

BEE YET

Not as fun as
a Volkswagen

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Happy January! For many beekeepers this means your hives are tucked in for the winter and you are enjoying a time to catch up on the season that has passed and get ready for the new.

Winter is also a time where we see breaks in lifecycles of many parasites that can play to our advantage. Many parasites diminish in number and/or reproductive activity or hibernate during the Winter months. This does not mean that they are gone, however. If given the opportunity parasites of all types, will hunker down in/on our warm and cozy bodies, home, or hives to make it through the winter and produce the next generation.

Most parasites, including fleas, ticks, *Varroa* mites, and various intestinal worms are endemic in most of the world. We cannot stop them but strive to control them. No matter the type of parasite or animal it infects, several factors are always at play in the host-parasite-environment relationship. Nutrition, general health of the host animal, genetics, medical preventative or treatment interventions, and climate/shelter/other environmental stressors all play a role in maximizing or minimizing a parasite's effects on our animals.

Nope- this is not another article on *Varroa* mites. By reader request, I will review a parasite that is often

listed as a secondary "pest", but they can still cause significant issues within a hive and may be an indication of the even greater issue of a weakened hive...*Aethina tumida*, the small hive beetle.

History

Aethina tumida is a newer pest to the US, arriving as early as 1996, about a decade after we first observed that *Varroa* had arrived on our shores. In Europe, it is considered a notifiable pest. Small hive beetles are native to South Africa, but despite efforts to control spread, hive beetle infestations are now found throughout the US, Canada, Mexico, Australia, and parts of Europe, Asia, South America, and Central America.

Adult small hive beetles are small (about half a centimeter), brown to black, oval-shaped beetles with club shaped antenna. Female beetles lay their eggs in the hive. Their eggs are smaller than honey bee eggs, so they are hard to individually see, but the eggs may be laid in cells or in multi-clusters around the hive.

The larvae are creamy white to light yellow in color and can be over one centimeter long. Larvae feed on all things within comb; honey, pollen, and brood, and can be quite destructive. Pollen patties may also attract female hive beetles for egg laying and therefore may become infested with larvae. Adults and larvae can defecate through the hive, ruining honey by fermentation.

The pupae must mature in soil, typically in front or near an infested hive. After pupation, the adults emerge, are sexually mature within a week, and may reinfest the nearby hive/s or travel up to five miles to find a new host. The lifecycle from egg to adult is typically four to six weeks. Adult beetles may live up to six months and females can lay up to 1000 eggs in her lifetime. Warm and humid conditions favor hive beetle reproduction.

Aethina tumida are "timid" in their behavior in that they use hiding as a survival behavior. Adults move very quickly and can be elusive to both the bees and the beekeepers. In some hives, bees have been observed "herding" beetles into an area or propolis "jail" to control them by confining them.

While parasitic to the honey bee, *A. tumida* have been found to infest

bumblebee colonies, and to feed on tropical fruits. Small hive beetles have been reported to be a possible vector for *Paenibacillus larvae* (American Foulbrood) and some honey bee viruses, like deformed wing virus (DWV) and Sacbrood virus.

Diagnosis/Clinical signs

Diagnosis can be straight forward with visualization of adults, larvae and/or eggs. Soil in front of hives can be examined for pupal tunneling. However, several non-pathogenic beetle species, other than *A. tumida*, can be found in hives. So, it is vital that beetle samples are properly identified. Visual identification can be aided with laboratory microscopic exam and PCR is available for confirmative diagnosis.

Damage to the hive's comb may be evident on inspection and a foul odor due to fermenting honey may be present. Slime trails may be evident from larval wanderings. In-hive beetle traps can be used for monitoring as well as control (see Traps below).

Hive beetle infestation should also be on the differential diagnosis list for hives that abscond.

Prevention/Treatment/Control Chemicals

Many who comment in the literature are not big fans of using insecticidal products around bees to control hive beetles. I will say that I am in that camp. However, to be complete, there are several products on the market that have been used in the control of hive beetles. I will briefly mention them here.

Coumaphos is an organophosphate that has been used in veterinary medicine starting in the late 1950's for the treatment of various parasites in a variety of animals. While attending veterinary school in the mid 1990's, I mostly learned about organophosphates as toxins. Coumaphos persists in the envi-

Hive beetle larvae in pollen patty





Hive beetles.

ronment, has shown resistance in the treatment of target parasites, and many of the long-term effects of chronic human exposure remain unknown (CDC). Hives are treated with coumaphos strips placed **directly** into the hive.

There are several ground drenches used (i.e., not placed in the hive but on the ground in front of the hive), which contain a Permethrin. Permethrins have lethal and repellent effects on various external parasites and pests of many animals and humans and are commonly used medically today. It can be helpful as a medication, when used under the proper guidance, but it can persist in the environment. It is particularly toxic to cats and aquatic life. Do not use it around bodies of water, if you like to fish. Like other insecticides, it is toxic to honey bees, if they come into contact with it.

Traps & DE

I would be happier if beekeepers utilized less toxic methods, for both us and the bees, to help monitor and control hive beetles. There are several beetle traps and beetle towels with or without the use of oil that are placed in the hive on the market. Homemade traps can be made from dry, disposable, dusting mop pads. These traps and towels can help trap adult beetles so they can be removed from the hive and may I suggest, placed in a hive to measure the presence or amount of hive beetles in a hive. Remember you will have to check your traps periodically for them to be the most informative and effective. Anecdotally, I have heard varying reviews from beekeepers regarding their experience with various trapping methods utilized in hive beetle control.

Diatomaceous earth (DE) makes me recall my old lifeguarding and swimming pool “work” days. DE is commonly used in filtration systems

of swimming pools. Diatomaceous earth originates from the remnant shells of little pre-historic sea creatures called diatoms. Evidence of DE’s effectiveness in controlling hive beetles is anecdotal, but the theory is that the crystal-like shells of diatoms cut and dehydrate any hive beetle larvae that try to pupate in front of a hive. Therefore, this organic substance can be placed outside, in front of hives, to make the ground less hospitable for pupating hive beetle larvae without the fear of environmental toxicity. Check your local swimming pool store for prices. Warning: DE can become very clumpy and stick to your boots when it gets wet.

General management/IPM

There are several management techniques that can also be employed to reduce hive beetle infestations.

1. This is often stated but cannot be overlooked here- *keep strong colonies*. Strong colonies will always have an advantage over parasite infection and hive collapse. Colonies collapsing due to hive beetles may have had underlying issues in functional hive immunity. Assure varroa control and good nutrition.

2. This may seem obvious but physically remove and kill any hive beetles you see during hive inspections. Death by hive tool. Do not spend all day doing this but any beetle you can take out can be helpful. Be aware they are quick little buggers.

3. This may not be practical for all beekeepers, but it is a method I have employed with success. Do not keep your hives directly on the ground/dirt. Placing a weed barrier and then gravel over the ground will create a barrier for grass, weeds, and hive beetle reproduction. I suspect hives on rooftops may enjoy a similar benefit.

4. While it’s true that hive beetles can “fly in” to your hive from miles away, biosecurity principals should still be employed to reduce parasitic pressures. Swarms, while they may have other issues, are less likely to introduce hive beetles to a new yard. Trade and movement of package bees, nucs, colonies, various hive products and even tropical fruits can present risks of further beetle spread. If you are purchasing nucs or hives, ask the supplier if you can inspect the hive/nuc, prior to purchase. If the

answer is “no” that may provide you with enough information to make an informed choice. Nucs originating from the South are more likely to carry hive beetles, since the winter is mild in those areas and their reproduction is not curtailed (Sammataro). Producing your own new stock from splits is often the best way to avoid biosecurity breaches.

5. Freezing frames will kill any hive beetle eggs (as well have other parasites like wax moths). If possible, store un-used comb over the winter in a freezer.

6. Hive beetles do not prosper or reproduce if humidity falls below 50%. Controlling humidity within hives can reduce their success. Top entrances and screened bottom boards may be helpful under the correct environmental conditions.

7. In honey houses, extract honey from supers quickly to avoid attracting hive beetles.

What’s on the horizon?

The Large Hive Beetle, consisting of two main species that infest honey bee colonies, *Oplostomus fuliginosus* and *Oplostomus haroldi*, are currently found in southern Africa. This pest is *not currently* in the US, but it is just another parasite to be on our watch list. 

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Gravel in beeyard.