

PROFESSOR, STUDENTS PUBLISH PAPER ABOUT FIRE ANT BEHAVIORS

Dr. Deby Cassill, associate professor of Biology, and three USF St. Petersburg and USF students co-authored an article that was published July 5 in the Journal of Bioeconomics. The article, which focuses on the social behavioral interpretation of abdominal wagging in fire ants, also includes contributions from retired Texas A&M professor and entomologist S. Bradleigh Vinson.

Cassill and the students studied videos, conducted research projects, and observed the ants' various behaviors including sleep, caring for brood, and interactions with worker ants. The "booty waggle," as Cassill often refers to it, is speculated to be a positive and human-like form of expression in these social vertebrates.

"I'm guessing it's an expression of pleasure," she said, adding that fire ants appear to showcase other human-like emotional expressions. "They pull away; they show fear by scrunching down into a fetal position and they withdraw their antenna. I see boldness and a great deal of affection for the babies as they move and protect them. When you look at fire ants on a human scale through the microscope as I do, you can see their personalities and moods; they have rich emotional lives."

Unlike humans, Cassill said fire ants don't have the physical ability to convey facial expressions because of their hard outer shells, so they still appear to express emotions in different situations through their body language. "You can see them in the context in which they're working and observe how they react in that context. It really is like how we react to different situations."

The former students who assisted in the research—now USFSP alumni whose majors ranged from Chemistry and Biomedical Sciences to Psychology—include Krista Ford, Lieu Huynh, and Daniel Shiffman. Alumna Elizabeth Bonert, who graduated with a bachelor's degree in fine Arts in 2014, created a graphic illustration of some of the ants' varying waggles.

Cassill, who serves as lead author for the article, worked on the article with each of the students at different times over a period of more than five years.

"Each of them worked maybe a semester or two in my lab at different times," she said. "They weren't there at the same time. It's like a quilt: You have pieces that you stitch together into a good story."



Dr. Deby Cassill

Cassill, who said she has mentored hundreds of students over the past 15 years, believes that the research experience provides students with a clearer view of the world.

“After a person has done research like this with fire ants and learns how to quantify the data, count and measure it, and truly study animal behaviors, they become much better at seeing the details during classroom lectures,” she said. “They say they are able to pay attention to details they’ve never before noticed, and that’s what learning is all about. We get the overall picture and start peeling away the details like an onion: We understand life at a greater depth after experiencing research like this.”

Cassill said her ongoing research expands on the article to characterize the presence of oxytocin or its precursors in fire ants caring for the larvae. Oxytocin is a chemical that elicits the contraction of the uterus, milk production, and the maternal instinct in mammals when they care for, feed and protect their helpless offspring.

“We need to find the ‘smoking gun,’” said Cassill, who will attempt to do so by collecting ant queens to grind up when they’re laying eggs. “We’ll see whether we find a receptor in their neurons that was designed to capture some form of oxytocin. If we find oxytocin production, we have additional evidence for the idea that all animals survive, as we do, by thinking and ‘feeling’ their way through risky and often unpredictable environments.”

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