable to feed on adult bees, so their phoretic phase is much shorter than *Varroa*, usually only three days. This characteristic force the mites back into the brood for yet another quick reproductive cycle, killing more brood and making more mites. Despite the short phoretic period, adult bees are still able to spread mites to other hives via swarms, package bees, exchange of frames bees between hives, drifting, and robbing.

Mites are diagnosed and treated

A swarm from our apiary. Tropilaelaps can be transmitted through swarms. (photo by Deidre Ressler)

using similar methods to *Varroa*. Adult honey bee samples can be checked for mites with alcohol wash or sugar roll. While mite counts levels have yet to be established for *Tropilaelaps*, any mites found would be significant. The mites are visible with the naked eye, but they are smaller and move faster that *Varroa*. They are easier to observe in capped drone brood. Sticky board or "bumping" frames to dislodge mites onto a white surface can also be used for detection. At the colony level, infestations will result in rapid colony collapse or absconding. Brood comb may be severely affected due to high mortality infected larvae and pupae. Treatment should involve an IPM approach. Treatments can include common acaricides used for *Varroa*, along with biological controls of inducing brood breaks, brood removal and caging the queen. Treatment timing protocols should consider the short phoretic period of the mites. Being unable to parasitize adult bees is one biological weakness of *Tropilaelaps,* that we can exploit. Natural broodless periods and overwintering are ways to limit or control these parasites. Luckily and so far the geographic range of *Tropilaelaps* has largely been limited due to this "tropical nature" of the mite. However, some honey bee colonies in South Korea, with a more temperate climate, have been found to support *Tropilaelaps* mites.

There is more bad news. While rare, *Varroa* and *Tropilaelaps* can co-infect colonies, but *Tropilaelaps* usually out competes *Varroa*. *Tropilaelaps* has also been found to be a vector for viruses, like DWV. **The good news**: Tropilaelaps has not yet been reported in much of the world, including the U.S., Europe, Australia, and Canada. However, awareness and prevention of diseases are keys to keeping our honey bee population safe. How diverse animal species, humans, and diseases can be, yet how much is still shared and interconnected, amazes me. Studying and understanding these similar biological and epidemiological principles are paramount to understanding how we can all work together to best promote our collective health. BC

Danger emerging from the shadows.

References & for further informational links:

De Guzman, Lilia I. , Williams Geoffrey R., et.al., "Ecology, Life History, and Management of Tropilaelaps Mites", *Journal of Economic Entomology*, Volume 110, Issue 2, April 2017, Pages 319–332, **https://doi.org/10.1093/jee/tow304** Published:08 March 2017.

Vidal-Naquet, Nicolas. Honeybee Veterinary Medicine: *Apis mellifera* L., 5m Publishing, 2015, pp.138-142.

OIE policies on Tropilaelaps mites: **https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_tropilaelaps_spp.pdf**.

Great picture of Tropilaelaps: **https://beeaware.org.au/archive-pest/tropilaelaps-2/#ad-image-0**

USDA bee mite ID, Tropilaelaps: **http://idtools.org/id/mites/beemites/factsheet.php?name=15241**

Tropilaelaps info sheet: **https://www.aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/Tropilaelaps-InfoSheeta.pdf**

USDA national honey bee survey information including surveillance for Tropilaelaps: **https://www.aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/SurveyProjectPlan.pdf**

USDA reportable bee diseases: **https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/sa_nahss/status-reportable-disease-us/!ut/p/z1/lZJNU4MwEIZ_Sw8cIRvaodQbIFNQqGMtirl0gqbADCVMEmT015vWkx9tMZd8zPPuZt9dRFCOSEvf6pKqmre00fdn4mxXOFiCO8PJMrzG4EWL-DaaOwD3Nno6AsndLMD-A-g99MEL1_M0DGMb8BSR_-kfl0frN9lm5WI_**

Dr. Tracy Farone, BS, DVM, is a Professor of Biology at Grove City College. She worked in various areas of private practice, academia, and research for over 20 years. She currently teaches a wide variety of bio-health related courses and leads student research. Since 2016, Dr. Farone has been researching beekeeping and bee medicine. She was granted a sabbatical to pursue apicultural studies and develop a small teaching and research apiary at her College. She traveled to France, Scotland, and Canada, where she met and worked with multiple bee experts. These experiences provided Dr. Farone with a unique perspective in the development of relationships between veterinarians and beekeepers. To share these lessons with others, Dr. Farone has created veterinary continuing education lectures, writings, and programs for local, regional, and national audiences, focusing on bee health. Dr. Farone enjoys spending time with her family, running, horseback riding, SCUBA diving, and of course, just "beeing" with her backyard hives.

Tropilaelaps, right, next to a Varroa. Univ of FL photo.