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Bee researchers unveil tool to chase colony collapse disorder

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BEE RESEARCHERS UNVEIL TOOL TO CHASE COLONY COLLAPSE DISORDER

MISSOULA, Mont. –

University of Montana researchers and their UM-affiliated company, Bee Alert Technology Inc., have employed a powerful new tool created by a U.S. Army lab to discover a honeybee virus invading North America.

The new virus does not cause Colony Collapse Disorder – a mysterious malady depopulating beehives around the globe – but the method used to find the virus may help scientists unravel the CCD mystery in the future.

The invading bee virus is called Varroa destructor virus-1. First definitively identified in Europe in 2006, VDV-1 is carried by both honeybees and the tiny varroa mites that afflict them.

The invading virus was discovered in two honeybee samples collected by UM scientists in the southeastern United States. Jerry Bromenshenk, a UM biology research professor, and his colleagues gathered the incriminating samples as part of a larger sampling effort in bee yards affected by CCD across the nation.

Bee Alert had the samples analyzed at the Edgewood Chemical Biological Center, a U.S.

Army-backed laboratory based at the Aberdeen Proving Grounds in Maryland. Edgewood has developed a liquid-chromatograph proteomics mass-spectrometry device, which can identify all the peptides (short lengths of proteins) in a given sample.

“Every virus, every fungus, every bacteria has its own group of peptides that are unique to it,” Bromenshenk said. “We provided bee samples from a wide area and a number of colonies, and they very quickly produced a fingerprint of every pathogen that the bees are carrying.”

The Edgewood analysis didn’t provide a smoking gun for what causes CCD, but it did reveal that a European bee virus had “jumped the pond,” Bromenshenk said.

“What’s significant about this is typically we don’t know about new pathogens arriving on U.S. soil until there is some sort of outbreak and significant loss of colonies going around,” said Colin Henderson, a Bee Alert employee and UM College of Technology faculty member. He said an exciting aspect of Edgewood’s new technology is that it reveals everything contained in a sample. Using typical genetics-based methods like the polymerase chain reaction laboratory method – the same type used in the O.J. Simpson case – scientists have to specifically target genes and match those with the sequences they are searching for. This is extremely expensive and time consuming. The Edgewood method identifies all the peptides, and these then are cross-referenced with an index of millions of peptides stored at the National Center for Biotechnology Information, as well as other databases.

The UM samples provided as many as 15,000 lines of information, Henderson said. “And once the data is stored, unknown sequences may be discovered, and you can re-screen the file without rerunning the sample. It makes this a very powerful tool.”

“This became a perfect marriage of a technology looking for a real-world application,”

Bromenshenk said. “Edgewood had a tool that provided a solution to problems, and we had a

problem but no tool.”

So what does it mean for bees that VDV-1 is loose in the New World? Well, nobody really knows. Bromenshenk said the virus reproduces itself in both honeybees and varroa mites. It's also closely related to a family of bee viruses that cause deformed wings, aggressive behavior and death of brood.

“But we haven't seen it express itself among honeybees yet,” Bromenshenk said.

Henderson said the Edgewood process gave them a rare early detection of a new virus. “It will be an excellent model for epidemiology,” he said. “Bees move with people, and you get the same quasi-social interactions. We will be able to study how rapidly the pathogen gets from one place to another, spreads and moves around. It's amazing that we are getting to it while it's still localized.”

UM researchers got state Board of Regents approval in 2003 to form Bee Alert Technology Inc., a company designed to transfer technology from the University to real-world agricultural and military applications. The company employees workers from both the central UM campus and the College of Technology.

“I think this shows the strength of the merger between our two- and four-year systems,”

Henderson said. “There is a lot of synergy within the University system.”

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