WAS Journal

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Message from the President

April 10, 2020

July 2020 Montana Honey Bee Summit
Postponed to July 2021.

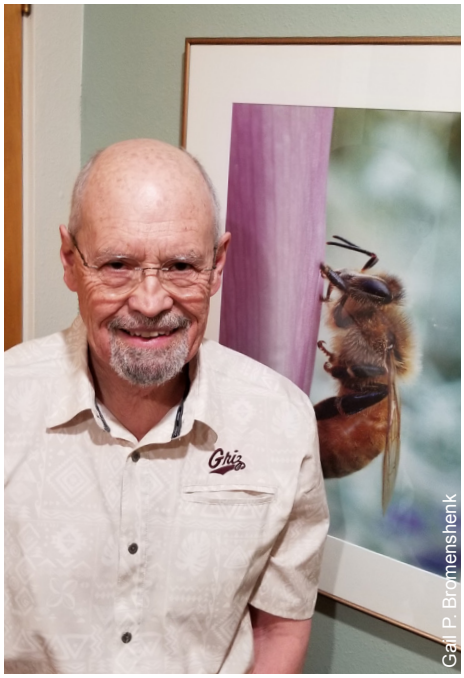
Nature does not need human beings, but humans need nature. Nature had the power to bring us into this world, and nature has the same power to bring us out (www.worldfuturefund.org/Media/naturespeaks.htm).

April Fool's Day 2020 is one I will not forget. It was cold and snowing, after a record-setting 65°F on March 6 and generally warm March weather with bees flying and foraging. March 31 ended with an earthquake! I was at home, scrolling through Facebook, when my chair started rocking and rolling, the whole house creaking and moving for about a half minute. A message instantly popped up on my Facebook from Meridian, Idaho—"Holy Crap, that was an Earthquake!"

That was the second time that I have experienced house swaying, with blinds banging. The first was in 1959, when my bed on the second floor of our old farmhouse in Billings, Montana, danced around the room due to the Hebgen Lake, 7.5-magnitude quake. The epicenter for yesterday's earthquake was near Challis, Idaho. That is closer to Missoula than the 1959 quake was from Billings. People felt the 6.5-magnitude Challis earthquake as far north as Lethbridge, Canada. Having grown up in Montana and worked in Yellowstone Park, I have felt a lot of smaller quakes and aftershocks.

As a point of reference, over the past 365 days, Montana experienced 791 earthquakes of a magnitude greater than 1.5. Whereas we may not have as many house damaging, 5.5 or higher earthquakes as California, our granite Rocky Mountains stand as testimony to plate movement. These mountains are still growing (www.youtube.com/watch?v=tJk9cFz152s). Ironically, every time California sustains a massive earthquake, we get an influx of people relocating to Montana!

Earthquakes are just one aspect of the power of nature. Growing up on a farm on the banks of the Yellowstone River, I have seen the river change course, overnight, cutting out a new channel in just a few days. Our neighbor had to move his house before it fell into the water. He barely made it. A tornado picked up our cattle shed, carried it over the barn, and landed it on top of my mother's clothesline. A 50-inch snowfall in less than a month collapsed roofs and even an airplane hangar. Baseball-sized hailstones knocked the cornfields down to stubble, destroyed rooftops and vehicles, but did not bother our Holstein bull at all. He refused to go into a shed, standing in the hail, letting the hailstones bounce off his neck and back.


Gail P. Bromenshenk

While working in Yellowstone Park in the late 1960s, I lived at Norris Junction and was privileged to have witnessed the largest geyser in the world erupt twice! The dual water spots rained over much of the geyser basin, and the steam phase roared like a giant jet engine and lasted for hours!

Now, in 2020, we have a global pandemic, COVID-19. Spanish graphic illustrator Juan Delcan aptly demonstrates (www.youtube.com/watch?v=8Hi9-5F2zW4) how social (physical) distancing can contain or maybe even stop COVID-19. If everyone could stay home for two-three weeks, the viral spread should be slowed or contained. Denying the virus new hosts and opportunities to reproduce itself, effectively trapping it inside of isolated hosts, provides another means of stopping lines of infection.

Viruses establish themselves by attaching to proteins on the surfaces of cells, then slipping inside the cells. They then manipulate the cells into making copies of themselves. The primary ways of fighting viruses are: (1) Prime the host's immune system to attack viruses as they invade the body, (2) Prescribe drugs to slow the spread, and (3) Quarantine to head off an epidemic. However, there may be another treatment option: (4) Trap viruses inside the host!

Some medical researchers are developing protein-coated beads or modified red blood cells to trap viruses (www.nytimes.com/2007/03/27/science/27viral.html). Others are

using a virus receptor decoy on a nanoplate to disrupt the viral envelope and inhibit infection (www.nature.com/articles/s41467-018-08138-1). Nano-size virus traps could be administered with an injection or an aerosol spray to patients exposed to a virus (singularityhub.com/2014/04/01/will-virus-particles-meet-their-end-in-these-tiny-death-traps/). Unfortunately, virus-trapping technologies are not yet available for use. Interest in this approach waxes and wanes with viral epidemics. Maybe the time to pursue this treatment strategy is now, when we are experiencing real, global pandemic.

In the meantime, I am glad to be in a sparsely populated state with a proactive governor. Montana confirmed the first four coronavirus cases on March 13. March 28, the governor issued a Stay-In-Place directive. As of April 1, we have 217 confirmed cases and five deaths. Fortunately, our governor encourages us to take walks, go fishing, enjoy outdoor recreation, as long as we remember to maintain reasonable physical distancing and are mindful of preventive measures like masks, not being in groups, and respecting others. Our mental health is essential, and, fortunately, keeping bees is another outdoor activity that soothes many of us.

Bees, Beekeepers, and COVID-19

First, our primary concern is for the health of our membership. As such, the WAS Executive Board and the WAS Board of Directors' decision was to postpone all of July 2020 Montana Honey Bee Summit activities until July 8–13 of 2021. The venue for 2021 will be Missoula, Montana. All of our vendors and hotels have been very helpful. None is charging any penalties, and all have agreed to reschedule for next year.

For 2020, we will hold a digital WAS business meeting in July using Zoom's video conferencing. We have postponed the Technology Demonstration Field Camp until 2021. We have also delayed the 4th International Bee and Hive Monitoring Conference until 2021. We are looking into conducting a shorter Zoom conference in 2020 for the Monitoring Group to facilitate networking and keep the momentum going among the technology companies and researchers.

A week before Italy and the US stopped airline flights, we had a slate of about 16 speakers for WAS, and I had 30–40 companies and researchers, out of 57 contacted, confirmed for the Technology Field Camp and the 4th International Monitoring Conference. Then the cancellations started coming in. It soon became apparent that this pandemic was likely to continue for weeks or months.

We considered shifting the dates to later in the summer, but there is no guarantee that the virus will subside in the summer, nor that it may not come back in waves during the summer or autumn. We decided to reschedule everything, with the same speakers, hotels, vendors, and location. I hope that within the next 12–15 months there will be a vaccine and treatment options for COVID-19. Besides, the 2021 WAS Conference, scheduled for Alberta, will be shifted to July 2022.

WAS 2020–2021

The upside of all of this is that we now have 15 more months to plan and refine the Montana Honey Bee Summit, and we plan to make it an epic event. Anyone who missed our calls for speakers and technology demonstrators, please contact us. Everyone working to raise funds to sponsor students to come to the Montana event, you now have several more months to communicate and work with your local beekeeping associations and bee equipment suppliers.

Most importantly, we now have time to address our membership. Jaylene Naylor and I are working on producing monthly videos consisting of interviews with speakers, educational topics, and other things of interest. As the University of Montana learns how to put all of its classes online, we hope to take the lessons learned and apply them to better service to the WAS membership. We are open to suggestions about what each of you would like to hear. At some point, we may try holding digital WAS meetings or webinars.

While we work on educational content, information, and service to the membership, I am again asking for the members to promote WAS, recruit new members. Mention WAS at beekeeping meetings, recommend to new beekeepers, and invite them to the annual conference and Montana Honey Bee Summit in 2021.

Many of us are either in self-imposed physical isolation or in an area with a Stay-In-Place directive. Please take advantage of this time to reach out to prospective WAS

members, talk to other beekeepers, whether online, via emails, or through old-fashioned telephone calls. Help Loren Stormo and the student poster project. We want at least one, preferably many more students from every state and province in Montana next year.

Bees and Viruses

When the Deformed Wing Virus was first noticed, beekeepers had little or no knowledge of bee viruses. Writers of newsletters and beekeeping books speculated that some sort of flower with spines was ripping up the wings of bees. Slowly, beekeepers became aware of other bee viruses, such as sacbrood, bee paralysis, and viruses that produce visible signs in sick bees. Shimanuki was one of the first to associate viruses and Varroa mites with a bee health problem that he called *Parasitic Mite Syndrome* (PMS).

With new identification methods, genomics, PCR, proteomics, and rapid viral screening, such as that provided by Dave Wick of BVS Inc, we now know that there are somewhere between 20 and 30 identifiable bee viruses, maybe more. In the Journeyman level of the University of Montana Online Master Beekeeping course, we discuss a research article that shows that some viruses can transfer from one species of bee to another.

COVID-19 has mutated and found in us a new host. Perhaps we should think about applying lessons learned to our bees and beekeeping. For example, my team and, more recently, an independent team have found that at least one virus from wax moths can and does kill bees. We have shown this in laboratory studies using caged bees, in inoculation studies using frames of brood, and in isolation studies with whole colonies of bees. Some of that work has been published, and another article is *in press*.

Given the parallels of host switching and rapid spread in dense populations, whether it be people living in New York City or bee diseases and pests in large apiaries and holding yards, might we want to reconsider some of our current beekeeping practices? For example, should we use open feeding of pollen substitute or allow bees to clean out wet combs?

Social Networking

Finally and above all, stay safe; take this pandemic seriously. It is not likely to go away any time soon. Mortality rates for the age group of many of our members, including myself, are high. Nevertheless, it is the rate of spread that is alarming. Still, we need to stay calm, we need to continue to take precautions, and we have an opportunity to pull together as families, as communities, and as a society.

Families rediscovering shared meals, entertainment, and homeschooling have become the norm. College and K–12 students are attending classes online. The food industry is pioneering new methods for safe handling and delivery services. Neighbors are helping neighbors. Zoom conferencing was mostly unknown a few months ago. Now, like Google, it is becoming a verb, as not only businesses and universities but now grade schools and even churches are holding Zoom meetings. Along with this sudden growth in Zoom has come some security and privacy issues, but overall Zoom went worldwide overnight. Our lives are changing daily, often in unpredictable but not necessarily harmful ways. For example, Geographical Positioning Systems (GPS) were expensive, not very accurate, and limited to users such as DOD and research before Desert Storm in the early 1990s. Now GPS is a term familiar to nearly everyone, and it is on most phones and in the majority of new cars; there has been a major technological shift.

Maybe COVID-19 will bring families back together and establish new priorities. Stop using the term *social distancing*; the proper term is *physical distancing*. Let us start using and practicing social networking . That can be done digitally, with everyone able to see and hear everyone else. There are many readily accessible digital ways of connecting to family, friends, neighbors—FaceTime on iPhones and iPads, Google Hangouts on Android, Alexa Drop-In, Duo Call on Google Nest and Google Home, Skype, to name a few.

In the last few weeks, nearly every college and university and most K–12 schools are using Zoom. Therefore, if you have children, grandchildren, or even great-grandchildren, they can see and talk to you. They can guide you through downloading Zoom. You can use it to visit them wherever they may be in the world. Zoom's free version has a 40-minute limit on conversations. A paid subscription allows for longer ones. Other services like Alexa enable you to drop in for a chat or an emergency. You just say, "Alexa drop in on (name)." If they have Alexa equipment, you will get them with no dialing, no menus, not even a Smartphone, Tablet, or Laptop needed. That is a great safety feature for some of us older folks.

If you have been dragging your feet about going digital, now is the time to do it. We may need to stay physically separated to stem the spread of this virus, but we no longer need to remain socially isolated. Let your children be your teachers. Once you learn Zoom, you will be able to participate in Zoom meetings of WAS! Regional meetings do not need to be limited to once per year.

Welcome, Newest Member of the Board!

ALASKA DIRECTOR—Lisa Hay

Lisa Hay is in her sixth year of beekeeping. She owns and operates Happy Creek Farm in Alaska. There she grows peonies, haskap berries, and vegetables. She also taps her birch trees for syrup and has an apiary of 12 hives. When she first took a beekeeping class, she was told that it was impossible to overwinter honey bees in the Interior of Alaska and that she should expect to kill her bees at the end of the season. She set out to find beekeepers who were overwintering their bees in the circumpolar North. Lisa has since done an Overwintering Survey to gather information from Alaskan and Yukon beekeepers who have been able to keep their bees alive during winters that can last from 6 to 8 months. The data collected were provided to interested beekeepers. Lisa also started the Northern Alaska Beekeepers Facebook forum that is focused on helping Interior beekeepers network, mentor each other, and share information specific to the environment of the Interior. She is also the moderator for the Interior Alaska Beekeeping forum that includes beekeepers in the remaining five regions of the state. Almost three seasons ago, Lisa lost two of her hives due to exposure to mosquito spraying. Last year, almost 40 Fairbanks-area apiaries were poisoned by the same sprays. Lisa has researched the chemicals being used as well as state and federal regulations regarding their use, and has been leading an effort to educate the community and stop the use of such sprays. She's started a change.org petition as well as a gofundme to raise money for testing of exposed bees and hives. She's also spoken with state and local government entities about the pesticides and presented the information at the state Beekeeping Symposium and to local associations. Most recently, Lisa has organized a conference on Overwintering Honey Bees in the Interior that brings together beekeepers who've been successful overwintering in the subarctic so that more Alaskan beekeepers have the knowledge they need to move towards sustainably keeping bees. In her day job, Lisa is a psychotherapist who specializes in working with violent offenders and also works with those who suffer from complex PTSD, ADHD, and other issues.

State of WAS Bees | Spring 2020

The WAS region is extensive and wonderfully diverse. So, too, are the conditions for the bees and the options for those who care for them. Here we find Director Reports of some of the conditions this season. See upcoming area events in the Beekeepers' Calendar (page 40) and/or updates posted at: **westernapiculturalsociety.org**.

BRITISH COLUMBIA—Nancy Burkholder

The COVID-19 crisis has put an indefinite stop to beekeeping conferences, AGMs, local association meetings, bee courses, field days, and even the mentoring of new beekeepers in British Columbia. We are now reliant on other resources, such as books we have bought over the years and current science-filled publications, including this quarterly *WAS Journal* and our BC Provincial *BeesCene* quarterly, to give us the best science and best practices to keep our bees healthy. We depend on the greater beekeeping community to keep in touch through phone calls and the Internet to give us the latest local news and updates concerning our bee activities.

Due to uncertainties in airlines and border closures, Canada has been faced with considerable problems in acquiring packaged bees from Australia and New Zealand during the pandemic. Air Canada has decided to allow for "live animals" (not dogs and cats) to be allowed on their flights, so we are hopeful that Hawaiian and California queens will be imported. Some beekeepers have decided this is the year to start purchasing only BC queens.

The results to the BC Spring Survey have not been published yet (the survey is intended to determine the wintering results of honey bee colonies and their conditions in each of the province's regions); however, production results for 2019 show an average of 32 kg (70.5 pounds) of honey was harvested per hive in BC, 41 percent of which was sold retail. There were approximately 25,800 queens raised in BC, of which 13,766 were sold during 2019.

Looking forward into summer, BC beekeepers will be on the lookout for more sightings of the Asian giant hornet *Vespa mandarinia*. With the help of local beekeepers in Nanaimo BC (Vancouver Island), a nest was found and destroyed in September 2019. This is an insect you should learn to recognize and report if found. In BC, contact the BC Invasive Species Council (bcinvasives.ca/report); in Washington, contact the Washington State Department of Agriculture.

It may be some time until we can come together again to support each other in the bee yard, meetings, and conferences. Spend as much time as you can reading and acquiring knowledge about your bees and the environment. Keep in touch with new beekeepers and help them "do it themselves." We can all be part of a strong, confident new generation of beekeepers and of a strong environment, which includes food security for the world. Want less and give more.

MONTANA—Shelley Mills

Most of Montana had a relatively mild winter in terms of temperatures, and we had a better than normal survival rate for overwintering. The bees are beginning to make their foraging flights now, with only a few forage options in sight in the northern and high elevations of Montana. As I write this in early April, we are just now getting out from under our snow cover, but by the time this goes to print, spring should be full-on. The willow trees will be opening their flowers soon, the queens will begin laying, and the forager bees will begin to greedily collect the pollen for their developing brood.

Spring workshops were canceled this year due to the coronavirus outbreak and the "Stay at home" order issued by Governor Bullock in March. I have had tons of questions from beekeepers about typical spring strategies for managing colonies, how to hive packages, where to purchase bees, how and when to do supplemental feeding, and so on, so I have been recording my presentations and posting them to our website for anyone to view (valley.msuextension.org). I see that other beekeeping associations in Montana have been sharing valuable information and resources on their Facebook pages. I plan to hold a workshop on pest management as soon as we are able to have meetings with more than 10 people again. I have considered Webex or Zoom meetings, but I find that seeding and spring work are keeping people busy, so making resources available for people to watch at their convenience seems to be the best strategy for right now.

During this time of COVID-19 quarantine and isolation, I find that beekeeping helps soothe the soul and invigorate the spirit while it makes me mindful of how important it is to keep the hive healthy. Watching how a single entity can impact an entire population is sobering. When you apply what we are learning about the transmission of coronavirus in the world to the effect on the entire hive when one bee brings home a single pathogen, we can surely see how pervasive the pest becomes and how quickly a colony can decline. It highlights how critically important it is to be ever vigilant and proactive on pest management within the hive.

One of the greatest concerns I have for the health of our honey bees involves the loss of the antibiotic Fumagillin for management of Nosema. In northeastern Montana, we have had sort of hit and miss on hives with a Nosema problem this year. As I watch our tiny store of Fumagillin dwindling, I can't help but wonder if alternative treatments are going to be effective and how this will impact the overall health of my colonies. I am among many beekeepers worried about the future of colonies with less effective Nosema as well as mite control strategies.

In an article in the April issue of the *American Bee Journal,* authors Kaitlin Deutsch and Scott McArt discuss the recent research of Sean Leonard and his colleagues at the University of Texas, "Engineered symbionts activate honey bee immunity and limit pathogens." The research is focused on altering naturally occurring gut bacteria that can teach the honey bee immune system to produce RNA interference (RNAi) molecules that can detect the viral dsRNA (double stranded RNA) and destroy it. In the study, mites feeding on honey bees with the modified bacteria targeting Varroa-specific dsRNA were 70 percent more likely to die than those feeding on the bees in the control group. Honey bees with the strain of bacteria targeting deformed wing virus were 36.5 percent more likely to survive to day 10 after exposure over the control bees. Though there is tons more research to be done, it's an interesting read and is thought provoking not only for its potential to improve honey bee health and the long-term protection offered by this method but also for the ability to reduce or eliminate pest resistance development.

NEVADA—Del Barber

Canceling regular meetings has made it difficult to keep everyone informed, but we are all moving forward and "apart"!

Hive buildup is evident as more bees are flying out of the hives. Most of our beekeepers fed fondant this winter and survival has been good, with only about 10 percent losses. We have encouraged local beekeepers to begin feeding 1:1 sugar solution. We are expecting an increased swarm season.

Hive survival was also evidenced by fewer numbers of packages and nucs ordered for association pick up from Olivarez Bees. Great Basin Beekeepers President Crystal and her husband Brian drove to California to pick up the packages, which were distributed at the Bee Magic Building in Mound House under Linda's careful guidance. All went well with everyone following CDC guidelines for social distancing.

With cancellations being as they are, our big news is still the first annual report for the Carson City Bee City USA #76 Program! Lyndsey Boyer, Senior Natural Resource Specialist for Carson City Parks, Recreation & Open Space, prepared the first annual report. Lyndsey is a key factor in the ongoing success of this program. Highlights are below:

Carson City thanked "the Great Basin Beekeepers of Nevada for their passion and support throughout the process of receiving the Bee City USA designation, in addition to funding the annual program establishment fees. Carson City would not have received this designation if it weren't for the hard work and dedication of this group." Additionally, Carson City thanked specifically numerous state, county, and local organizations and individuals for their continued support and assistance.

Habitat Creation: Carson City seeded approximately 240 acres of disturbed landscape with a pollinator-friendly seed blend.

Integrated Pest Management: While the Carson City Integrated Pest Management Plan is still in progress, we have continued to implement a variety of IPM principles in parks and open spaces. Specifically, we removed plants by hand when appropriate.

Education and Outreach Events: Getting the word out about pollinator conservation is an essential component for the Carson City Bee City USA #76 group. An aware and engaged community is crucial for helping us accomplish our primary goals of educating the public on what they can do in their own homes and yards to

preserve and protect pollinators. In 2019, approximately 25 events were held throughout Carson City to promote pollinator conservation and awareness.

The original board of directors welcomed new officers.

Original Board (L–R): Lyndsey Boyer, Linda Groves, Del Barber, Myrna Barber, Gillian Mellor, and Frank Mellor.

2020 Elected (L–R): Linda Groves, Rex Jennings, Kelly Clark, and Lyndsey Boyer.

OREGON—Charlie Vanden Heuvel

The first quarter of 2020 becomes an exceptional reminder to beekeepers the interdependency between nature and our insects. Colonies faced with springlike sun and warmth gather in support of the queen as she ramped up her brood building toward an expectant nectar flow. And then—bam! Winter reared its head to bring snow, hail, rain, and cold driving the girls back into their cluster. One has to ponder the thoughts that transpired! The downside to the explosive growth, of course, is the parallel growth of the Varroa mite. Already testing has demonstrated several mites per hundred. This will be a doozy of a bee season. Diligence is the order of the season, especially during 2020 as it unfolds.

Many of the hives in Oregon fared well coming out of the mild winter. One wonders if the girls will explode in population overly prepared for the immanent nectar flow. Will this become a banner year for honey? Only time will tell!

Unfortunately, with the mild winter followed by an early spring, some beekeepers discovered hives with inadequate honey stores falling into starvation. The girls' butts sticking out of cells and the pile of them on the bottom board are the ill-fated signs that we, the beekeeper and the tribe, failed to adequately prepare for the winter's night.

But, as beekeepers, we regather our strength driving on toward revival of spirits as the beauty of nature unfolds with fruit trees coming into bloom. The agricultural terror that arises each year as buds form, but potential for a freeze, becomes the buzz. Smudge pots do not seem prevalent as orchardists convert the nightly hum of the fan. The transition from winter into the beauty of the trees in bloom brings warmth to our souls. So, our human spirits vacillate from the blessings of spring revival to the dredge of COVID-19 as it clouds our everyday thoughts. Wouldn't it be nice to be a bee—with only nature to contend with.

In the Columbia Gorge, there is one beekeeper with passion for art. Jacquie Brown-Barone, who graced the Hood River County Extensive Service Apiary with a painted hive. No doubt the honey bees will excel in their activities basking in the beauty of their new hive.

Most of the bee associations throughout the state faced with the sequestration demanded by COVID-19 have found Zoom, a blessing to their membership. In times of tragedy, societies have always shucked their abhorrent behaviors to come together in compassion and inventiveness in their effort offer solutions rather than voice negativity.

May we find the fall of 2020 bringing the abundance of our hives' efforts paralleled by society's kindness as we intertwine ourselves between nature and our honey bees.

SASKATCHEWAN—Doreen Bradshaw

A new season is about to begin; however, spring is a little slow arriving in Saskatchewan. To date, the weather is still more like winter, with periods of snow on the ground. Bees were flying in March on warm days and then have had some very cold days and nights. We do hope the bees continue to come through the winter and beekeepers can soon begin the season with hives in good shape.

The Regina and District Bee Club put on two events in February 2020. The first was the Introductory Beekeeping Class, well attended, and led by Regina Club. The second was a presentation covering the aspects of bee biology that happen beyond or on the tip of their tongue—that is, such aspects as nectar collection and production, pollination, pollen collection, and general foraging biology. Also, there were discussions about different plants and their nectar and pollen production, and what makes a good plant for bees. There is work being done to track flowering plants in the province and when the bloom takes place. This will assist beekeepers in ensuring there will be food available to bees during the foraging seasons. This event was led by the Provincial organization and was also well attended.

The Regina and District Bee Club Annual General Meeting was canceled due to the COVID-19. The plan is to hold the meeting at a later date. Beekeepers are looking forward to warmer weather.

WASHINGTON—Margo Buckles

In 2019, Washington State Beekeepers Association helped pass a bill in the Washington legislature limiting beekeepers' liability. Here's some information that appeared in the *American Bee Journal*: americanbeejournal.com/washington-state-beekeepers-now-protected-from-civil-liability.

The other horrifying news in Washington is a new honey bee predator, the Asian giant hornet. Recently, a specimen was found in Blaine, Washington, at the Canadian border and, according to an article in the *Capitol Press*, a beekeeper found a specimen in Bellingham (between the Canadian border and Seattle).

YUKON—Etienne Tardif

Not much to report yet from the Yukon. We had a very cold winter with more snow than usual. All of our hives are still wrapped for winter. We were still getting -30°C evenings as of last week. We are now heading into the period of extreme diurnal temperature swings, i.e., from +5°C day highs to -20°C morning lows (40–60°F swings). Several of us have done quick top inspections to check on cluster size/position and stores level, and to add some sugar candy if they seem low. A few have also added early pollen supplements to give the bees an early start once spring comes around. All my 8 hives (5 doubles, 2 singles, and one 5-frame nuc) seem to be doing great. My trials to attempt to overwinter various size configurations outdoors have been a success. This will give us some other options in the future to help make our apiaries more sustainable. Several other beekeepers have reported very good overwintering successes, while others have had poor results. We will be conducting our 2020 Winter Survival Survey shortly to measure this number to help continue to improve our beekeeping approaches.

Your Bees Don't Have To Die: How Can We Become Treatment-Free Without Killing Our Colonies?

Meghan Milbrath, PhD—Michigan State University Extension, East Lansing, Michigan

Meghan Milbrath is an academic specialist at Michigan State University, where she does honey bee and pollinator research and extension and is the coordinator of the Michigan Pollinator Initiative. She owns and manages The Sand Hill Apiary, a small livestock and queen rearing operation in Munith, Michigan. Meghan presented *Toward Treatment Free Beekeeping* during the 2019 WAS Conference in Ashland, Oregon.

Keeping bees with my dad was fun when I was a kid in Northern Wisconsin. It was in the golden era of beekeeping—it was easy, the bees all lived, and I hadn't even heard about the Varroa mite. Fifteen years later, while in school in Michigan, beekeeping didn't seem as fun or as easy. Every conversation that I had with beekeepers centered on figuring out why their bees were dying. Beekeepers were sick of losing bees, and sick of treating for Varroa. They wanted treatment-free, strong Northern bees. So, I started rearing queens with the goal of raising these strong Northern bees that could thrive without treatment.

I had been collecting swarms for years, getting the best queens from local beekeepers, and trying out fancy stock like Canadian Buckfast and Minnesota Hygienic. I had been reading up online, and I wanted to find the best bees that could survive Varroa. At that time, there was a lot of support for the "Live and Let Die" method—where you let your bees go with no care, and whichever ones "survive naturally" are your new, better stock. I had some colonies that I thought had a lot of potential, so I let them go, hoping to find out which hives held my new, hardy, treatment-free bees. The outcome that spring was horrible and really made me rethink why and how I want to keep bees. In this article, I am going to explain why the "Live and Let Die" system doesn't work for my beekeeping (and probably yours, too) and to give you a new method that can help you find your best bees while keeping you happy and your bees healthy.

Issues with "Live and Let Die" Treatment-Free Beekeeping

1. My animals suffered.
2. I put the bees around me at risk.
3. It was really expensive.
4. It made me miss good genetics/it didn't work for getting better bees.

1. Suffering Bees

My treatment-free colonies looked great all year, but when I opened the hives for a late final inspection before winter, I felt sick to my stomach by what I saw. Spotty brood, melted larvae, and small, demoralized looking bees—colonies deep in the throes of parasitic mite syndrome. My thriving, booming colonies had been reduced to small clusters, working desperately to raise the few larvae that were left after the viruses had devastated most of the young. Full supers of honey for winter looked ridiculous now, sitting optimistically on top of colonies that were mere shells of what had gathered that nectar all summer. It didn't take a diagnostic expert to know that my bees were profoundly sick and didn't have a chance that winter.

My husband and I have raised all sorts of animals on our little farm—pigs, chickens, rabbits, cattle, sheep, goats, ducks, dogs, horses—you name it. We have the same philosophy for all our animals: If it is under our care, we will keep it in good health. Every animal gets good food, clean bedding, and the attention they need. We would never let a sick ewe suffer and slowly die, or let a pig walk around with a devastating injury. I care for my bees, and it didn't make any sense to me to let them suffer and die slowly. (This is especially true now that I know that it is unnecessary—as you will read at the end of the article).

We know that colonies with high levels of Varroa have all sorts of viruses, poor nutrition, and very little chance of living through any sort of winter, let alone having the energy to raise brood in the spring. Part of the problem is that most beekeepers who lose bees to Varroa-associated viruses never see it happen—they wrap up their big booming colony in the fall and then clean up the deadout in the spring. It literally happens inside a dark box, and beekeepers can skip the sad suffering part. If you

are thinking about not managing Varroa mites in your colonies as a way to keep bees, I urge you to open the colony while they are in the dying process. Look those suffering girls right in their compound eyes, and reflect on how you want to provide for the animals under your care. It just doesn't feel right to call yourself a beekeeper while letting your bees die a slow, preventable death.

A brood frame from colony with parasitic mite syndrome. If you look close, you can see a bee with a mite on her thorax, a bee with K-wing, mites in cells, and melted-looking sick larvae. This colony was once thriving with lots of nurse bees and healthy brood.

2. Save the Bees?

Like a lot of beekeepers, I take pride in knowing that I am providing pollination services to gardens and plants, and I like to think that I am doing some good by keeping bees. When I had sick colonies, however, I realized that my beekeeping was probably doing more harm than good to my environment. I was putting the pollinators around me at risk. When a colony is sick—like my bees with mites and viruses—it becomes weak. Weak colonies get robbed by bees from all the nearby colonies.

We also know that bees are more likely to leave or abscond from a dying colony. Ever had a colony up and leave in the fall? Think about if you had Varroa populations under control in those hives. Through drifting and robbing, sick colonies can act as a disease reservoirs, with your bees spreading disease throughout your area. Honey bee colonies are everywhere now days, and it is impossible to know every hive hidden in a back yard or wild colony that was living happily in a tree until you came along and threatened them with your sick bees.

Even worse, it isn't just honey bees that are at risk—we even see deformed wing virus spreading to bumble bees and some of our other native bees. Our native pollinators are already facing huge problems with habitat loss and pesticide exposure, and I don't want to be the one with the "Save the Bees" bumper sticker who is quietly infecting my native pollinator population with new diseases. I'd really like my effect on the environment around me to be positive. I don't want my role to be the person who maintains disease and infection and makes it worse for nearby bees and beekeepers by perpetuating an epidemic in my area.

3. A Bass Boat Would Have Been Cheaper

Even if you have an icy, shriveled little prune heart and it doesn't bother you to let your bees die or to put the bees around you at risk, it shouldn't take long to figure out that the economics just don't work. Of the 24 treatment-free colonies I put into winter, about 6 made it through alive. This result isn't unusual for treatment-free beekeeping, and many people I talk to lose 50–100 percent of their colonies every year. Others using the "Live and Let Die" method record losses of 95 percent. If I had kept my losses to my normal 15 percent, I would have come out of winter with about 20 hives of the original 24. I usually split my colonies in the spring and make an average of 75 pounds of honey from each split. From my 6 hives, that would be 900 pounds of honey. From 20 overwintered hives, I could expect 3,000 pounds. My little experiment literally cost me one ton of honey.

Let's say I didn't care about the honey, but was interested in bees. I can usually make 3 nucs from every overwintered hive. Now I have just lost over 40 nucs that I could have made available to beekeepers in my area looking for local bees. At a price of $150 per nuc, I could have made a lot of money that I could have donated to honey bee research at Michigan State University (www.givingto.msu.edu/gift/?smid=A1109), or I could have gotten a new fishing boat. We try to practice sustainable farming, and there is nothing sustainable about losses that high.

4. What Kind of Bees Am I Left With?

The reason we let our bees die without treatment is to find bees that can survive Varroa. We think that it will work like textbook natural selection. We put in a pressure, the weak die, and the strong survive. Unfortunately, it is much more complex than that with bees, and this process may not lead us to the end that we want. We may not actually improve our bees. There are few reasons why.

- *Most of us don't live in isolated environments*. Either we or someone else is bringing in new genetics. If I replace my losses with bees from outside my apiary (packages or nucs), I am completely negating the bottleneck effect of the losses of the year before, and I am replacing the susceptible population. If I make splits and raise queens from my survivor stock, but I don't have an isolated mating yard,

then those daughters are going to breed with whatever is out there, and I will have no idea if these new combinations can survive Varroa. I'll have to let them die again to find out, getting me into a perpetual cycle of bee death.

- *You aren't controlling how your bees manage Varroa*. Maybe your colony didn't have problems with Varroa because it swarmed 4 times, so it constantly broke the brood cycle. This is one way to keep Varroa populations from getting high, but now your neighbors have to pay thousands to get the colonies out from behind their siding and your township is putting up an antibeekeeping regulation. You want bees that manage Varroa in a way that is good for your future beekeeping—not just staying alive by any means possible.

- *If you only select for a single trait, you lose a lot of other good things*. Let's say you live in an isolated forest and don't bring in any new genetics to your area, and you breed only off of your survivors and control their mating. There is a chance that you can get bees that are highly hygienic and can handle Varroa. But what if they are jerks, and are so highly defensive that you can't work with them, or are susceptible to chalkbrood? It is really hard to breed other good traits back in once they are lost.

- *You can kill colonies that you actually want by putting them under too much pressure*. Natural selection results in a balance between parasites and their hosts. If a parasite is so bad that it kills all the hosts, then the parasite dies, too. In a parasite-host balance, the parasites don't kill as much, and the hosts are able to tolerate some level of parasitism. In the long view, we are looking for bees that can live at this balance. We may have some great bees in our yards that can live with some Varroa and would thrive once we reach a balance with this pest. We would lose those hives, though, if we let 12 hives crash around them. The disease pressure may be too high for them to handle, and we would lose the very bees that we want to keep.

I don't live in a completely isolated area, and, since I use splits as a main part of my management, I am constantly creating new genetic combinations—colonies that are going to have different behaviors and different abilities to handle disease. I also wanted to sell queens to beekeepers, and to have high quality queens for myself, so I knew I needed to have gentle, productive colonies as well. Just leaving the bees alone wouldn't likely give me the strong Northern stock that I was looking for.

So, now I feel bad for letting my bees die and for putting other bees at risk. I'm broke, and I still don't have the bees that I want. But . . . I still want to find good bees, and I don't want to just put chemicals in my hives all the time.

What Is a Beekeeper To Do?

After that spring, I re-evaluated my goals as a beekeeper. I still didn't want to be on a cycle of treating all the time, and I still wanted to be working towards better bees. However, I also needed a way that my bees stayed healthy. I thought about why we navigate towards having unmanaged colonies in the first place: Because it allows us to find out which bees can handle Varroa (and other diseases) without treatment. What if we had a way of finding those bees without letting the rest of them die? Well, we do have that way, and I've been using it the last few years, and I've been able to find colonies that don't need treatment, keep my losses down, and work towards having better bees (all while taking good care of my girls).

Here is my new system for identifying treatment-free colonies while keeping healthy bees.

You will need the following:

- Some honey bee colonies.
- A good system for taking notes.
- A method for monitoring for mites.
- A source for good queens.

Briefly, you will identify those colonies that aren't doing a good job of managing Varroa mites and other diseases, you will first get them back to health, and you then will requeen from a better colony. The big thing to remember is that the properties of the colony are a product of the genetics, and the genetics of the colony are dependent on the queen. If you don't like a colony, you don't have to kill a bunch of innocent workers; you need to switch the genetics—i.e., just replace the queen. There is never a need to let a colony crash and die.

1. Start with some honey bees.

2. Start monitoring for Varroa using a sugar roll or alcohol wash. For instructions on how to use a sugar roll for monitoring, visit: pollinators.msu.edu/resources/beekeepers/varroa-mite-monitoring (*American Bee Journal*, October 2016). Monitor each colony at least once a month; it doesn't take long after you get the hang of it. You will soon find what colonies are keeping the Varroa population stable and what colonies can't control Varroa on their own.

3. Take good notes. Make sure you record swarms and supercedures, and any activities that you do (like making

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splits or removing drone brood). This will give you more information on why mite counts are low. Think about what characteristics are important to you—Varroa, gentleness, honey production, etc., and find a way to record that for each colony. For example, use a 1–5 gentleness scale, and record what they act like each time you enter the colony. Write down how much honey you take off from each colony, how they act on the frames, or if you just don't like the cut of their jib. If you just care about survival, then just keep a column for Varroa counts.

4. Once you find a colony that has a disease, including high mites, treat that colony and then requeen with a good queen. For a summary of naturally derived treatment options for Varroa, see: pollinators.msu.edu/resources/beekeepers/managing-the-varroa-mite.

5. Keep watching your colonies to make sure that Varroa stays low and you don't see disease. Make sure you have notes that indicate which colonies never needed treatment and stayed healthy. Those are the ones you want to make queens from.

Monitor, treat bees if there is a problem, and requeen the colonies that don't need treatment with queens from your best hives. All your bees stay healthy, and you don't lose colonies to preventable illness.

Here are two examples of what this looks like in practice.

Beekeeper A has 5 colonies in spring.

- He inspects each colony every 2–3 weeks to make sure they are queenright, have enough space and food, and are free from disease. Most times that he inspects, he does a sugar roll for mites (less in the spring, more in the late summer when the risk is higher).
- In May, colonies 1–4 look great, but colony 5 has chalkbrood.

___He removes the queen from colony 5 and puts her in a nuc as a spare/emergency.

___He orders a hygienic queen from a local breeder to put in colony 5.

___The chalkbrood clears up.

___Throughout the spring, he continues to monitor, but hardly see any mites in his sugar rolls.

- In June, he see a few mites in some samples, but colony 1 never has any. He records all these counts in his notes.
- By July, he is starting to see more mites while monitoring, but always below the threshold of 3 mites/100 bees.
- In late July, colonies 2–4 are above the treatment threshold.

___He treats colonies 2–4.

___Once the treatment is finished, he orders 3 queens for fall requeening of colonies 2–4.

The rest of the season, he keeps monitoring. He doesn't get above threshold again, and he doesn't see any other signs of disease.

- Beekeeper A ensures that everyone has enough food and bees, and buttons them up for winter.
- In spring, Beekeeper A has 5 out of 5 colonies live. He wants to start to raise his own queens, and, looking through his notes, sees that colony 1 didn't need any treatment and stayed healthy. He'll see how they do this year and raise queens off of them to replace any queens from colonies that need them. Beekeeper A buys some queens from the same local breeder in the spring, using them to sell nucs from his colonies because he doesn't want to expand the apiary. He uses the money to take his favorite daughter fishing.

Beekeeper B has 5 colonies in spring.

- He inspects them occasionally, but mostly just leaves them alone.
- Colony 5 has chalkbrood, but doesn't do anything about it.
- He doesn't monitor, but notes that colonies 1–4 are booming and colony 5 seems slower.
- He closes them up for winter at the end of the season.
- His bees in colonies 2–4 succumb to Varroa-associated viruses, and colony 5 had too small of a cluster.
- In spring, Beekeeper B has one colony left, and he buys 3 more packages to replace his losses.
- He does this a few more years, and then quits beekeeping because it is too expensive and he would rather spend the money on more fishing gear.

We all want to move to a place where we don't have to treat our bees, but we want to make sure it is because our bees don't need treatment, not because we are withholding care. Because we have the tools of Varroa monitoring and requeening, we don't have a reason to let a colony die while we work towards better stock. Do right by your bees this year by responsibly moving towards treatment free.

To happy beekeepers and healthier bees!

Wintering in the Yukon: Part I

Etienne Tardif—WAS Regional Director for Yukon, Mt Lorne, Yukon

As I write, the thermometer outside my window reads -31°C (-24°F). It's March 30, 2020, and I am dreaming of the first warm spring days.

A Quick Disclaimer: My findings, approaches, and results have not been peered reviewed; however, they have worked well for me in my area. I do have an engineering background, so I am very comfortable with numbers and spreadsheets.

Overwintering bees in the Yukon is like an ultramarathon race. The hives need to be well nourished, healthy, and properly housed to be able to survive seven months from October to sometime in April without cleansing flights or a proper inspection. Over the last seven years, I have lost three hives out of 30 in late winter. These three hives had severe dysentery, which likely spread *Nosema ceranae* throughout the population. I also lost one hive in late spring from a rapidly declining hive, also due to Nosema C. I will cover why this happened and show you how even those winter losses were preventable.

Creating an Approach for Successful Overwintering in Your Area

I will start by saying that "all beekeeping is local"; however, bee biology and the laws of thermodynamics are universal. Every beekeeper needs to develop the ability to filter information and apply it to their local environments. One can do this by developing a set of filtering questions for every piece of advice coming from other beekeepers, bee books, Facebook, or one of the many beekeeping forums.

Where/Who is the advice coming from?

- Weather/Seasons/Timing.
- Forage/Dearths/Quality.
- Isolated/Populated/Rural/Urban.
- Years of experience.
- Number of hives and success rates.

Ask them why they think it works.

- Can they explain the science of why? Is "just because"?
- Is it their story or somebody else's story?
- Is it supported by science, trials, research?
- Be wary of anecdotal information.

In my beekeeping, I strive to achieve the following objectives and outcomes:

Develop a beekeeping approach that—

- Aligns with my local bee cycle (from spring ramp up to winter prep).
- Maximizes the use of my local forage (availability of pollen and nectar sources).
- Helps my bees stay healthy (nutritional diversity).
- Allows for supplemental feeding to fill the gaps.
- Takes into account environmental limitations (hive limits, honey targets).

Work toward outcomes in which—

- Vigorous populous hives (splits/nucs+, honey+, wintering+) are the norm.
- Consistent honey yields are produced.
- Diseases and Pests are managed.
- Desired number of hives are maintained.
- The apiary sustains itself (Bees+, Time -, Costs).

Common Misconceptions About Winter Losses

There are plenty of misconceptions when it comes to overwintering. You'll often hear people say things like:

"Bees don't die from the cold, they die from excess moisture/starvation/mites," or "Bees don't heat the hive," "Bees starved next to the honey," "Natural honey is best for the bees," "You need plenty of ventilation," and so on.

My beekeeping philosophy is that the root cause of all failure is linked to something the beekeeper did or didn't do. We "Canadians" and many cold-weather beekeepers seem to blame the weather, poor wintering, or starvation for our winter losses. (Source: CAPA and BIP Winter Survival Survey results). Those are all symptoms and fail to identify the root cause of why we have such a hard time getting our bees through winter. I find myself scratching my head when I hear these reasons for overwintering losses. If the beekeeper doesn't plan for a "polar" vortex (typical winter weather where I live), then they are responsible for the loss. The sooner beekeepers learn to own their failure and try to understand and improve their beekeeping practices, the sooner they will start hitting 10–25 percent losses or better.

A Tale of Overwintering Woe

To use an example from my yard, I have never had a hive die from starvation, condensation, or mites despite being in a subarctic climate. However, as noted earlier,

I have lost four hives to Nosema C, with three of those during the same winter. It was one of our coldest in recent times. However, the root cause was my lack of early winter preparation. I was away on a 4 week road trip and hoped that fall would be mild enough to give me time to prepare (remove honey supers, feed, and wrap). I was still in my early, overconfident years as I had yet to lose a hive in my first three years and I had just had my best honey crop to date. Each hive had 75 pounds of honey in their supers, and I was using my trusty polystyrene hives. Unfortunately, we ended up having a very short fall, and I decided to alter my previous wintering approach. All my hives had abundant "natural" honey. I decided to give them some insurance and made candy boards. I also added top entrances as "ventilation is critical," having yet to learn the difference between passive and active ventilation. I will describe these two concepts in a future part of this article. This was also my first year of hive monitoring. From December, we started getting temperatures in the -40s, and I started noticing dysentery and masses of dead bees out in front of each of my hives after every extreme cold event. My first hive to go was my one hive in a solo configuration; the other two that were wrapped together lasted until mid-April, at which point the cluster had dwindled to softball size. April is famous for massive temperature swings (from high 5°C to low -30°C, Δ 35°C /from high 41°F to low -22°F, Δ 63°F). I was devastated. My first losses. Luckily, I had already ordered two nucs and decided to add two more. I also decided to purchase myself a microscope and learn how to test and sample for Nosema.

So, what were the symptoms?

1. Extreme cold -> Top entrance increased heat loss -> Open screen bottom board (it was, however, protected from drafts).
2. High honey consumption -> Honeydew honey -> Dysentery inside the hive -> Nosema C.
3. Small late-winter cluster.

What were the root causes?

1. Poor winter prep (see Figure 1) -> Solo beekeeping -> No knowledge of honeydew honey -> Hive setup not thought through adequately (top entrances should not be used with SBB—open screened bottom boards). This increases the flow through of cold air from the bottom through to the top ventilation hole (active). These poly hives don't come with a top entrance. I made that myself.

Why Colonies Fail Over Winter

This is where my desire to understand honey bee biology (i.e., thermoregulation and diseases that impact wintering success) and bee hive thermodynamics really begins.

I now have three simple bee rules that I follow and

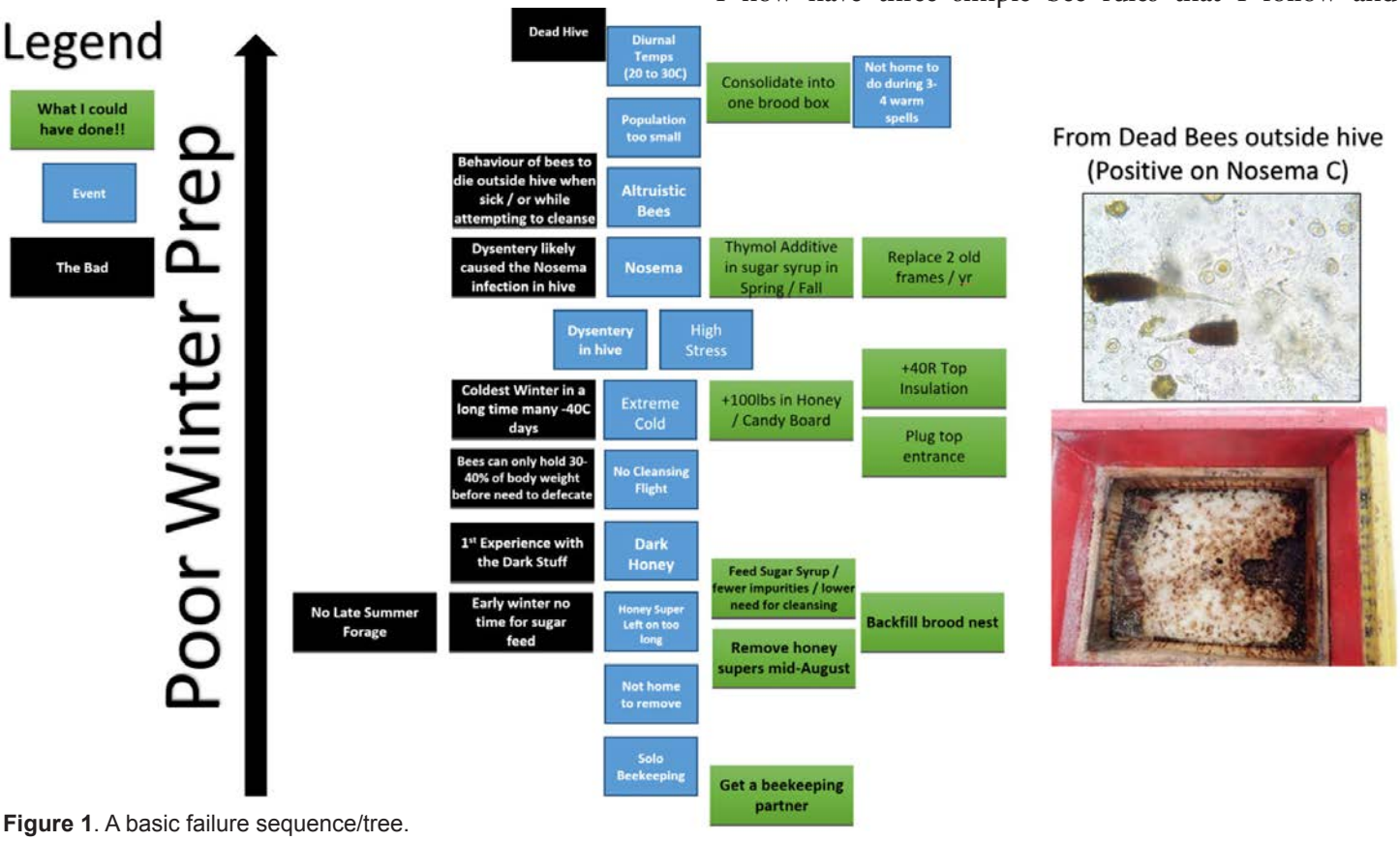

Figure 1. A basic failure sequence/tree.

continuously look at improving. They are:

1. **Bees need healthy nutritious food**.
2. **Bees need to be healthy and numerous**.
3. **Bees need a dry and thermally stable home**.

I no longer prepare for winter in the fall. I manage my hives from spring to late fall in a way that ensures the bees will be in the best possible position to deal with all of the year-round stressors.

In very cold climates (subarctic), we typically get only one chance to get things right during the season, one chance at getting the bees ramped up to healthy populations in time for the nectar flows, one chance to make a swarm split, and one chance to maximise the number of healthy winter bees going into the winter. Our season runs from early May to early September. In that time, we squeeze in a short swarming season in early June, one minor nectar flow from mid- to late June, and one major nectar flow from mid-July to early August. Winter bees get raised from early August, which coincides with first frosts in certain locations (like where I live). We typically have two dearths running from early July and then from the middle of August.

In the next section, I describe wintering bees from a beekeeper's perspective for the first of my bee rules. I will introduce my winter survival model and work with the remaining two rules in a future issue of the journal.

1. Bees Need Food

Bees require an abundance of nutritional food throughout all four seasons. As we all hopefully understand, bees need large quantities of pollen (protein, lipids, minerals, and vitamins) to raise healthy brood and a surplus of nectar (carbohydrates). These resources provide energy and materials for all the hive members to go about their daily tasks (producing royal jelly, making wax, foraging, heating, cooling, etc.). This food is sourced from nature or supplemented by their human beekeepers. At the end of the growing season, the bees will need a surplus of cured nectar (honey) to survive overwinter.

The beekeeper needs to know what their local forage (pollen and nectar) cycles look like throughout the beekeeping season. Identifying gaps (i.e., dearths) during the season will allow the beekeeper to take actions to ensure the bees always have what they need to survive. In most parts of North America, beekeepers feed sugar syrup in spring. Some occasionally feed pollen supplements in spring to speed up brood rearing. Less common is the feeding of pollen supplements in fall.

In spring, I will typically start by adding a ¼-pound patty (113 g) and block of candy per hive in late winter when weather permits (late March to early April). My trigger for the pollen patty is after we start getting daytime highs of +5°C (41°F). Colder evenings are not an issue as my hives are insulated year round. It is very important for our northern colonies to get an early brood rearing start prior to first inspections to take advantage of our short season. Having a queen start rearing in March will ensure that the hive can be used for the June native flower nectar flow or be a splitting candidate. This additional brood can also be used to strengthen weaker hives. Some of you may think that we risk running out of feed if our bees start rearing so early; however, one benefit of insulation is that the bees have access to most of the hive interior all winter long, so starving due to not reaching the honey stores does not occur. Some of my hives show signs of brood rearing (brood nest temperature rises and stabilizes to 35°C / 95°F) from the middle of February (pulse brood rearing) for short one- to three-week periods.

In fall (August in our case), pollen supplements are very important, as it is not uncommon to have hives go pollen deficient in August. The last significant "native" source of pollen is fireweed. This is also the period where our winter bees are being raised. Our hives will typically have very little stored pollen going into winter as most of it is used to raise the last round of bees. Low fall pollen stores will typically make for very slow spring brood rearing. Many of us have started adding pollen supplements in August to help ensure the bees are able to store some of the fireweed pollen for spring and use the supplements for winter bee rearing (in theory, I hope). In colder climates, the first pollen often comes 2–3 months after the hive has commenced brood rearing in mid- to late winter. The winter bees typically use their internally stored

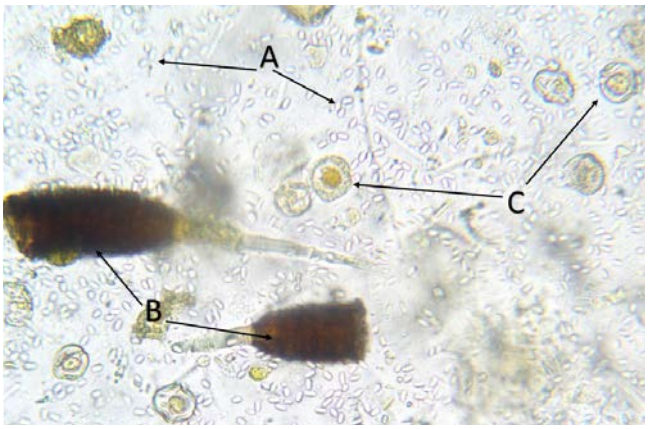

Figure 2. Microscope photo (x400 magnification) of dead bee gut contents showing severe (A) Nosema C infection, (B) Phragmidium spores, smaller (C) urediodiospores, and a few pollen grains. This hive had severe dysentery and Nosema C infection. Winter stores was honeydew honey.

Figure 3. Set of photos on left: Smaller, yellowish ones are (A) urediniospores (summer spores), and the larger, longer, septate dark ones are (B) teliospores (winter spores) of a rust that grows on members of the rose family. It's called *Phragmidium* sp. Set of photos on right: (C) *Pucciniastrum epilobii* (Fireweed Rust).

vitellogenin to initiate brood feeding during winter. A lack of late summer natural pollen can cause winter bees to be "skinny" or malnourished with poor vitellogenin body reserves. Malnourished winter bees will also winter poorly and be at higher risk to diseases.

Another late-summer challenge is the increased foraging of rust spores by the bees as the natural pollen disappears (Figures 2 and 3). These rust spores also seem to be associated with honeydew honey and winter dysentery. I have observed bees collecting two types of rust spores. Both occur after the first frosts in August as the fireweed and the wild roses start dying out. I have been able to sample rust "pollen" from my hives to confirm. I have also observed the rose winter rust spores in my honeydew honey samples and in the guts of deceased Nosema C-infected winter bees from hives with severe mortality and dysentery.

Pollen patties are now part of both my spring and late-summer feeding routine.

To be continued—Part II, August 2020

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Honey Bee and Pollinator Facility

Scott Weybright, WSU College of Agricultural, Human, and Natural Resource Sciences, Pullman, Washington

Brandon Hopkins and Steve Sheppard suspend the ribbon while Carol Hiatt does the honors. Cheers for ongoing research at Washington State University!

OTHELLO, Wash. – Washington State University celebrated the opening of its new Honey Bee & Pollinator Research, Extension and Education Facility [March 6, 2020] with a formal ribbon cutting and self-guided tours of the building. "This new facility will be a tremendous benefit to our WSU bee and pollinator researchers as well as the beekeeping and agricultural industries in Washington and around the world," said André-Denis Wright, dean of the College of Agricultural, Human, and Natural Resource Sciences. "The support we've had from donors like the Hiatt family, Ken and Sue Christianson, and Eric and Sue Olson, and groups like the Washington State Beekeepers Association has made this possible. We look forward to developing these important relationships as our scientists work to help save the bees."

The nearly 50-acre property, which WSU bought this winter, will house most of WSU's Honey Bee and Pollinator program, which is part of the Department of Entomology. Over $3 million has been raised and fundraising is continuing to expand the impact of the program. It's not just beekeepers that will benefit, but the agriculture industry as a whole.

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The 2020 Bayer Bee Care Program's Blue Ribbon Beekeeper Award is in recognition of the next generation of beekeepers (12–18 years old) and their efforts to give back to their communities through activities that support honey bee and pollinator health. These outstanding individuals have created unique projects on their own or with their local communities to promote and protect bee health for years to come. Each entrant has a chance to earn a $3,000 (first), $2,000 (second) or $1,000 (third) prize, which can be applied toward continuing their beekeeping efforts or a college scholarship.

Applications open the week of **June 22, 2020**, and entrants can apply online by **August 21, 2020**.

Visit www.BeeHealth.Bayer.us for more information.

bee care

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Reading a Frame

Al Chubak—former WAS Regional Director for Utah, Salt Lake City, Utah

With any hobby, the goal of why the particular hobby was chosen over others can be quite diverse. Enjoyment, filling a void, supporting another interest like gardening. It can be for learning and demystifying a world previously unknown, or as a social attraction for those wanting friends or just wanting to meet others of similar mind. Yes, it can be for producing the golden sweet, sometimes elusive honey. Farmers markets, classes, socials, conferences, BBQs, workshops, hiving activities, inspections, harvest give an almost constant series of activities to enjoy on a yearly calendar.

Beekeeping is an activity where you can put from little-to-no effort into it to having it encapsulate every waking moment. The degree of "I'm in" is up to the beekeeper.

Seek for Insights

It is your responsibility and yours alone to maintain and care for your hives and colonies. Others may help from time to time, but you are "steering the wheel." Mentors and social media voices can tell you to turn left or right, but ultimately you steer the way "you" want. Back in high school, wrestling was a sport that, in the end, was all up to you on the mat—not the coach, friends, videos, books . . . just you and your opposition. All the training to that point was to be tested in a short-timed, free-for-all contest with someone of equal size and age. If you lost, you alone faced the music. If you won, someone always appeared wanting to take some credit for the accomplishment. This is life in every journey we walk. In the end, it is you, your bees, and the dynamics of the world around you.

The wild card in beekeeping is that each area may differ in requiring adaptations to accommodate the variations. One area is humid, another is frigidly cold, another has invasive fire ants, some areas are overrun with mites, others have neighbors with no understanding of pesticide use or who may have a personal vendetta against flying buzzing insects—and on the list goes.

The focus of this article is to identify some of the areas beekeepers need to focus their attention.

Etiquette in Learning

At a recent conference, a question was asked of a master beekeeper and former president of a regional beekeeping organization, "How do you deal with all the questions from inexperienced beekeepers?" The answer was interesting, "I first ask what they have done to solve the problem, and, if they have done nothing, I suggest a book or source for them to go to." Many ask questions they could easily find answers to if they just opened a book or searched online. Limit questions to one or two well-thought-out ones rather than bombard experienced beekeepers with an on-going list of basic questions. The onus of your colony lies with you.

Varroa Mites Were Named "Destructor" for a Reason

Whether or not you use chemicals or invasive treatments to manage mite levels, management of mites has to be high on the to-do list. Learn about the various options for controlling mites, both natural and chemically related, and try them, test them, and document your results. Whatever works best, repeat. Keep the top few as options for maintaining mite levels at a minimum in early spring, mid-summer, and at the door of winter.

Inspect Your Hives Minimally Weekly with Full Inspections Monthly

It becomes easy to see, when looking at the external activity of a colony, if all is well or not. Sounds, temperament, smell, debris, activity, bearding, external marks can all share insights into the life of a colony. Reading the external signs are vital to a beekeeper. When concerns arise, a partial or full inspection should occur. Recently, a few large holes showed up at the front and side of a hive; further inspection showed dirt paw prints on the side of the hive. Skunk have a love for bees, wax, and honey. A portion of flooring tac-strip was placed on the entrance solving the evening visits from this nocturnal hungry critter.

Reading a Frame and Understanding a Colony

Pictures can show a thousand words, so does a visual inspection of a frame. Many assume seeing drawn comb and bees actively engaged are enough. Perhaps the challenge of "finding Waldo" the queen is high on their list. Some items to look for and research further:

- Location of the bees in the hive.
- How many frames are being worked.
- Are bees filling the spaces between the frames; if

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so, how many spaces and how are they positioned?

- Have the bees increased from last inspection?
- Cell size issues.
- Visual, and even taste of the honey to see what the bees are foraging on.
- Color, location of, and amount of bee bread (fermented pollen).
- Drone population.
- Inspect the brood chamber, determine the size.
- Laying pattern of the queen.
- How many open cells in the brood area.
- Perforated cells.
- Most diseases are found during inspection of the brood area.
- Color of uncapped larvae.
- Position of eggs in cell, and how many per cell.
- Any decaying larvae or dried-out eggs.
- Visual on queen cells, presence of queen cups.
- Amount of royal jelly in young larvae cells.
- Testing drone cells for mite populations.
- Age of wax, progression of wax, way wax is drawn.
- Signs of melted wax.
- Wax moth, small hive beetle, Varroa signs.
- Weight of the frame and/or hive.
- Presence of nectar and honey in relationship to brood, if out of balance or isolating brood expansion.
- Scent of the frame.
- Signs of mold or any other related growing bacteria or fungus.
- Amount of propolis on the frame—polished, packed, dripping, sticky, hard, color.
- A row of uncapped cells.

These are all items that lead the beekeeper to conclusions on what is happening in the hive. Inspections allow interaction from the colonies' caregiver in aiding their survival and health. Chapters can be written on each of the above-listed points, so reading a frame may take years or even a lifetime to learn. This should be every beekeepers goal: Understanding and reading their colony's frame, both prior to use, during activity, and after a loss.

Placement of a Hive

A mistake of many is that a colony can survive anywhere, anytime, and without the help of anyone. Of course, they have survived 30 million years prior to human intervention; however, they have not survived in all areas as they have limitations. It is the responsibility of the beekeeper to ensure a colony is safe from intentional or unintentional threats. Full sun is acceptable only if there is a reliable close (15 feet or more away) water source or if they are in an area prone to moisture. Full sun in dry areas with limited to no easy access to water is not an area a colony would have chosen naturally. Needs include sources for nectar, water, pollen or protein, and ingredients for propolis. Limit those vital items, and you limit the growth and health of the colony. Not every area is ideal for a honey bee.

Wintering a Colony

Winter does not kill bees, lack of resources, high mite counts, disease, high moisture, and complete uncirculated air confinement kills bees during the winter season. A few years ago, a colony that had entered the confinements of winter had its top blown off with no inner cover. For 2 months, the colony sat with no protection from above or way to confine heat. Background to this colony: It was split three times the prior season for nucs. The result was a zero mite load but with ample resources. When the top cover was placed back on in February, a quick inspection showed a live colony hunkered down in the lower box. It survived and grew rapidly in spring. Many challenges exist in wintering a colony. Some can be kept indoors with temps maintained at about the freezing point with external air circulation. Other colonies have to survive outdoors in frigid temps, but can be wrapped with lower and upper access points. Some areas need moisture protection due to rain so the colony can remain dry. Candy boards can be added during mid- to late winter to provide crystalized sugars with low to no moisture content. Prewinter mite management is vital as mites feed, too, all winter.

Documentation Is a Key to Knowing if Things Are Better or Worse

Memory can play games morphing an original experience into something completely different from the original. Some fishing stories begin in reality and end as a fairytale. The only way to know if improvement is happening is to document it. Record what you do, and what worked and what did not. Recording and documenting work with your bees can include handwritten notes, video, photos, and even, to some point, a collection of samples. Honey variations from year to year kept in 4-ounce muth jars can show variations from years past to seasonal variations. Documentation of a hive can be simple to very defined.

Keeping a waterproof file with your hive can help jog memories and aid in knowing if what was done helped or not. Remembering dates related to the development of a queen is vital. There are online sources like Hive Tracks (hivetracks.com/index.php) that aid the beekeeper in recording data, setting reminders, and even sharing your information.

Stepping Down from the Soap Box

Learn, try, and know that you may fail, just as you did when you first rode a bike and attempted to drive a car. You don't need to know everything at first; with decades under your belt, learning still continues as well as failure. A wipe out on a bike or fender bender is demoralizing, but a learning experience all the same. The most helpful lessons learned in beekeeping relate to reading frames and understanding bee activities inside and outside the hive and documenting them. Documentation sets the stage for repeating the good and avoiding past pitfalls. Getting stuck learning the same lessons yearly is like a wiping out on a bike repeatedly, so eventually you stop riding the stupid thing. There is much to learn about these amazing insects and much they have yet to tell us and science to yet uncover. Mastering your area is a key to mastering your colony.

WSU Scientists Enlist Citizens in Hunt for Giant, Bee-Killing Hornet

Seth Truscott, WSU College of Agricultural, Human, and Natural Resource Sciences, Pullman, Washington

PULLMAN, Wash. – More than two inches long, the world's largest hornet carries a painful, sometimes lethal sting and an appetite for honey bees. It is also the newest insect invader of Washington state.

The Asian giant hornet, *Vespa mandarinia*, is unmistakable, said Susan Cobey, bee breeder with Washington State University's Department of Entomology. "They're like something out of a monster cartoon with this huge yellow-orange face," she said. "It's a shockingly large hornet," added Todd Murray, WSU Extension entomologist and invasive species specialist. "It's a health hazard, and more importantly, a significant predator of honey bees."

Cobey, Murray and other WSU scientists are bracing for the giant hornet's emergence this spring. Sighted for the first time in Washington last December, the hornet will start to become active in April. WSU researchers are working with the Washington State Department of Agriculture (WSDA), beekeepers and citizens to find it, study it and help roll back its spread.

Voracious Predator

In the first-ever sightings in the U.S., WSDA verified two reports of the Asian giant hornet late last year near Blaine, Wash. and received two probable, but unconfirmed reports, from sites in Custer, Wash. It is not known how or where the hornet first arrived in North America. Insects are frequently transported in international cargo and are sometimes transported deliberately.

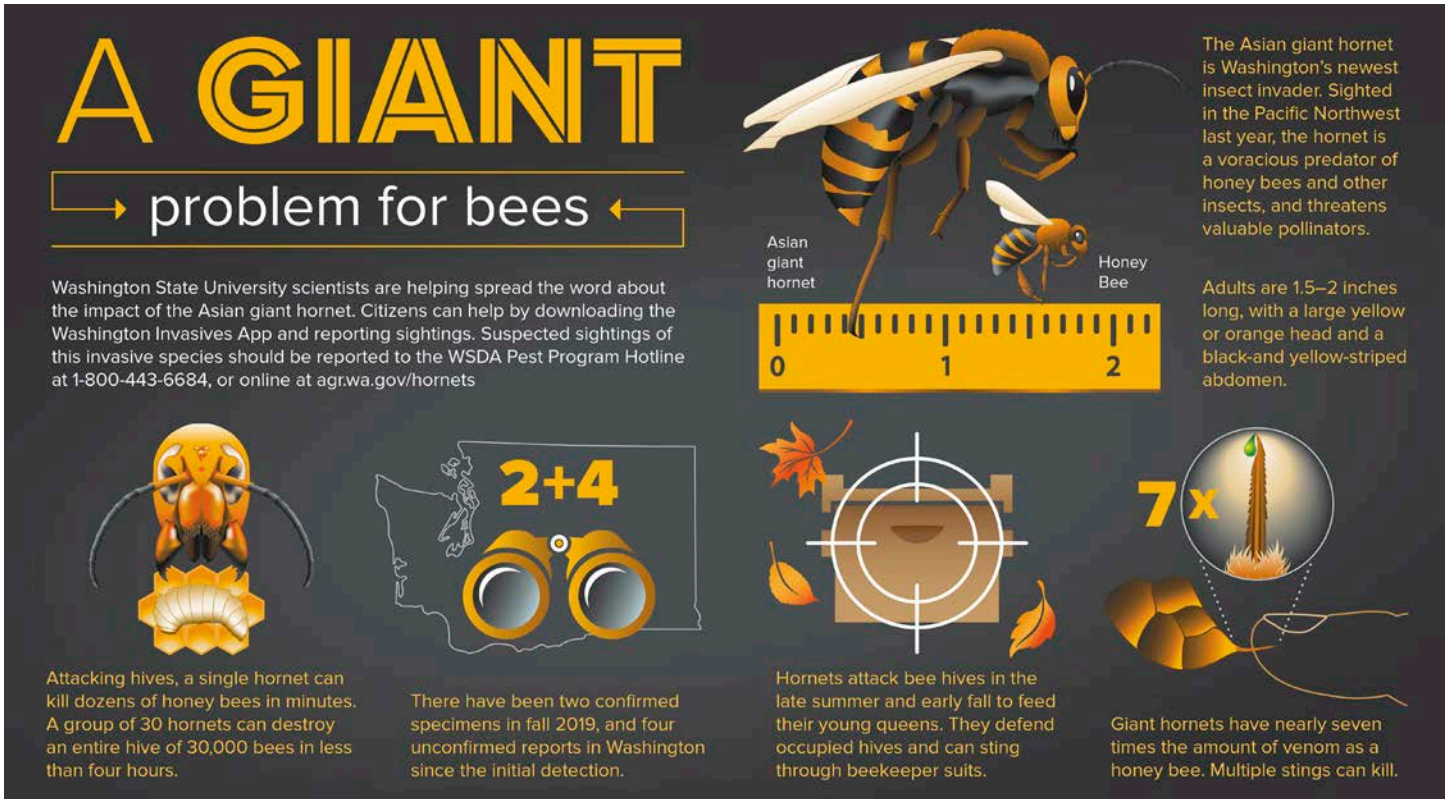
At home in the forests and low mountains of eastern and southeast Asia, the hornet feeds on large insects, including native wasps and bees. In Japan, it devastates the European honey bee, which has no effective defense.

The Asian giant hornet's life cycle begins in April, when queens emerge from hibernation, feed on plant sap and fruit, and look for an underground dens to build their nests. Once established, colonies grow and send out workers to find food and prey.

Hornets are most destructive in the late summer and early fall, when they are on the hunt for sources of protein to raise next year's queens. *V. mandarinia* attack honey bee hives, killing adult bees and devouring bee larvae and pupae, while aggressively defending the occupied colony. Their stings are big and painful, with a potent neurotoxin. Multiple stings can kill humans, even if they are not allergic.

Forever Changes

Growers depend on honey bees to pollinate many important



northwest crops like apples, blueberries and cherries.

With the threat from hornets, "beekeepers may be reluctant to bring their hives here," said Island County Extension scientist Tim Lawrence.

"As a new species entering our state, this is the first drop in the bucket," said Murray. Once established, invasive species like the spotted wing drosophila fruit fly or the zebra mussel make "forever changes" to local crops and ecologies. "Just like that, it's forever different," Murray said. "We need to teach people how to recognize and identify this hornet while populations are small, so that we can eradicate it while we still have a chance."

Beekeepers, WSU Master Gardener volunteers and other Extension clients are often the first detectors of invasive species. WSU scientists are now spreading awareness of the hornet to citizens and developing a fact sheet to help people identify and safely encounter the insects.

As partners with the Washington Invasive Species Council, they also urge citizens to download the WA Invasives smartphone app for quick reporting of sightings.

"We need to get the word out," said Lawrence. "We need to get a clear image of what's happening out there, and have people report it as soon as possible."

Early Detection, Faster Eradication

Scientists with the WSDA Pest Program are taking the lead on finding, trapping and eradicating the pest. WSDA will begin trapping for queens this spring, with a focus on Whatcom, Skagit, San Juan, and Island counties. "Our focus is on detection and eradication," said WSDA entomologist Chris Looney. The agency plans to collaborate with local beekeepers and WSU Extension scientists and entomologists with WSU focusing its efforts on management advice for beekeepers.

Regular beekeeping suits are poor protection against this hornet's sting, said Looney. WSDA ordered special reinforced suits from China. "Don't try to take them out yourself if you see them," he said. "If you get into them, run away, then call us! It is really important for us to know of every sighting, if we're going to have any hope of eradication."

To report an Asian giant hornet sighting, contact the Washington State Department of Agriculture Pest Program at (1-800) 443-6684, pestprogram@agr.wa.gov or online at agr.wa.gov/hornets.

For questions about protecting honey bees from hornets, contact WSU Extension scientist Tim Lawrence at (360) 639-6061 or timothy.lawrence@wsu.edu.

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Age group: ___under 25 ___25–40 ___40–65 ___65 or over

Number of colonies: ___small scale (<25) ___sideliner (25–300) ___commercial (>300)

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Beekeepers' Calendar

2020

Bee Informed Partnership **Loss and Management Survey**. *Information*: beeinformed.org/citizen-science/loss-and-management-survey.

May 2–17: **Mite-A-Thon**. To sign in and participate: www.pollinator.org/miteathon.

June 22–28: **National Pollinator Week**. *Information*: www.pollinator.org/pollinator-week.

June 28 (9 AM–5 PM): **Oregon Coast Honey Lovers Festival**. Yachats. Save the date!

July 19–24: **International Congress of Entomology 2020**. Entomological Society of America. *Information*: entsoc.org. Finlandia Hall. Helsinki, Finland.

August 15–30: **Mite-A-Thon**. To sign in and participate: www.pollinator.org/miteathon.

August 24–26: European meeting of the **International Union for the Study of Social Insects**. University Paul Sabatier. Toulouse, France.

October 3–4: **Washington State Beekeepers Association** 2020 Conference. Central Washington University. Ellensburg, Washington.

October 23–25: **Oregon State Beekeepers Association** 2020 Fall Conference. Florence, Oregon. *Information as it becomes available*: orsba.org.

November 17–19: **California State Beekeepers Association Convention**. *Information*: www.californiastatebeekeepers.com/annual-convention.

2021

July 8–10: **43rd Annual WAS Conference**. Missoula, Montana. *Information and updates*: www.westernapiculturalsociety.org.

July 11: **Technology Demonstration Field Camp**. Missoula, Montana. *Information*: www.westernapiculturalsociety.org.

July 12–13: **4th International Conference on Bee and Hive Monitoring**. *Information*: www.westernapiculturalsociety.org.