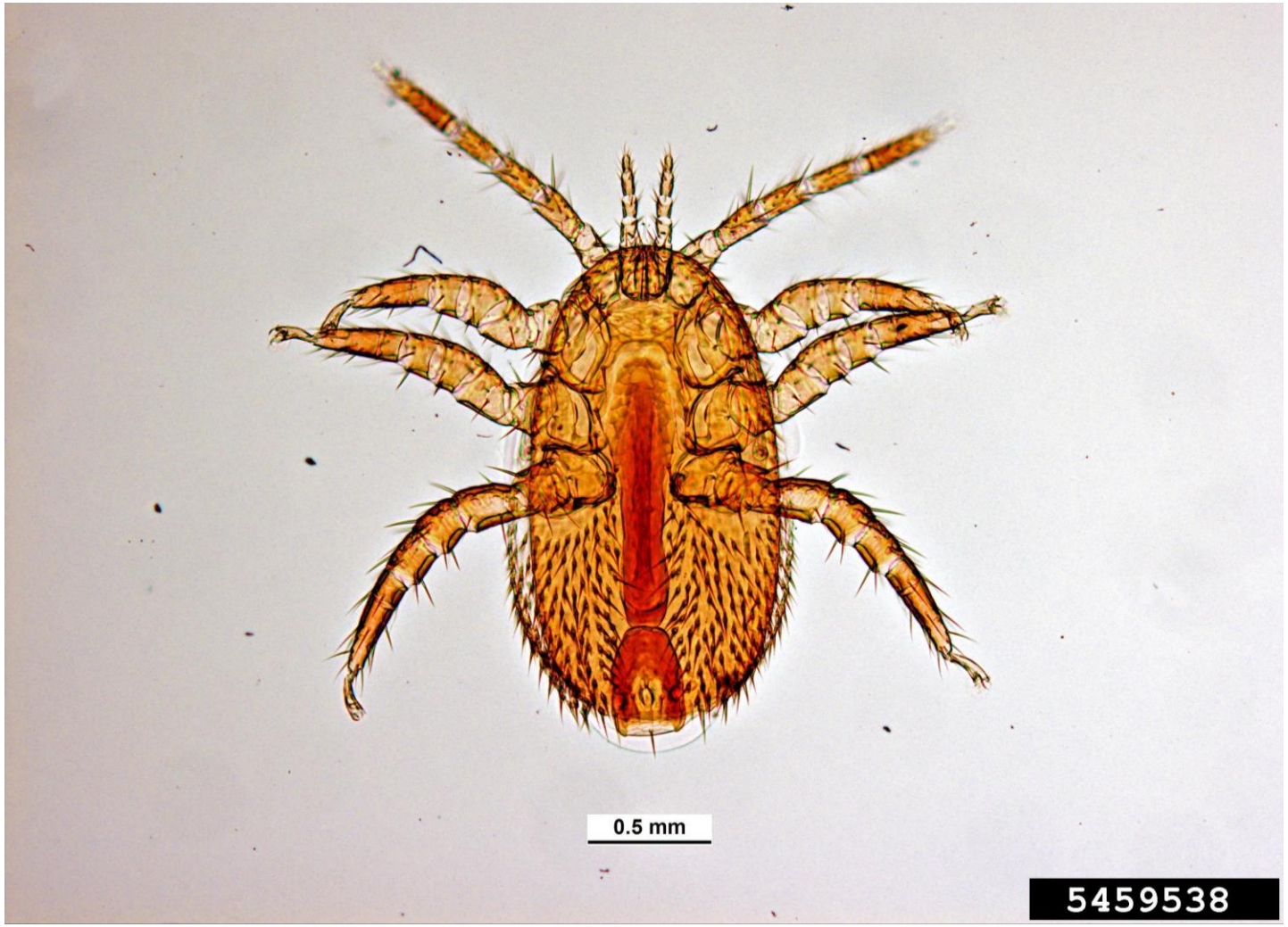
Varroa and Viruses in Honey Bees

Riley Reed

Tracheal mites are rarely an issue anymore.

Lilia De Guzman, Bugwood.org

Tropilaelaps are luckily not here yet.



Pest and Diseases Image Library, Bugwood.org

Tropilaelaps are smaller and more oblong than varroa mites.

Zachary Huang,
www.beetography.com.

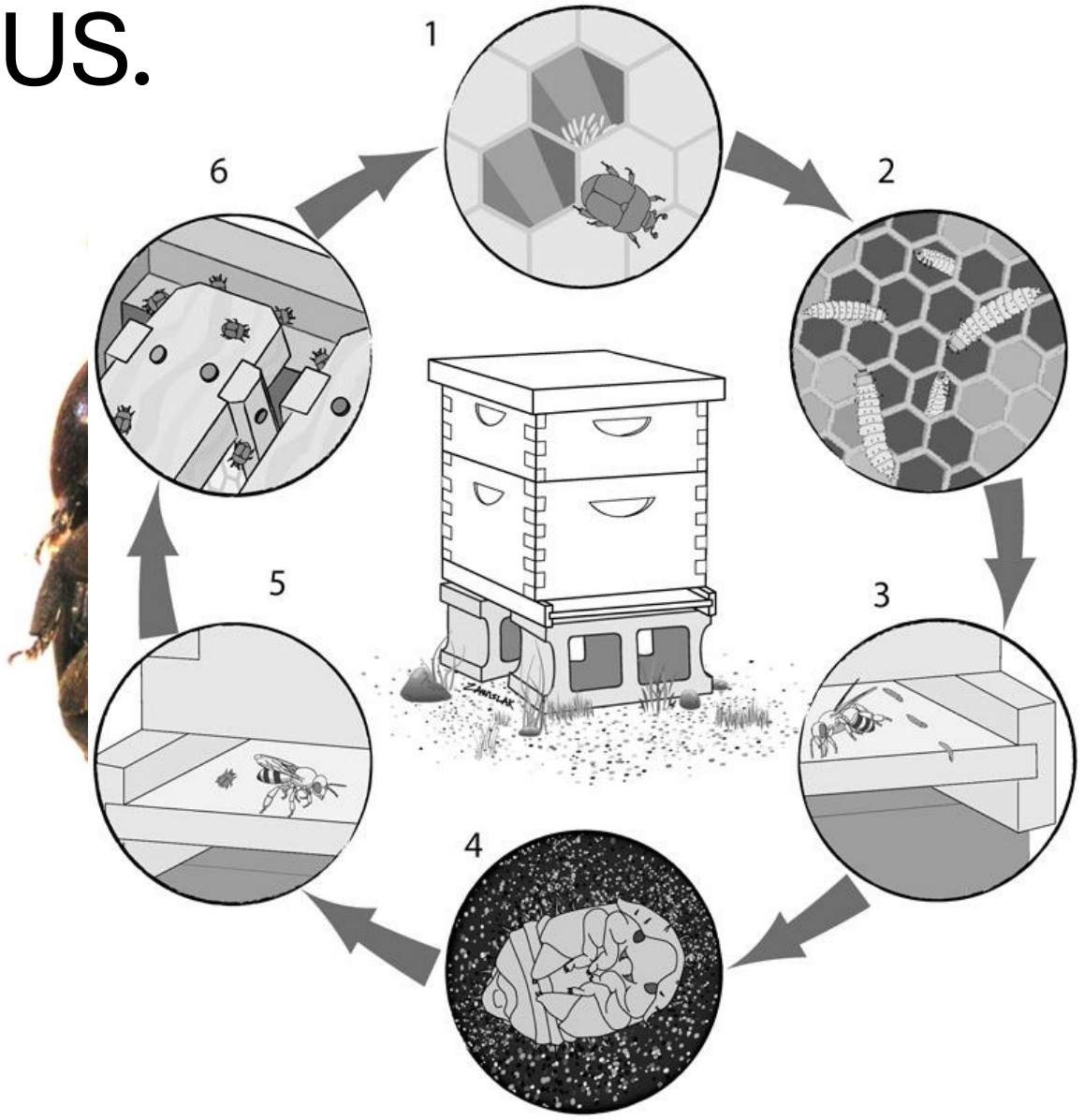
Bee lice are flightless flies that infest honey bee colonies.

(Parmentier, 2020)

Bee lice look strange but are harmless.

Pest and Diseases Image Library, Bugwood.org

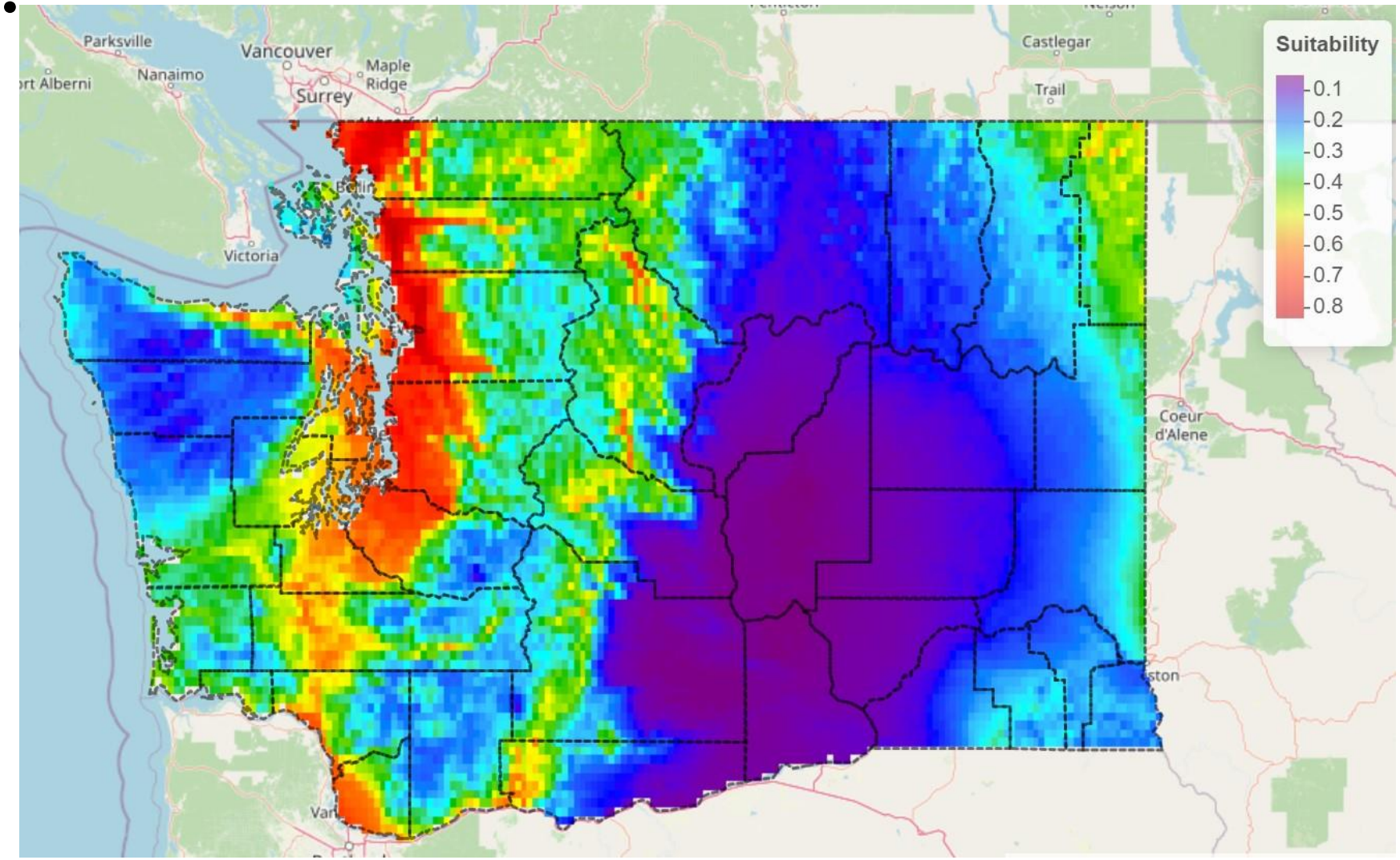
Small hive beetles are a common pest in the southern US.



Ellis, University of Florida, Bugwood.org

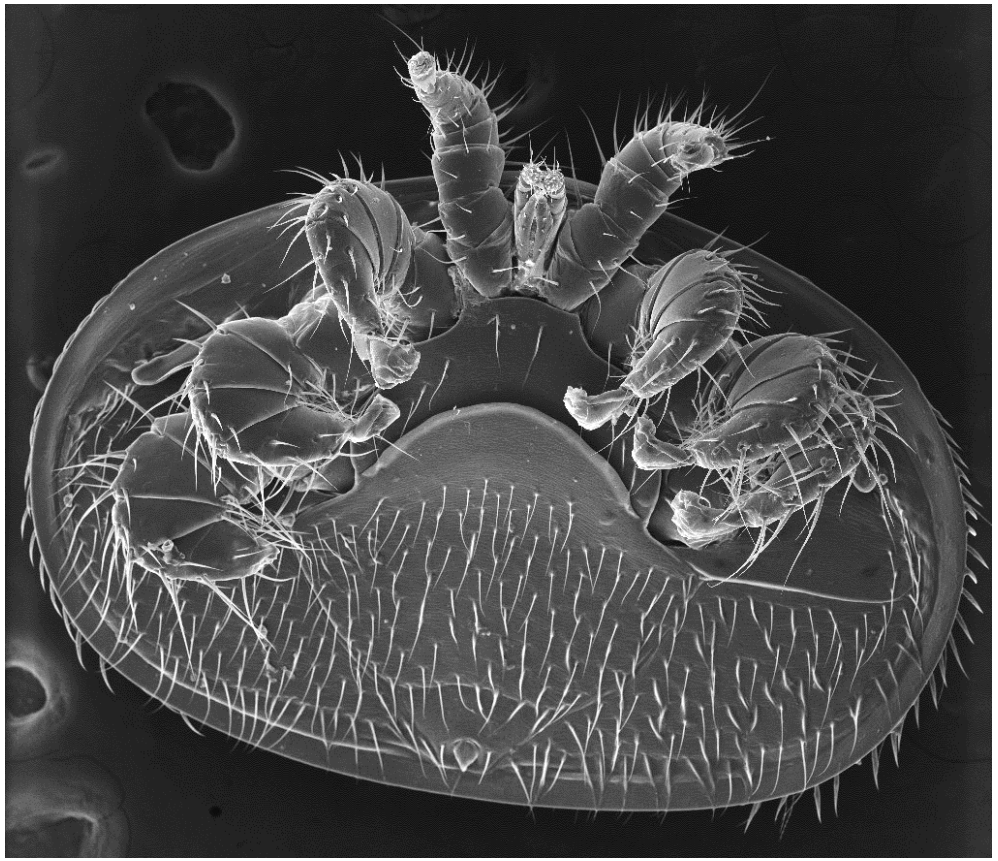
Courtesy of Jon Zawislak

Small hive beetles may become a common sight.

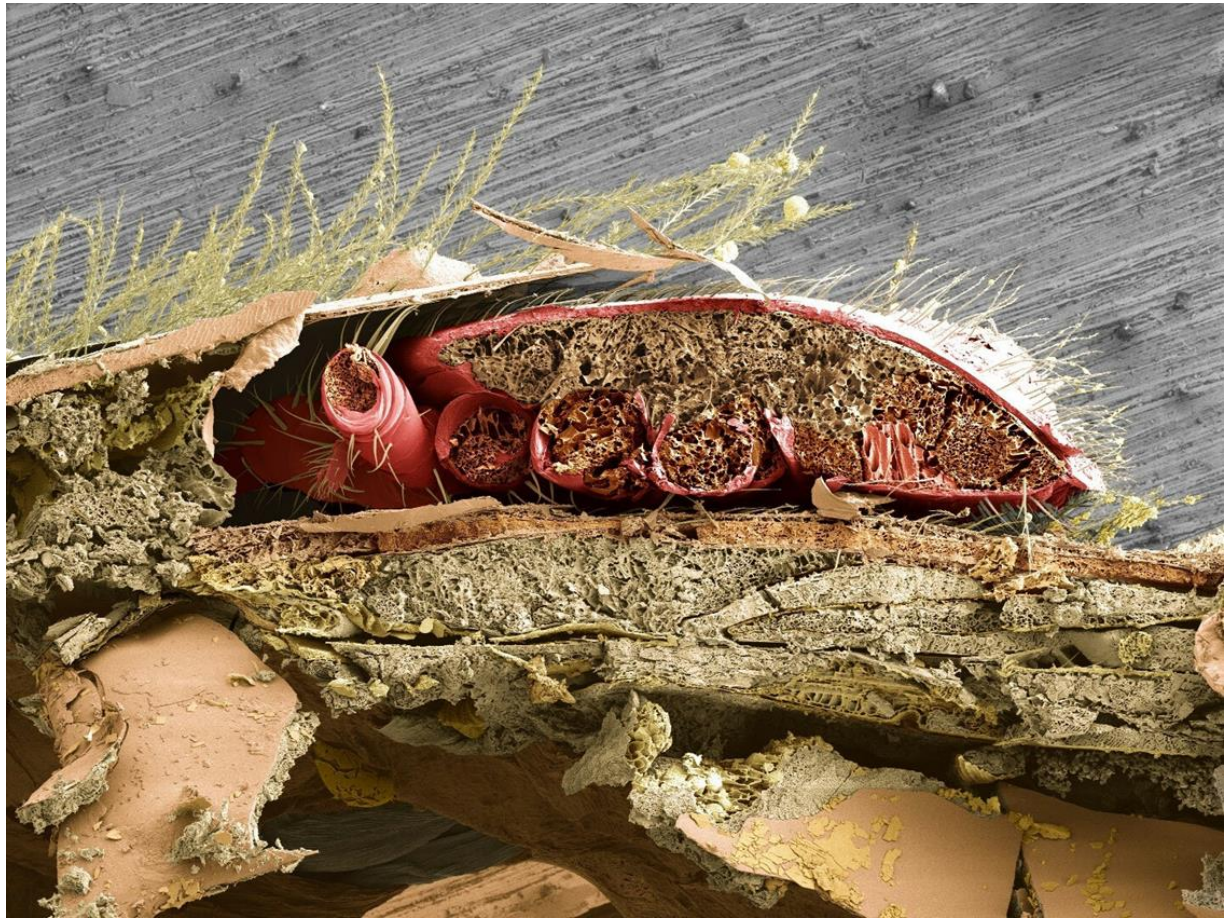


Courtesy of Gengping Zhu

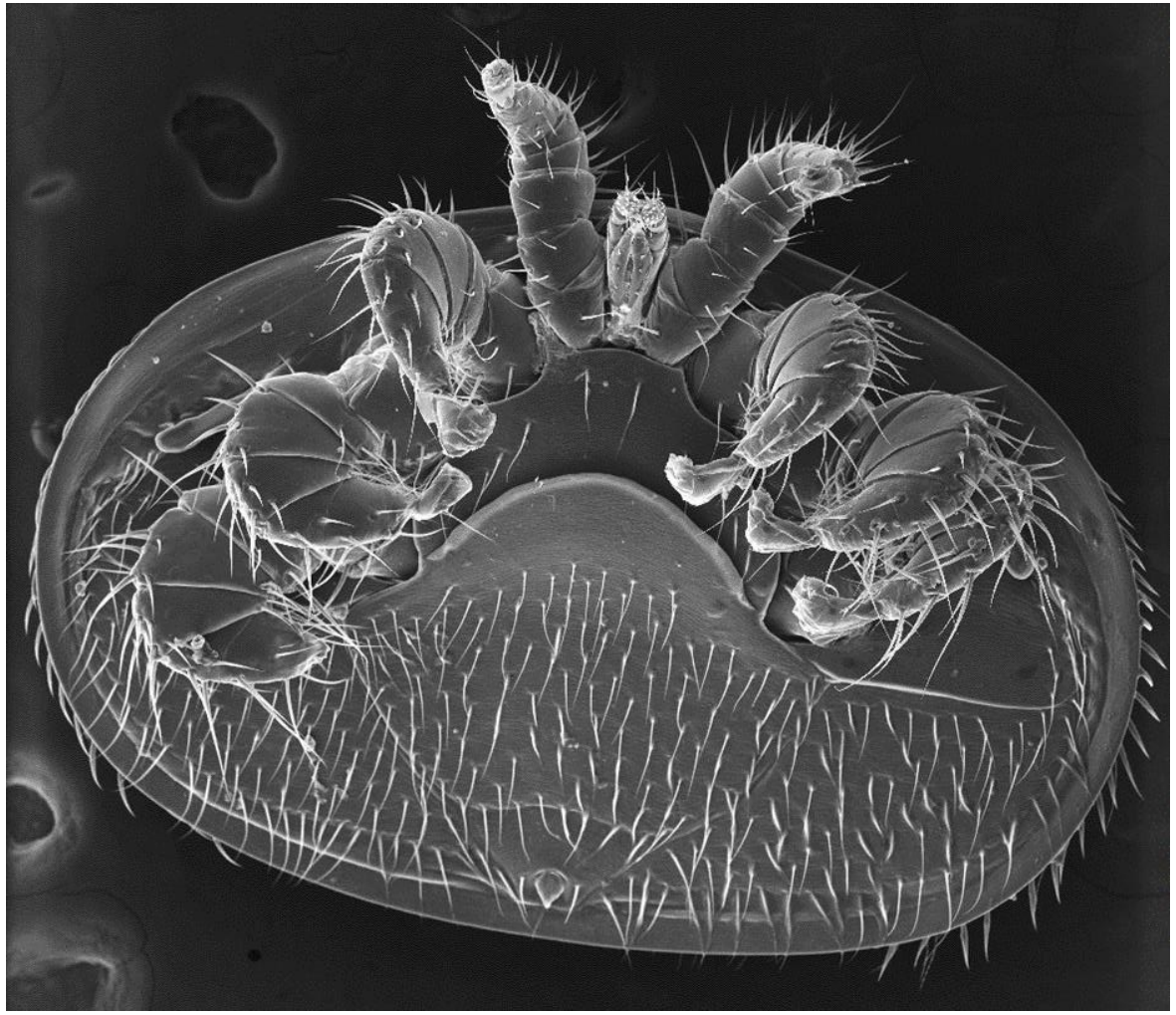
Varroa can be identified by their red, oval shaped bodies and relatively large size.



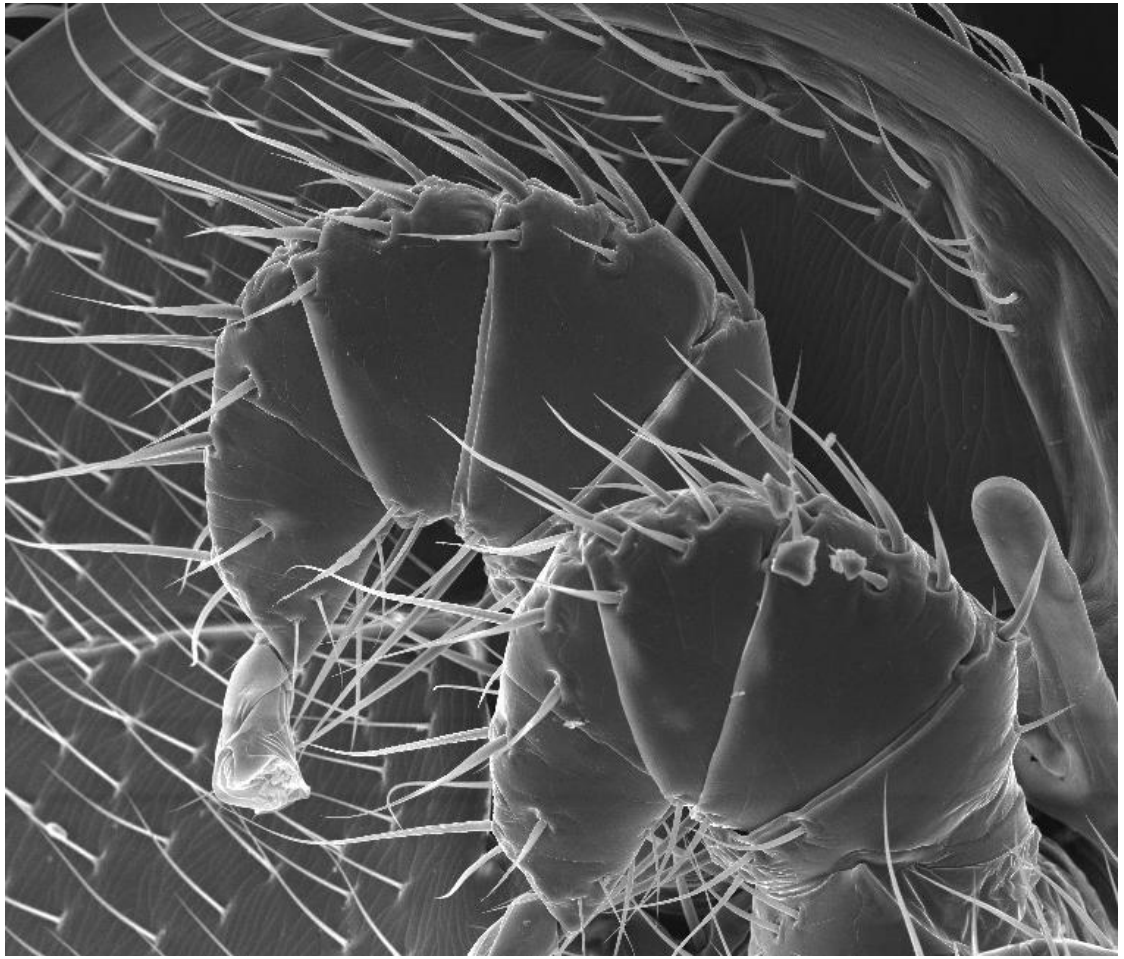
Varroa bodies are specially adapted to their life within a colony.

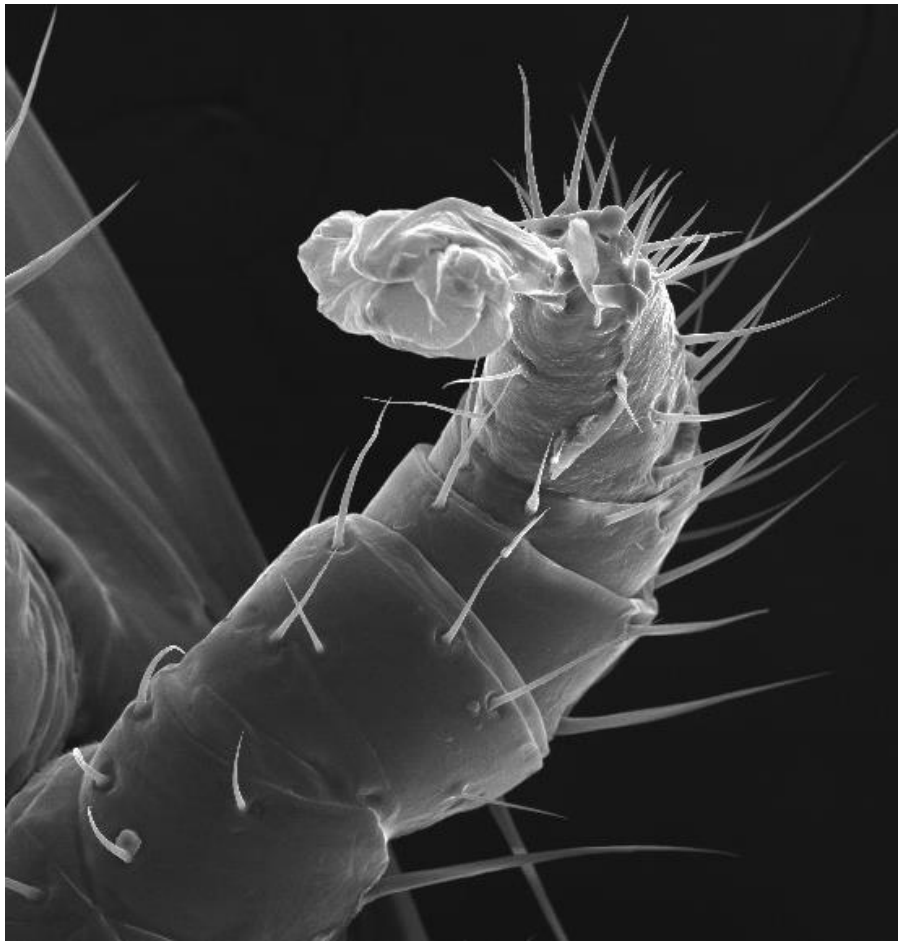


UMD/USDA/PNAS

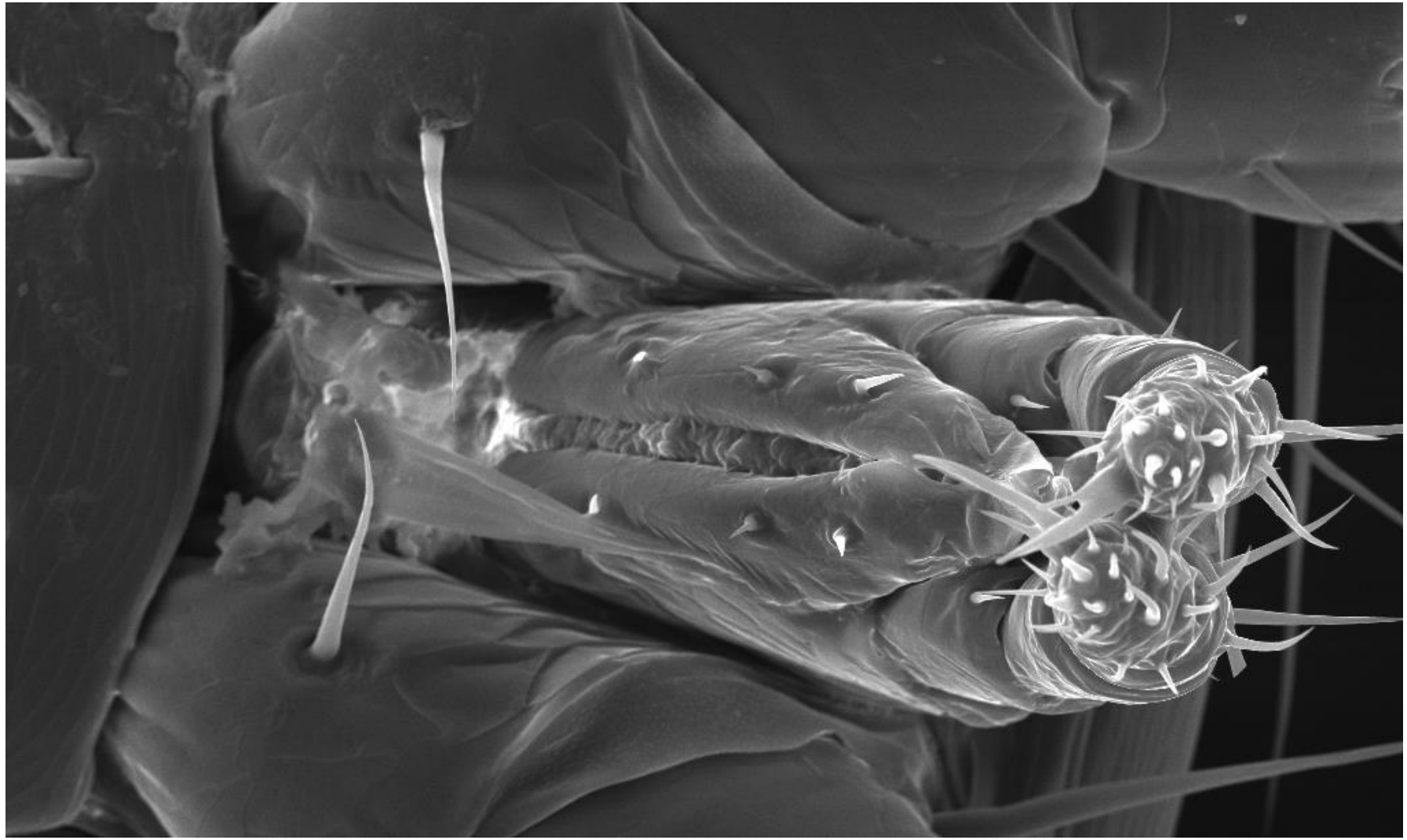


Grasping feet on the end of 8 short legs allow them to easily walk on a variety of surfaces.

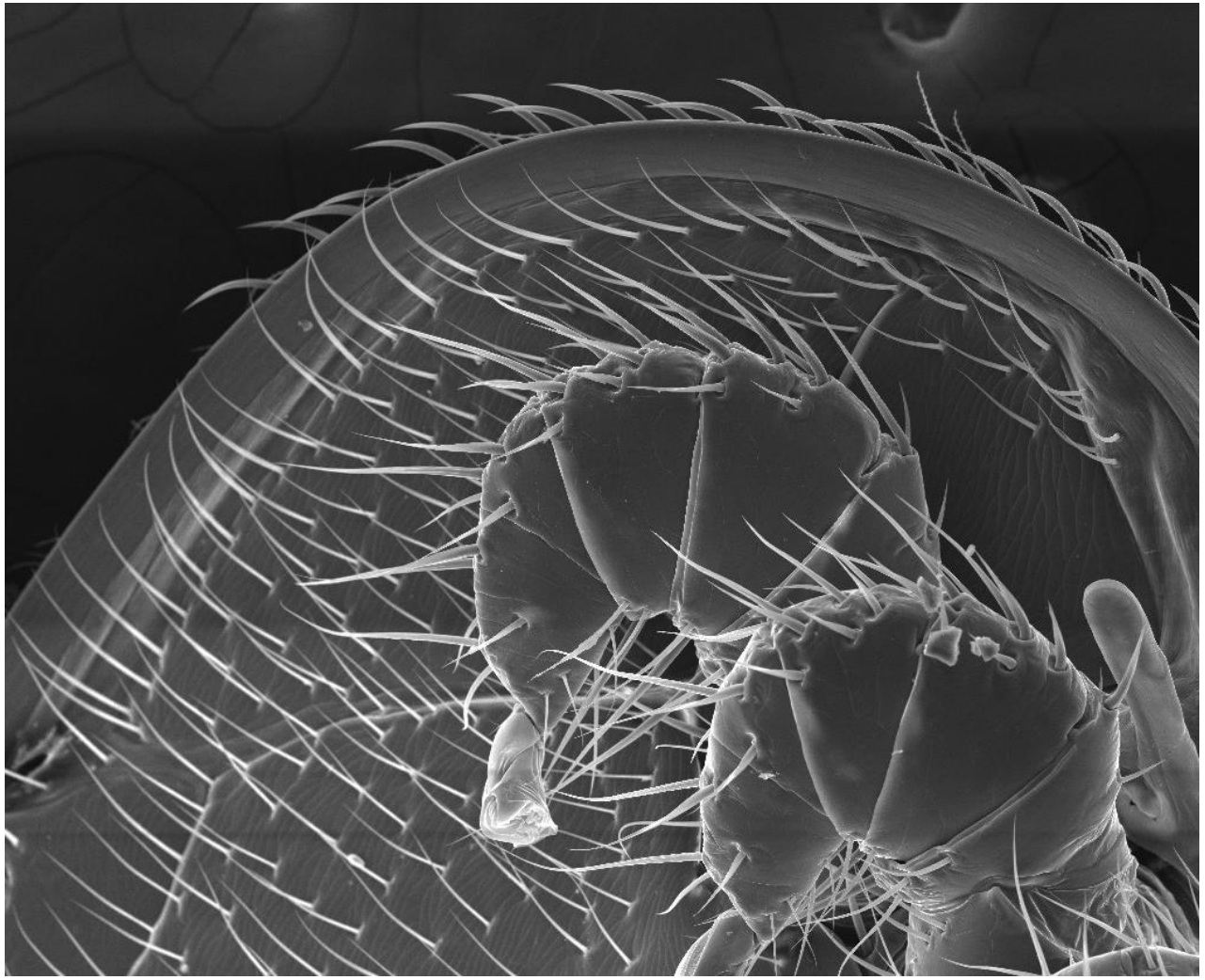




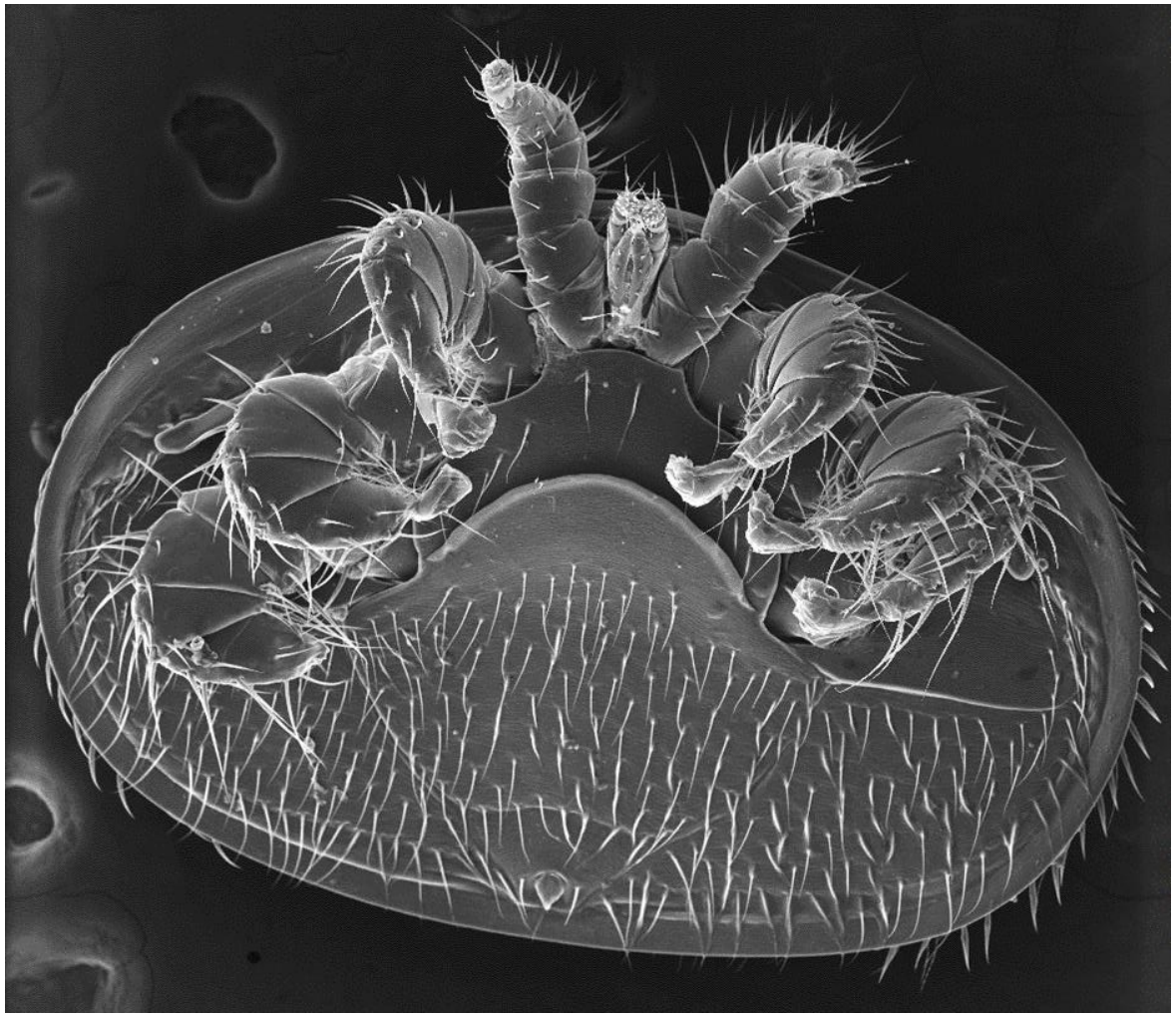
Sharpened mouthparts allow varroa to puncture the honey bee exoskeleton and feed.

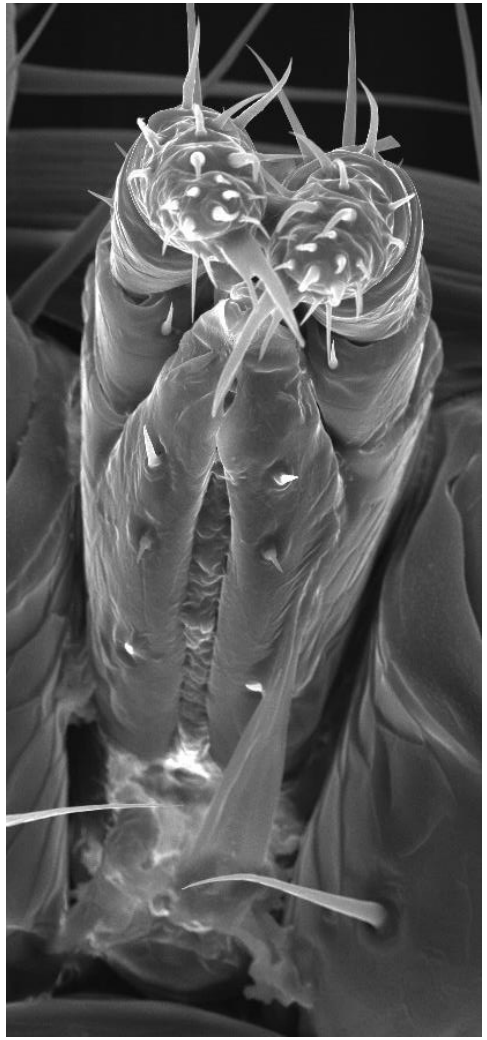


Just like bees, varroa are protected by a tough exoskeleton.

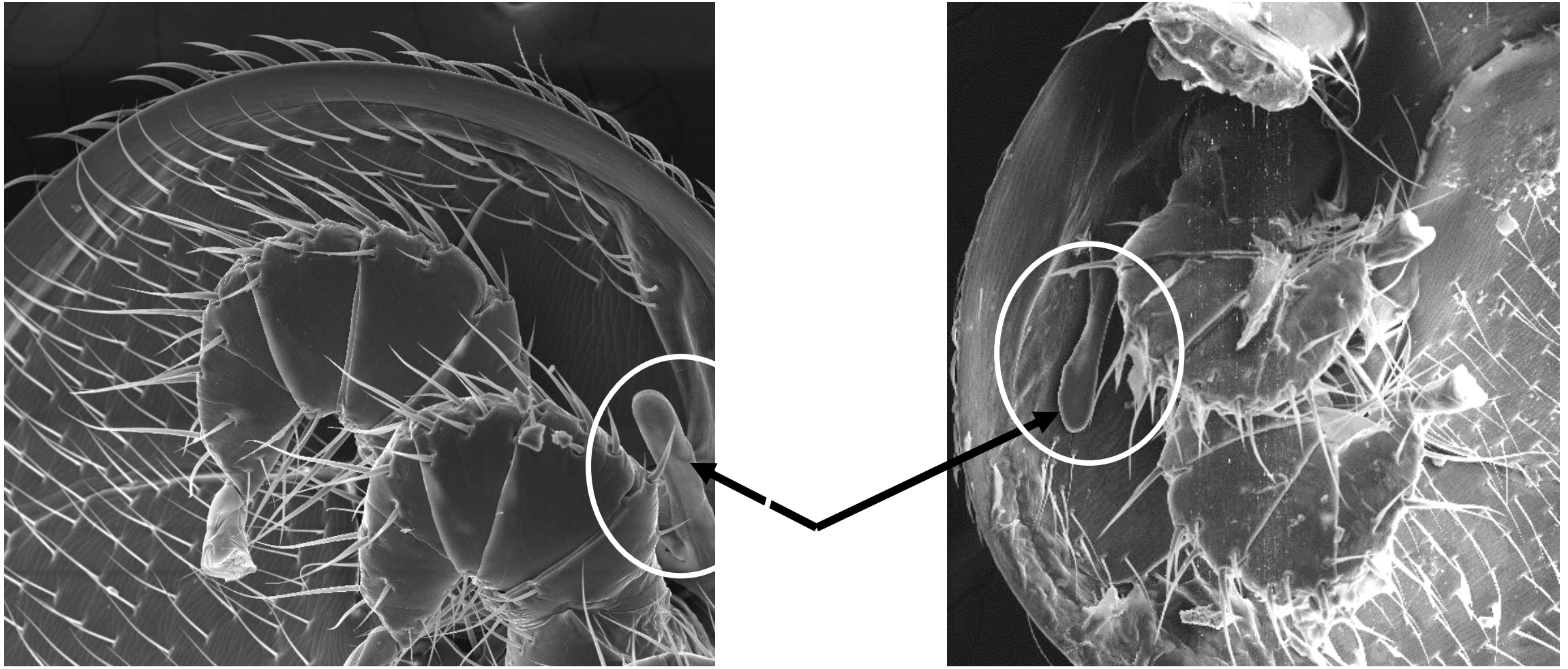


Varroa “see” the world through touch and smell.





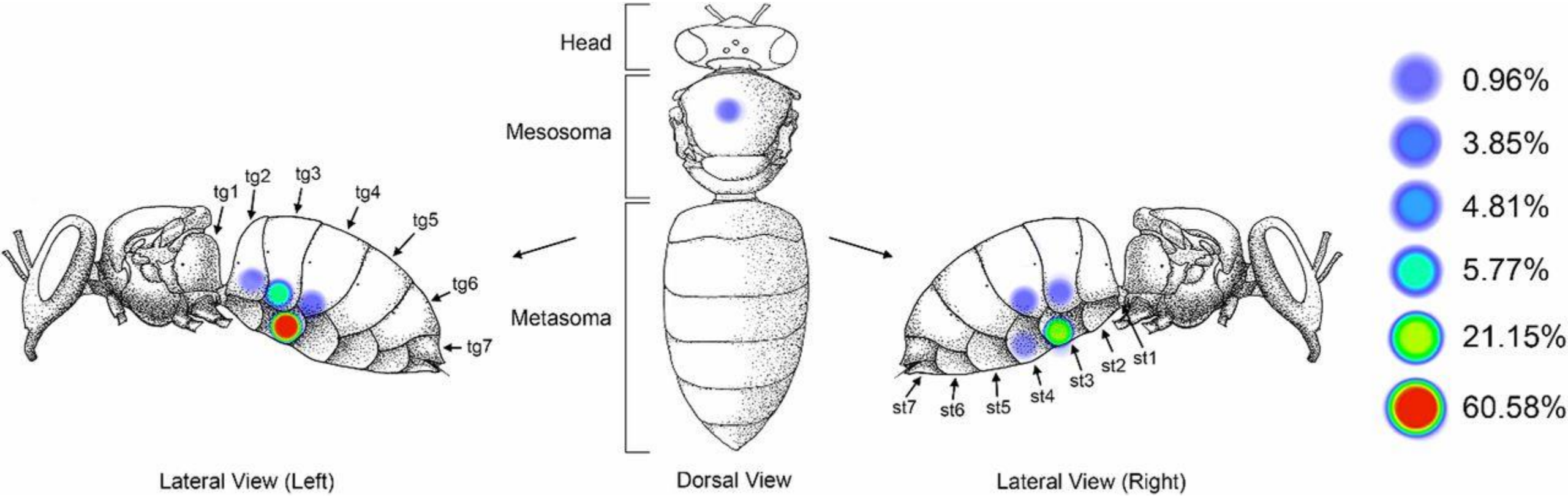
Varroa breath through a “snorkel” called a peritreme.



Female varroa mites go through two phases, known as reproductive and dispersal.

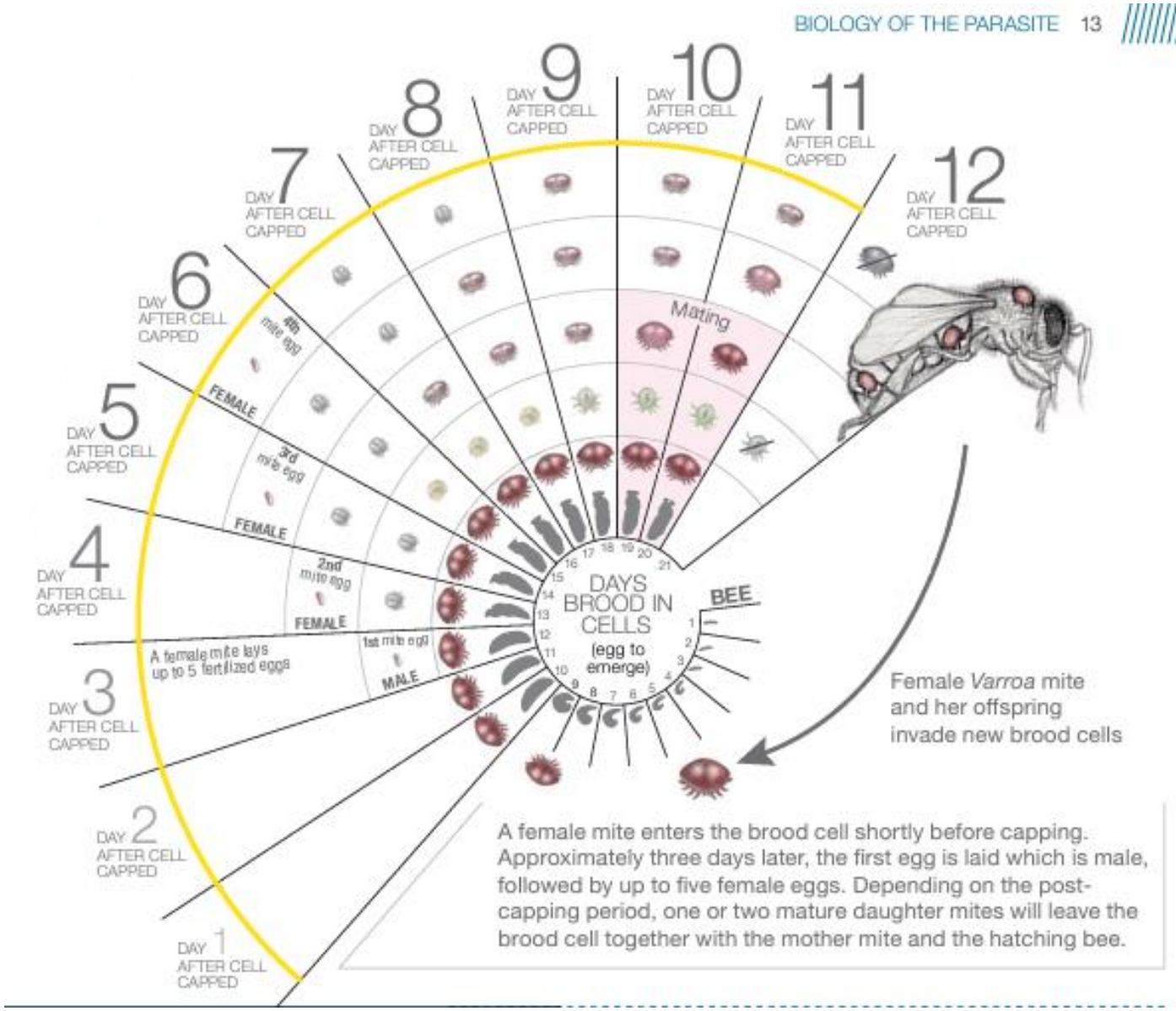
Scott Bauer, USDA Agricultural Research Service, Bugwood.org

During the dispersal phase, mites feed on and transfer between adult bees.



(Ramsey et al., 2019)

Inside the capped cell, the foundress mite will lay one male egg, followed by several female eggs.

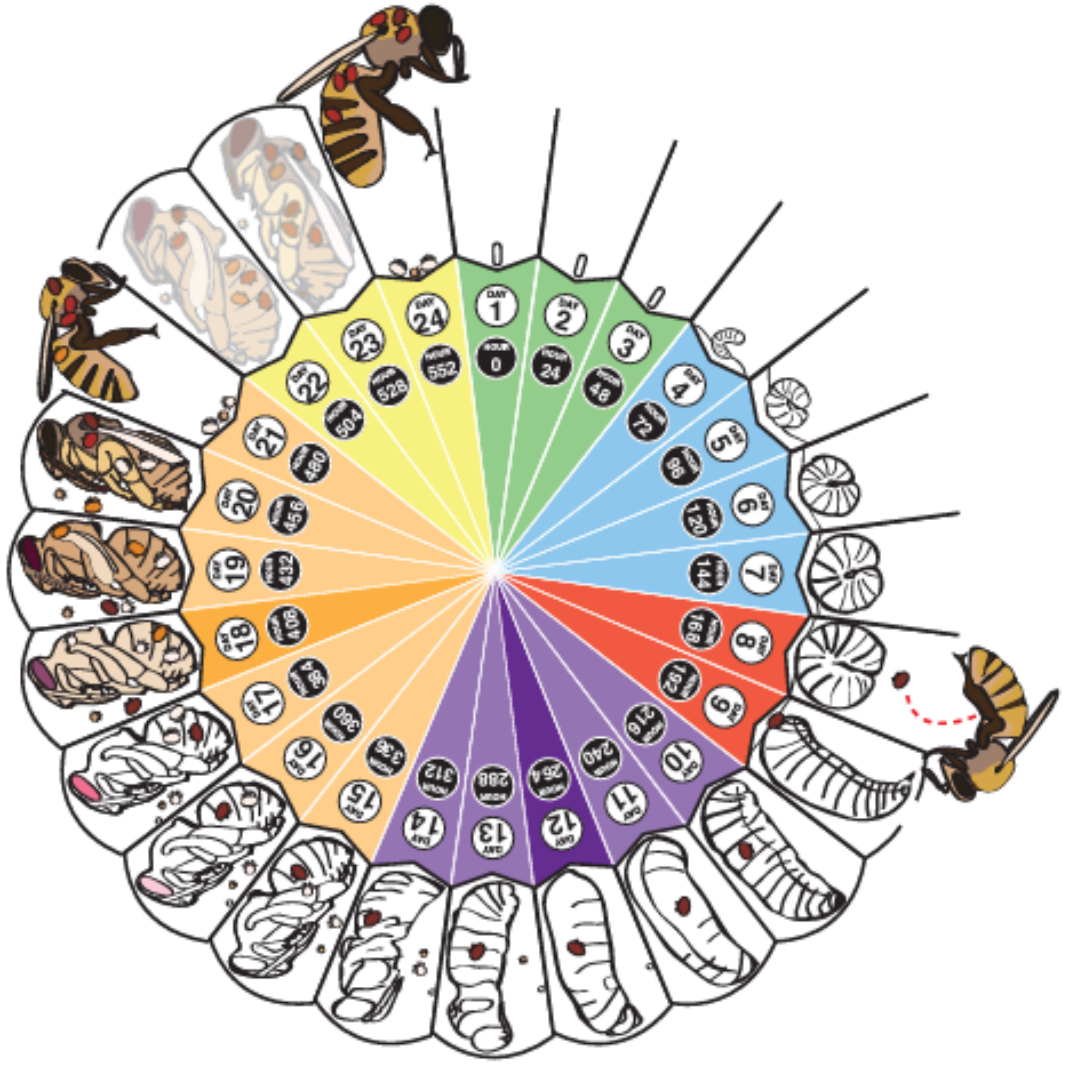


Bayer BeeCare, 2019

Only mature female mites can emerge with the bee.

Nganso, 2018

Varroa prefer to reproduce in drone brood because it takes 3 additional days to develop.

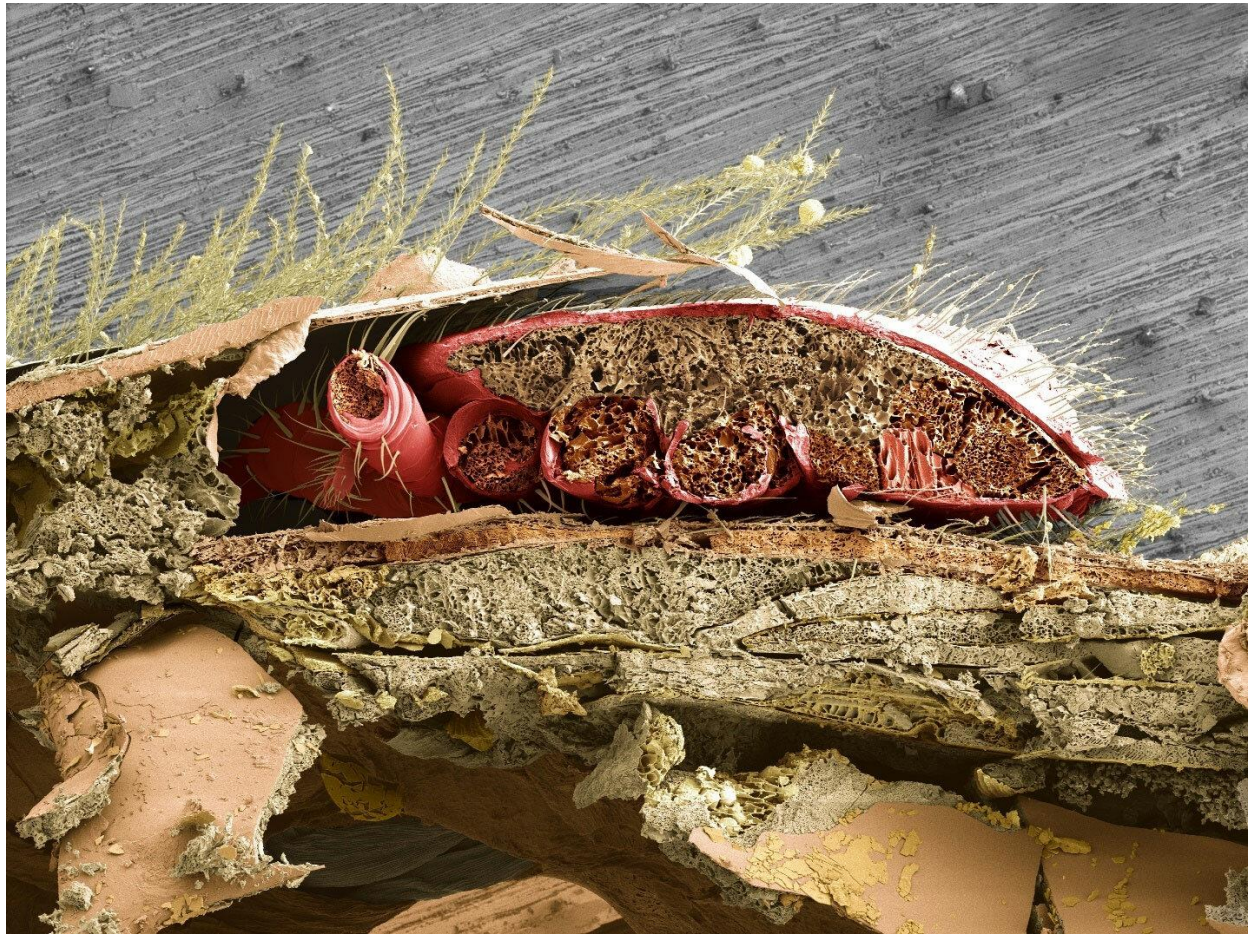


- egg
- larval stage pre-infestation
- *Varroa* enters cell (approx. 15 hours before capping)
- pre-pupal stage
- first *Varroa* egg
- pupal stage
- male *Varroa* reaches sexual maturity
- drone emerges 3 days after worker

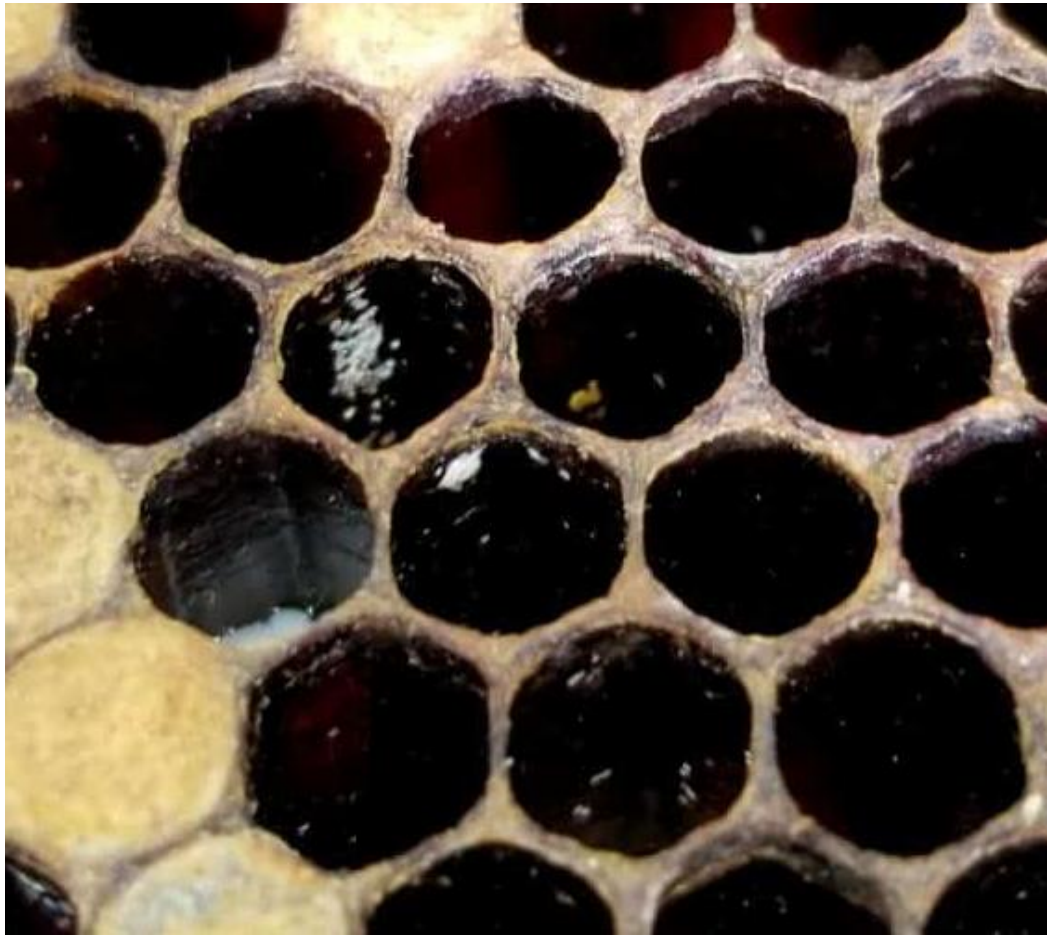
- foundress mite
- egg
- male proto- / deutonymph
- female protonymph
- female deutonymph
- adult male
- pre-adult female
- adult female

Evans & Cook, 2018

Varroa primarily feed on the fat bodies of honey bees.

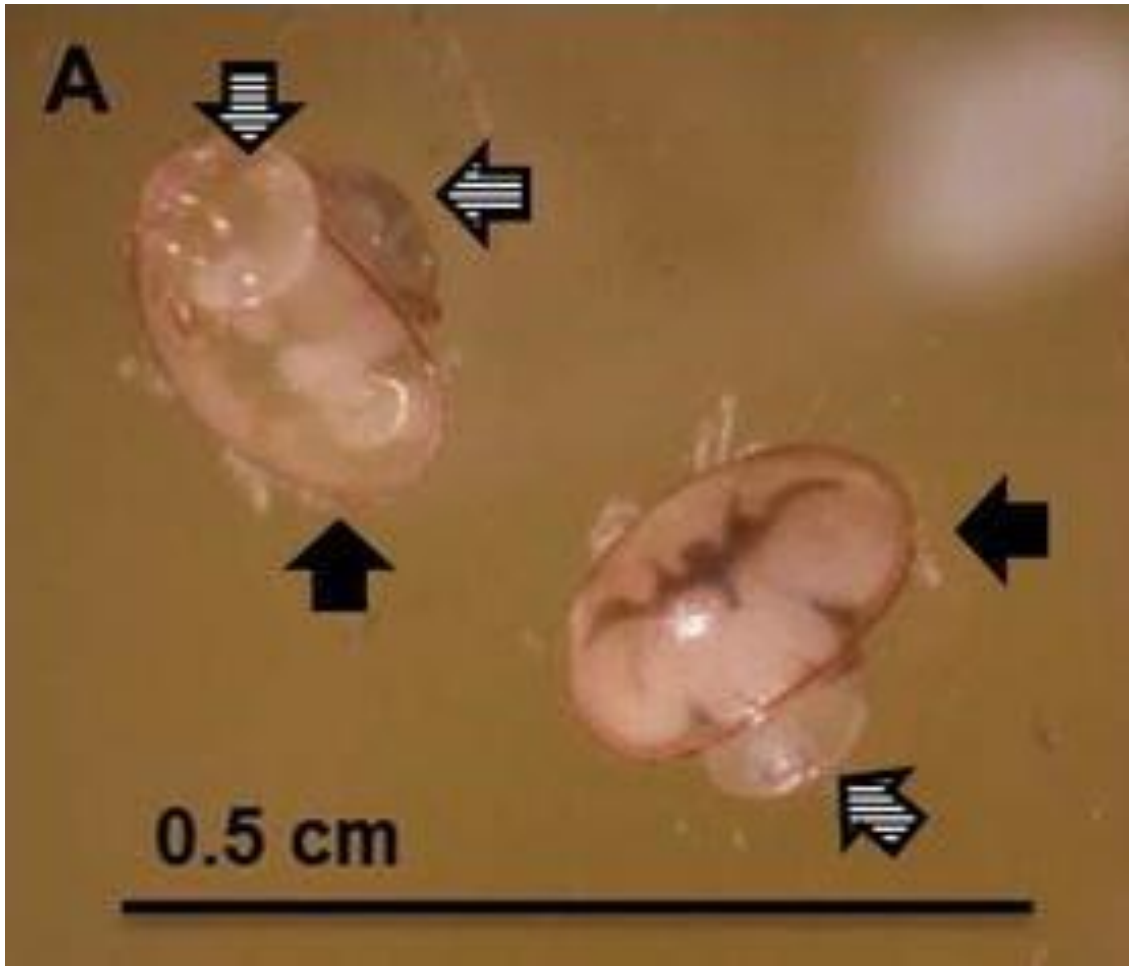


(Ramsey et al., 2019)



Robert C. Snyder, 2015

Male mites must mate with the females before the bee emerges.



Häußermann, et al., 2016

One common sign of heavy infestation is chewed pupae.

Snyder, 2013

Deformed wing virus is usually associated with high varroa infestations.

Paralysis viruses can also be spread by varroa, creating bald, “greasy” bees.

Photo courtesy of The Food And Environment Research Agency (Fera), Crown Copyright

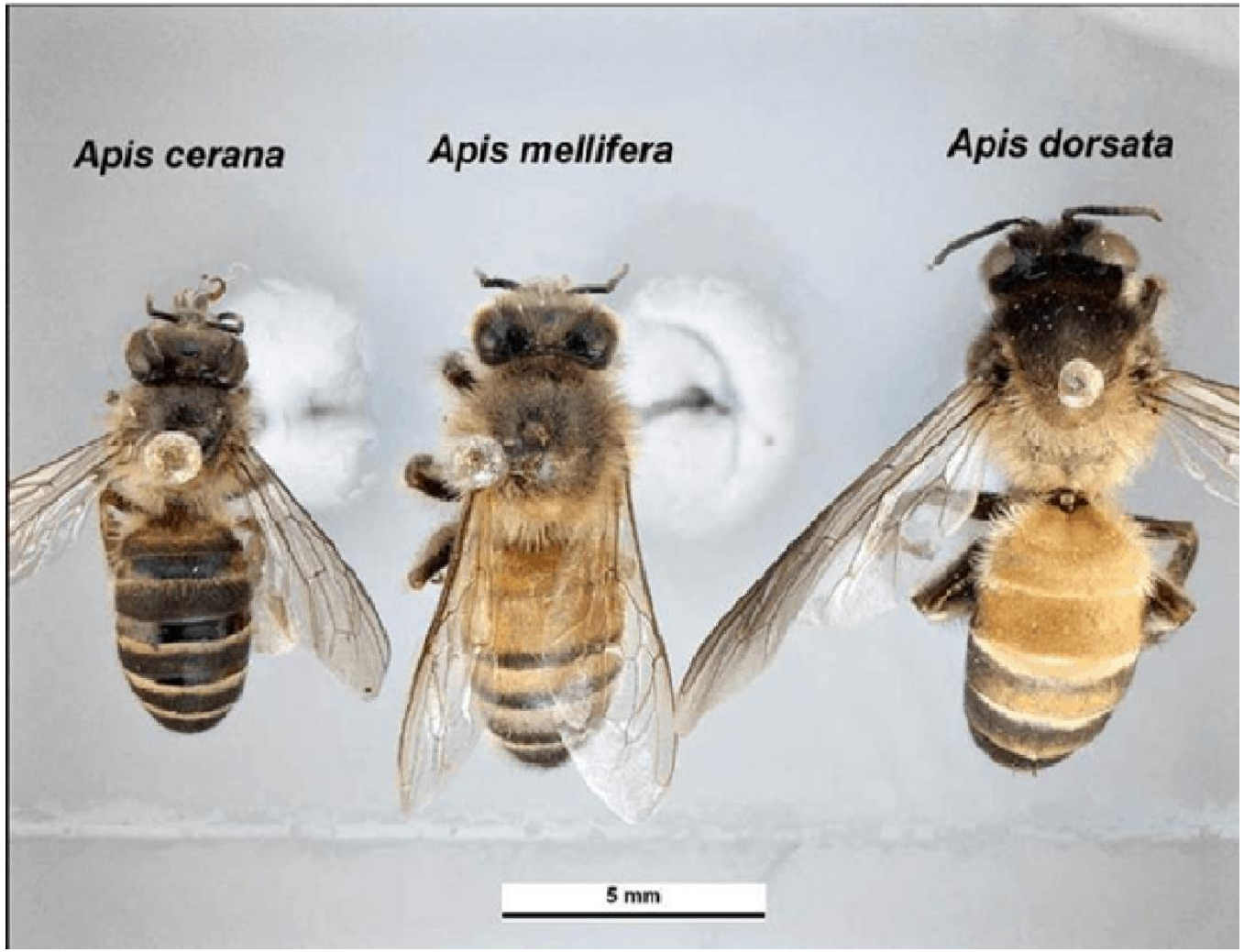
Sacbrood virus turns the larva into fluid filled sacks.

University of Georgia

Black queen cell virus kills developing queens and turns the queen cell a dark color.

The Spread of Varroa

Apis cerana naturally evolved with varroa, allowing them to better coexist with these mites.

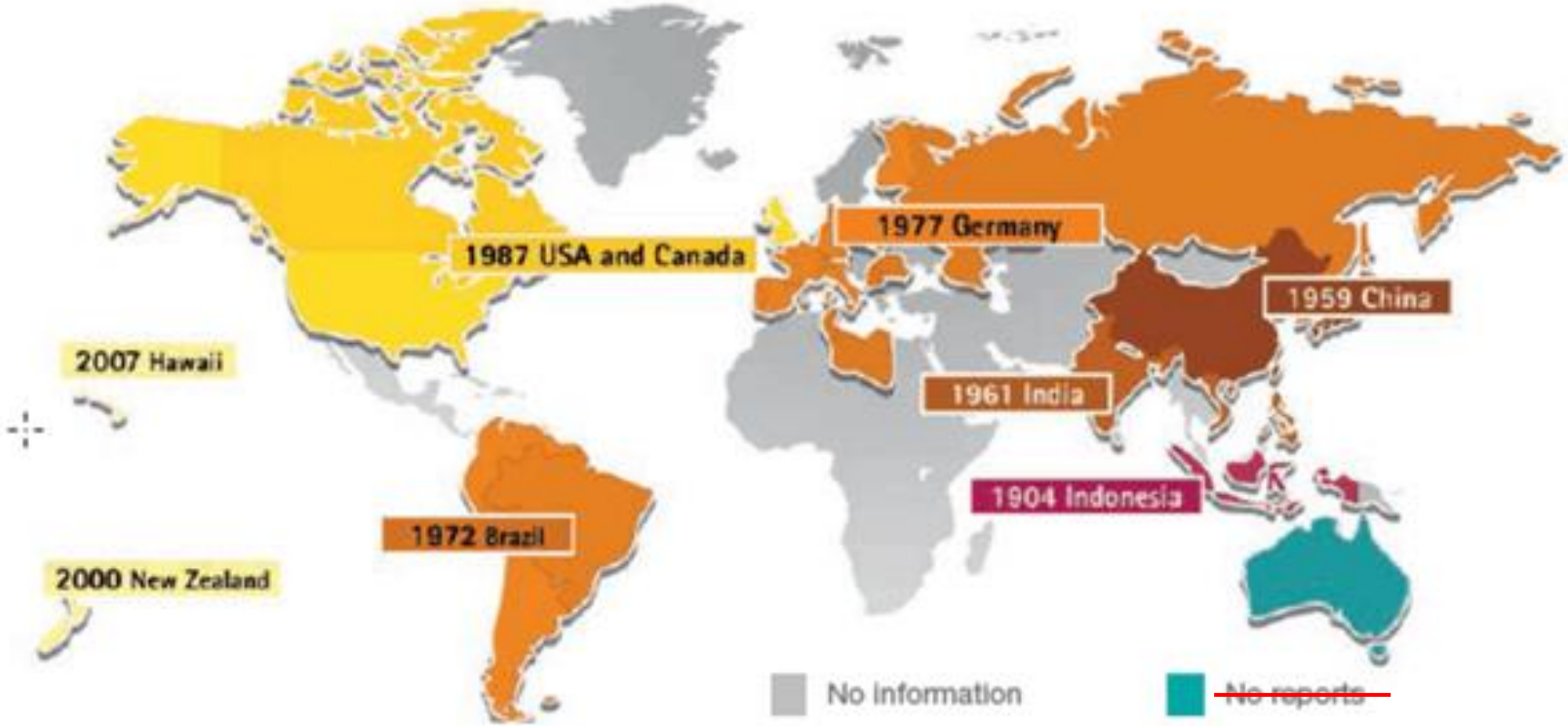


Pest and Diseases Image Library , Bugwood.org

Varroa first infested Apis mellifera in the 1950’s.

(Beaurepaire et al., 2020)

In less than fifty years, varroa had already spread to colonies in Europe and the Americas.



Spread of the *Varroa* mite in the selected countries with the year of detection in the corresponding decade.

2000s | 1980s | 1970s | 1960s | 1950s | First detection

Varroa can move between colonies during robbing, drifting, and foraging.

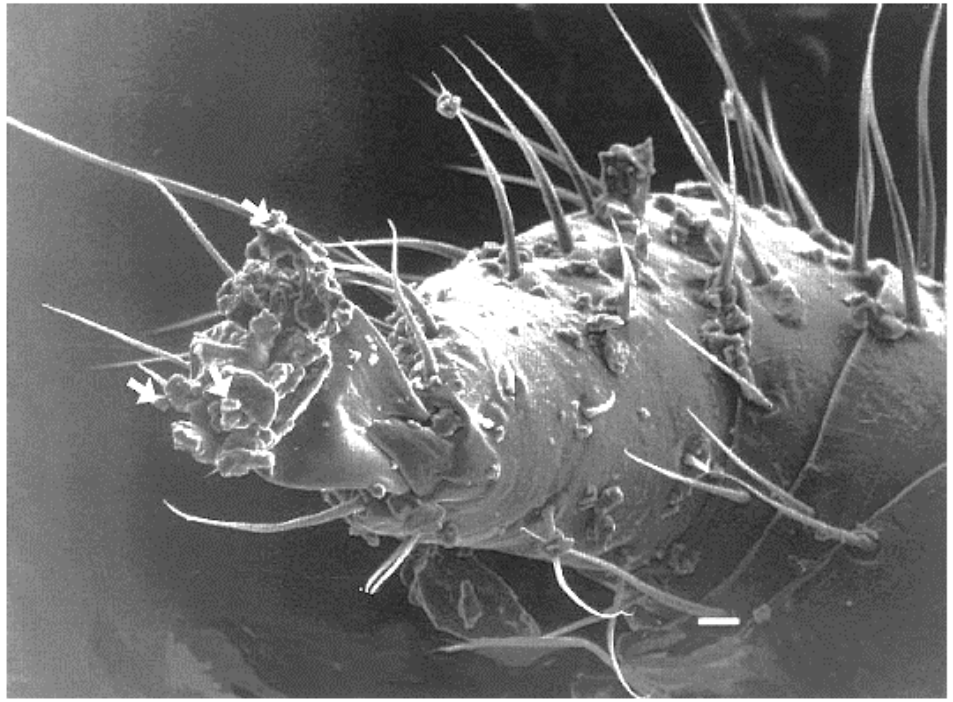
Wyns, 2020

Monitoring strategies

The ethanol wash is a quick and easy way to monitor varroa populations.

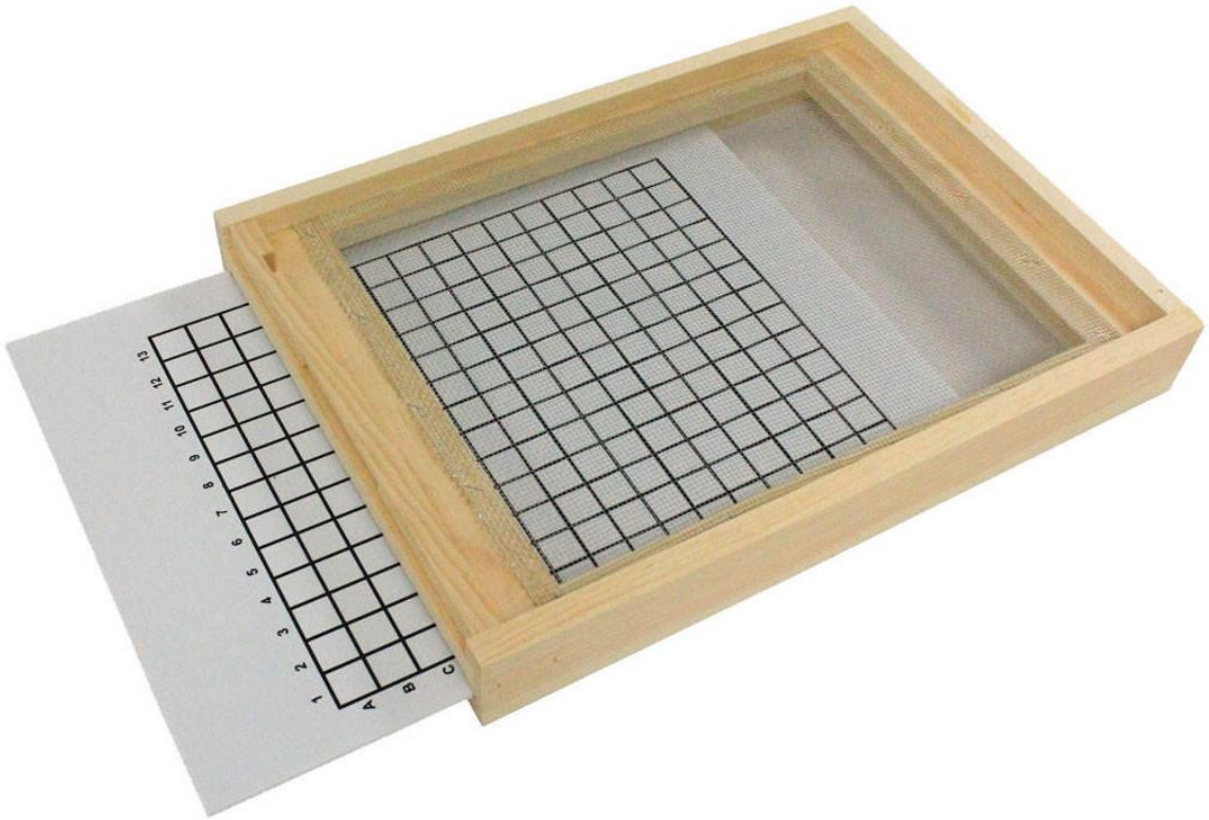
The sugar roll is a nonlethal alternative to the ethanol wash.

BetterBee.com

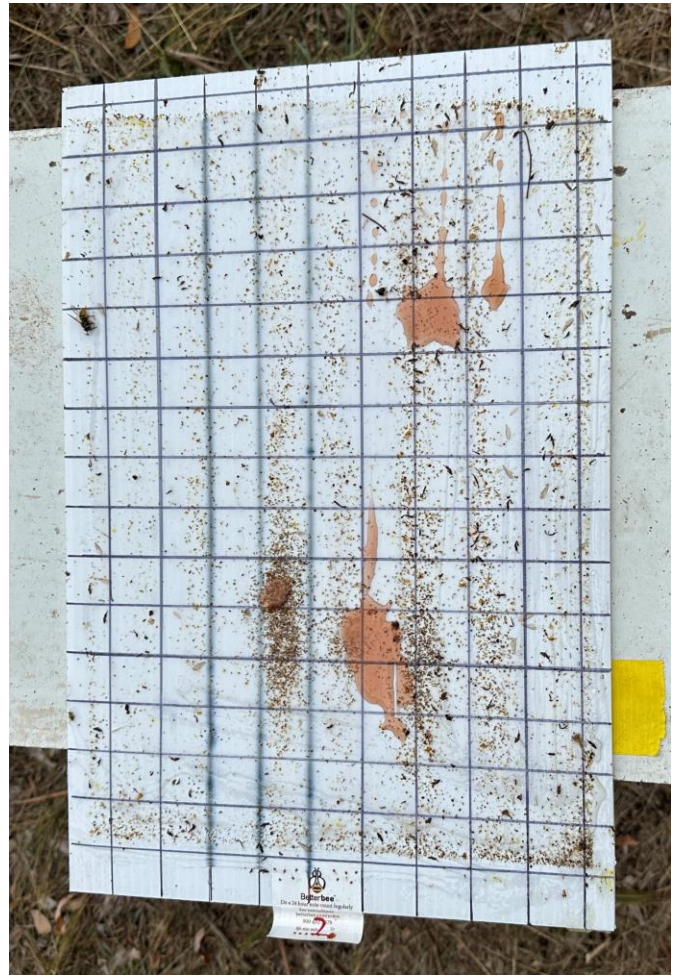


(Fakhimzadeh, 2001)

Screened bottom boards with sticky cards can also be used to monitor mite populations.



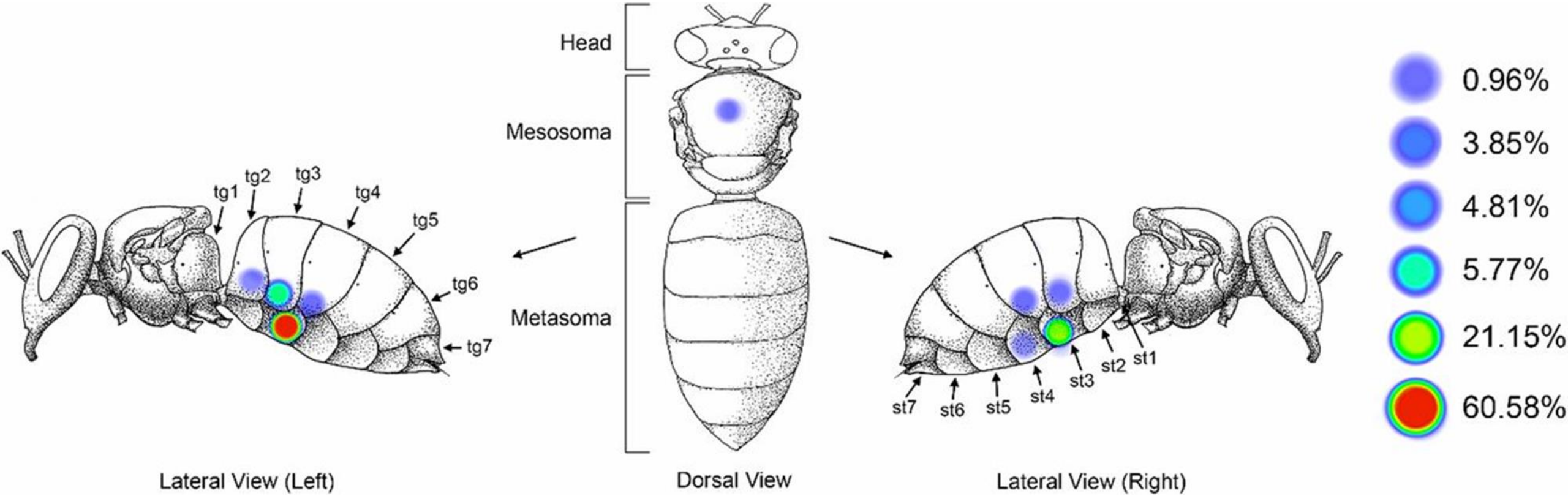
Mann Lake



Monitoring varroa in drone brood can also be used in a pinch.

Randy Oliver, 2006

You cannot effectively monitor mites by visually inspecting workers.



(Ramsey et al., 2019)

Control

Coumaphos and Tau-Fluvalinate are rarely used today.

Photo courtesy of Meyer Bees

Apivar uses plastic strips containing amitraz.

Apiguard contains thymol, derived from thyme.

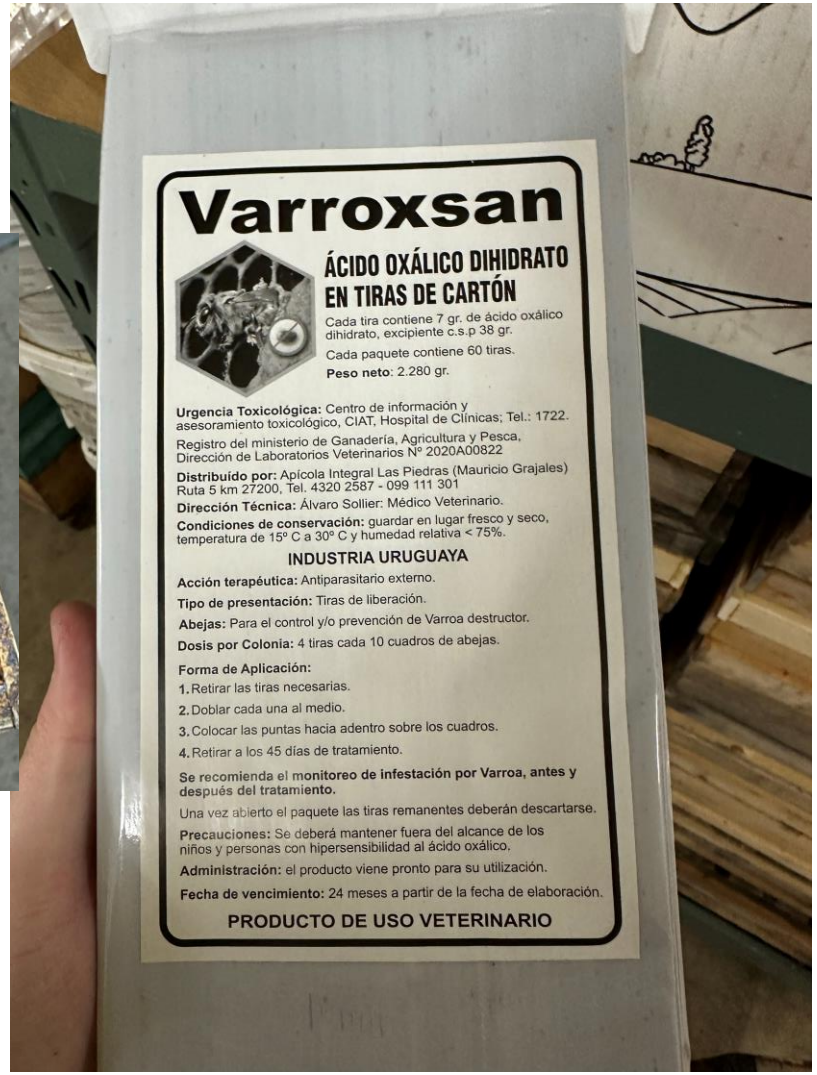
Hopguard is named for the hop beta acids is contains.

Mann Lake

Formic acid is one of the only miticides that can penetrate capped brood.

Mann Lake

Oxalic acid can bee applied as a vapor, dribble, or strip.



Drone comb trapping can help keep varroa populations from rising.

Brood breaks can increase the effectiveness of miticides.

AliExpress

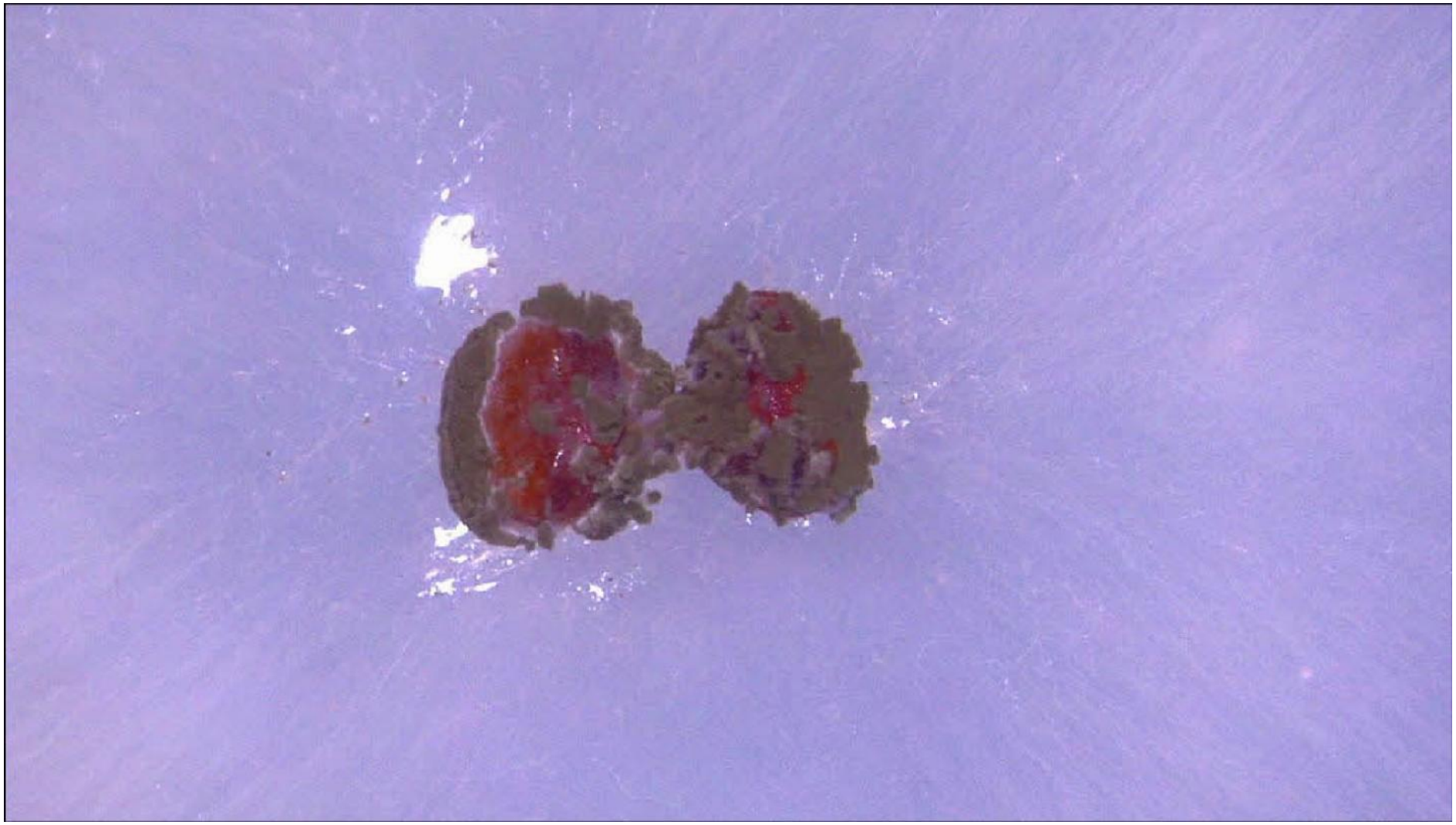
Cold storage can be used to create brood breaks on a commercial scale.

Varroa are slightly more susceptible to heat than honey bees.

Mighty Mite Killer, Facebook

Some breeders have developed resistant lines of bees.

Fungi like Metarhizium are being studied for use as biological control agents.

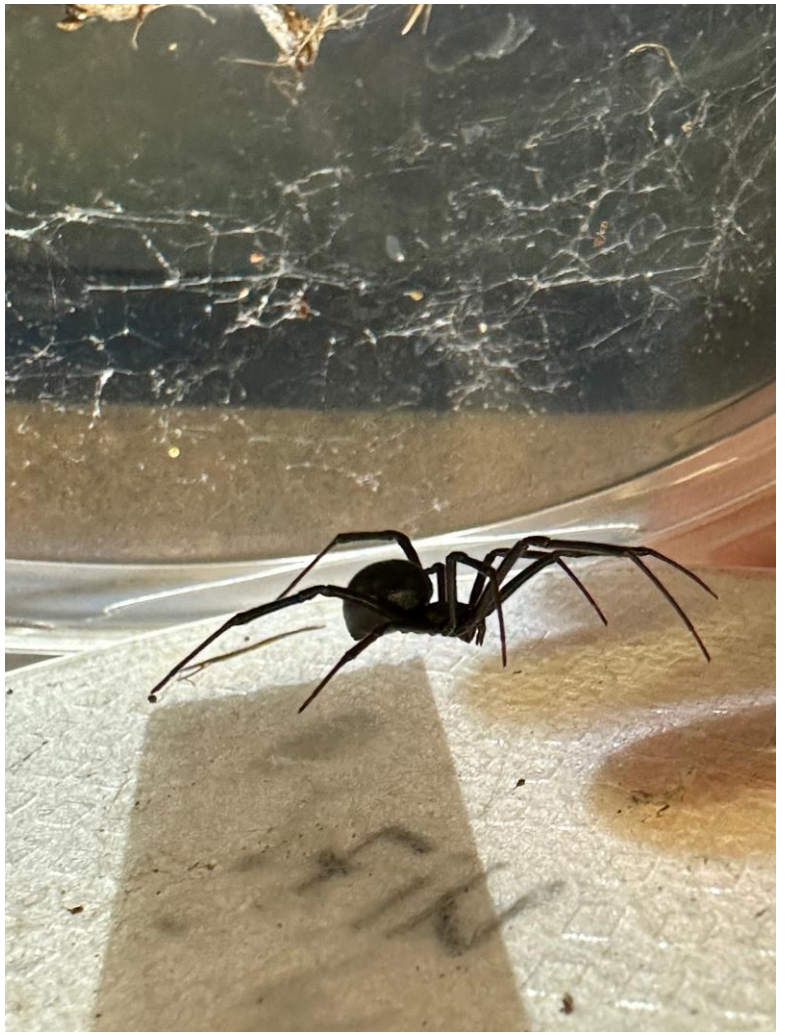


Psuedoscorpions will eat varroa but wide scale use could be difficult.

Torben Schiffers

Other hive visitors

Black widows and rattlesnakes can both be found in the apiary.



Paper wasps generally leave bees alone.

Mud daubers love nesting in empty hives.

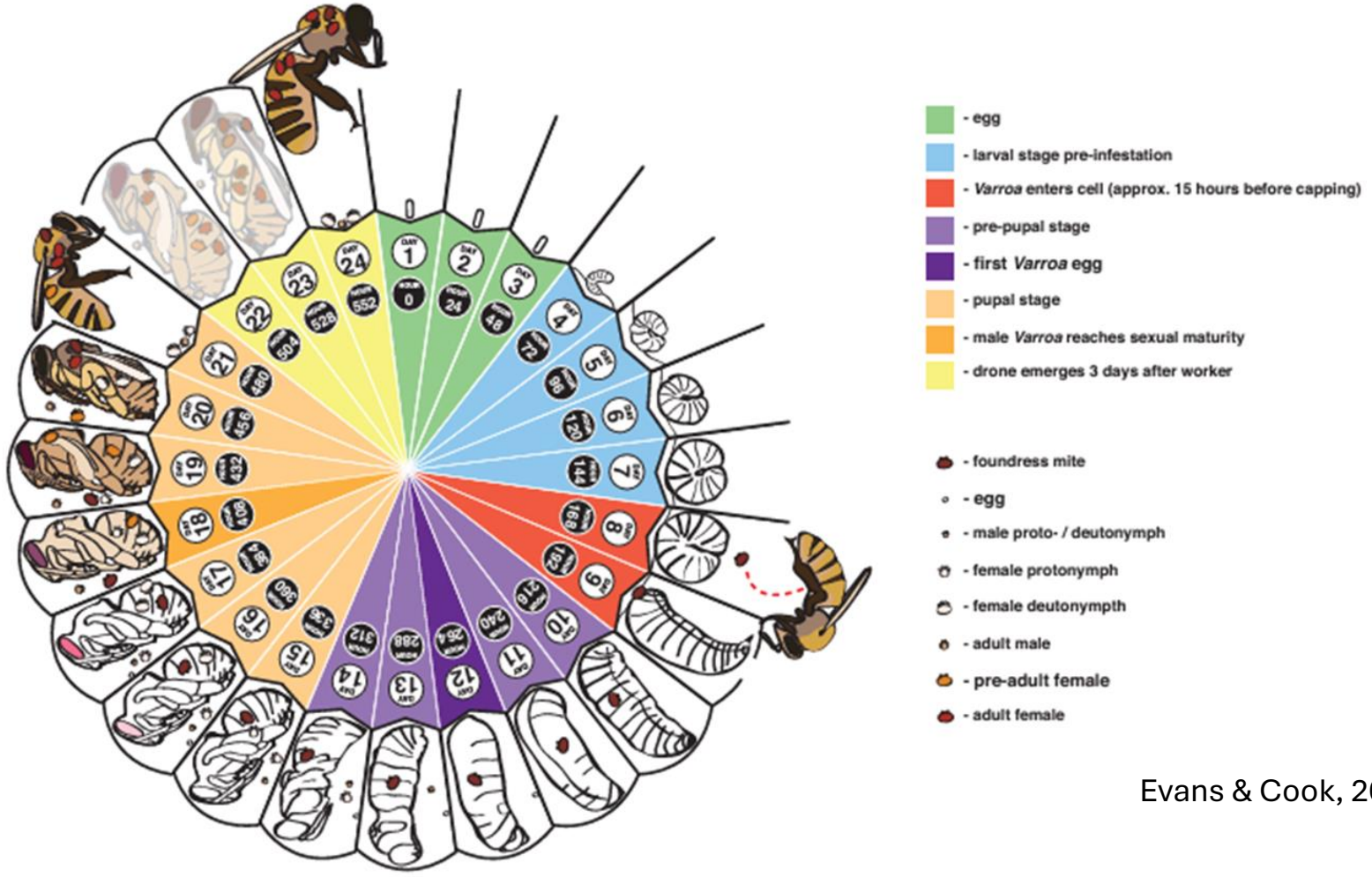
Photo courtesy of Johnny N. Dell, Bugwood.org

Photo courtesy of Mohammed El Damir, Bugwood.org

A praying mantis will never kill enough to hurt a colony.

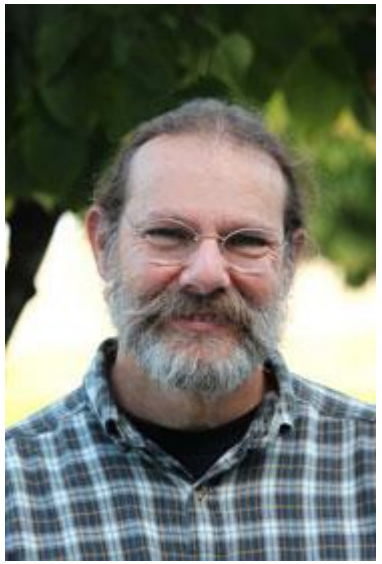
Bumble flower beetles can’t eat enough honey to hurt a colony.

To summarize, varroa are one of the largest challenges for beekeepers, making it very important to monitor and control them.



Evans & Cook, 2018

Thanks



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- Riley.reed@wsu.edu
- www.linkedin.com/in/rileymreed
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