

Real life 'zombee' hunter featured at EcoFest

By Jean Bartlett Features Correspondent

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This Saturday morning, thousands of volunteers will participate in the 11th Annual Pacifica Beach Coalition's Earth Day of Action. They will do cleanup and habitat restoration at more than 75 planned sites. Each year the PBC promotes an educational theme which focuses on wildlife protection. This year's theme is "Bee the Change, Bee an Earth Hero." The day of action begins at 9 a.m.

Following the "action," the PBC EcoFest begins at 11:30 a.m. on Linda Mar Beach. The EcoFest event includes: performers, 25 booths and keynote speaker John Hafernik. Hafernik is a professor of biology at San Francisco State University (SFSU). He is also the director of the ZomBee Watch Project, <https://www.zombeewatch.org/>, a citizen science project tracking the honey bee parasite, *Apocephalus borealis*. Once infected by the deadly fly parasite, the honey bee becomes disoriented, abandons its hive and dies a premature death. Five to seven days after its death, up to 15 maggots, who have eaten their way through, emerge from the area between the bee's head and thorax.

Hafernik accidentally discovered "zombees" in 2008. They were under the lights at the entrance to Hensill Hall on the SFSU campus.

"I was quickly intrigued by the possibility that *A. borealis* was manipulating its new host, the honey bee, and possibly contributing to the increasing number of failing hives in the Bay Area and around the U.S.," Hafernik said.

The professor enlisted graduate students to study the extent of parasitism in the Bay Area. They found that in the fall and winter, almost 80 percent of Bay Area hives were infected by zombie flies.

"The zombie fly is a native species," Hafernik explained. "It not only infects the honey bee (a species introduced to North America by European colonists in the 1600s), but also native bees and wasps, especially bumble bees and yellow jacket wasps. So far, 'zombee-like' behavior in infected bees has only been documented in honey bees."

"We started ZomBee Watch in 2012 to enlist citizen scientists to look for honey bees acting strangely and check them for infection by zombie flies," Hafernik went on to say. "Citizen scientists have made important new discoveries. They have now found infected honey bees along the West Coast from Santa Barbara on the south to Seattle on the north. Most recently citizen scientists documented infections in the eastern U.S. in Vermont and Pennsylvania."

The normal life expectancy of the queen honey bee is several years. Worker honey bees (sterile females) live six to seven weeks.

"They start out as house bees taking care of things in the hive, feeding developing larvae, cleaning house, removing dead bodies, etc.," Hafernik said. "During the last weeks of their lives they leave the hive as foragers to bring back pollen and nectar to the hive."

Male honey bees (drones) live a few weeks to a few months, unless they mate with the queen. Then they die immediately. Once infected by the fly parasite, the parasitized bee lives approximately a week.

"A parasite that eventually kills its host is a common lifestyle in the insect world," Hafernik said. "The

Apocephalus borealis is a native fly found over most of North America. It has probably specialized in parasitizing native bees and wasps for many thousands of years. Parasitizing honey bees could have started in the 1600s or it could be very recent and the equivalent of an emerging disease of honey bees."

Over the years Hafernik has studied a variety of insects from butterflies to damselflies to parasitic blister beetles and their bee hosts. Several years ago, he led a team from SFSU that investigated the diversity of bees and other anthropoids in the Presidio of San Francisco. His study of honey bees is relatively recent.

"Honey bees not only produce honey for us, but they are also the most important pollinator of our agricultural crops," Hafernik explained. "At least a third of the things we eat rely on honey bees and other insects for pollination. Hive losses are increasing in the U.S. If enough worker bees are parasitized by zombie flies, the productivity of infected hives could decline and hives could ultimately fail. Without honey bees we would have to change our diets and there would be fewer wild flowers to enjoy."

The professor noted that native bees and honey bees additionally face a number of environmental threats.

"People can help bees by planting bee friendly plants, not using pesticides or buying pesticide treated plants, and supporting efforts to maintain biologically diverse urban, agricultural and natural ecosystems," Hafernik said. "They can also volunteer in citizen science projects that promote bee health. Examples include our ZomBee Watch Project and the Great Sun Flower Project (<https://www.greatsunflower.org/>).

PBC's 11th Annual Earth Day of Action & Eco Fest. Saturday, April 18. Actions and cleanups at citywide sites, 9 to 11:30 a.m. EcoFest at Linda Mar Beach, 11:30 a.m. to 3 p.m. More information at: www.pacificabeachcoalition.org.

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