

It can be amazing how things seemingly unrelated are ultimately connected. Perhaps that is one reason why honey bees continue to fascinate me, as they so often demonstrate the story of One-health relationships.

In January 2019, I had the privilege of visiting Notre Dame Cathedral in Paris – just a few months before the infamous fire of April 15, 2019. In Europe, there are many lovely churches and cathedrals, but Notre Dame is a true standout. Beautiful, awesome, peaceful, and intimidating all at the same time. When I visited, the place was still decorated for Christmas and the organist was phenomenal, especially if you can appreciate a creepy “Phantom of the Opera” type of organ tune. Ironically, at the time, I was also in France for the purpose of studying apiculture.

The cathedral’s three honey beehives are now famous in the bee world for “surviving” the fire. The fire, in addition to partially destroying the magnificent building, was also considered to be an “acute pollution event.” Among other things, the ancient structure contained considerable amounts of lead. Following the fire, studies were conducted utilizing honey samples from various parts of Paris to measure lead levels. Honey samples directly downwind from the fire had two and a half times the lead of pre-fire levels, three times the levels compared to other parts of Paris, and six times the lead levels comparable to the wider geographical region. The good news is that even though post-

fire, downwind, lead levels showed elevation, the levels in the honey were still considered safe for human consumption. Most importantly, the information the honey bees and their honey provided a useful bio monitor of the environmental contamination of the area, helpful in assessing health risks for humans(1).

It is well documented that bees can be utilized as sentinels for various environmental pollutants including various heavy metals (such as lead, cadmium, chromium, nickel), pesticides, and other chemical substances(2,3,4). In medicine, the word “**sentinel**” is a reference to something that indicates the presence of a disease or health threat in an area. We often study various animal sentinels in veterinary medicine and can utilize this information to recognize and analyze human disease risk. For example, testing ticks for various infectious diseases and/or clinical testing of canines for Lyme Disease antibody can indicate disease exposure risk to humans and animals in a geographical region.

In the U.S., there is little found in the literature regarding heavy metal exposure affecting honey bees clinically and acutely. In Europe and elsewhere, there are some studies pointing to heavy metals as having detrimental clinical effects on honey bees, particularly in historically contaminated areas(5,6). It is well established that honey bee bodies can and do pick up metal levels from the environment through air, water, and plants (2-6). On most days, low level heavy metal exposure is one of

# BEE YET

## Sentinels

Dr. Tracy Farone



many environmental pollutants our bees must endure which may factor into difficult to diagnose subclinical manifestations. I would argue however, that if a “acute pollution event” occurred in your area, heavy metal toxicity could be a rare but possible differential consideration.

The take away from all of this is that for many things, from chemicals to infectious agents, it is not so much the “what” but the “how much” that determines effect – the dosage. While we cannot control all the ever-present



Christmas at Notre Dame.



Notre Dame towers.



Notre Dame fire.

contaminants in our bees' foraging range, we can control what is in our beeyards. The place our bees spend the bulk of their life.

The common definition of "sentinel" is a guard who stands and keeps watch. So, while bees can act as a medical sentinel for us, we can act as sentinels, watchful keepers, for our bees. Every chemical, every metal, every substance that you permit in your bee yard, are in the closest proximity to your bees most of the time. Particularly the substances we put on our bees, like medications. Next article, I am going to dive into one thing that is very important for you to keep watch of... the dosage of very common and important chemicals used in our apiaries – *Varroa* control products. **BC**

References:

- 1 Smith, K.E. Weis, D. et.al. 2020. *Honey Maps the Pb Fallout from the 2019 Fire at the Notre-Dame Cathedral, Paris: A Geochemical Perspective*. *Enviro. Sci. Technol. Asc.estlett*.0c00485.
- 2 Costa, Annamaria, Veca, Mauro, et.al. *Heavy metals on honeybees Indicate their concentration in the atmosphere: a proof in concept*. *Italian Journal of Animal Science*, Vol. 18, 2019- issue 1. Published on-line 24 Nov 2018.
- 3 Gutierrez, Miriam, Molero, Rafael, et. al. 2020 *Assessing heavy metal pollution by biomonitoring nectar in Cordoba (Spain)*. *Environmental Science and Pollution Research* 27, 10436-10448.
- 4 Floyd, Mark, "Scientists use honey from beekeepers to trace heavy metal contamination." Oregon State University newsroom. March 19, 2019.
- 5 Zhang, Di N., Hladun, K.R. et.al. 2020, *Joint effects of cadmium and copper on Apis mellifera foragers and larvae*. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology* 237, 108839.
- 6 Szilard Bartha, Taut, Ioan, et.al. 2020. *Heavy Metal Content in Polyfloral Honey and Potential Health Risk. A Case Study of Copsa Mica, Romania*. *International Journal of Environmental Research and Public Health*, 17, 1507; doi:10.3390/ijerph17051507.

**PACKAGED HONEY BEES #3 AND QUEENS FOR SALE IN OHIO, EASTERN INDIANA AND SOUTHERN MICHIGAN IN THE SPRING OF 2021**

For details contact:  
**Steve Johnson**  
[www.OldDrone.net](http://www.OldDrone.net)  
[johnsonshoneybee@gmail.com](mailto:johnsonshoneybee@gmail.com)

937-773-3417  
 Leave a message!

**FOR ALL YOUR PROCESSING NEEDS**

**MAXANT**  
 HONEY PROCESSING EQUIPMENT

AMERICAN MADE IN OUR NEW FACTORY  
**978-772-BEES**  
[www.MaxantIndustries.com](http://www.MaxantIndustries.com)

3100 EXTRACTOR  
 MADE IN USA

**Your Complete Bee Hive Supply Company**

All wooden-ware available assembled and painted

Hives are constructed using precision box joints.

Our hand hold cutter leaves no tear-out!

Made with Eastern White Pine

Shipping Available

Unassembled Frames  
 Assembled Frames  
 Wax Foundations  
 Shallow Super & Illinois Super  
 Hive Body  
 8 Frame Equipment  
 Deep and Medium Nuc Boxes  
 Honey Processing Equipment  
 Smokers, hive tools and much more.

**Forest Hill**  
 WOODWORKING  
 1985 Mine Road • Paradise, PA 17562  
**717-806-0193**  
 Manufactured in Lancaster County, PA  
[www.ForestHillBeeSupply.com](http://www.ForestHillBeeSupply.com)