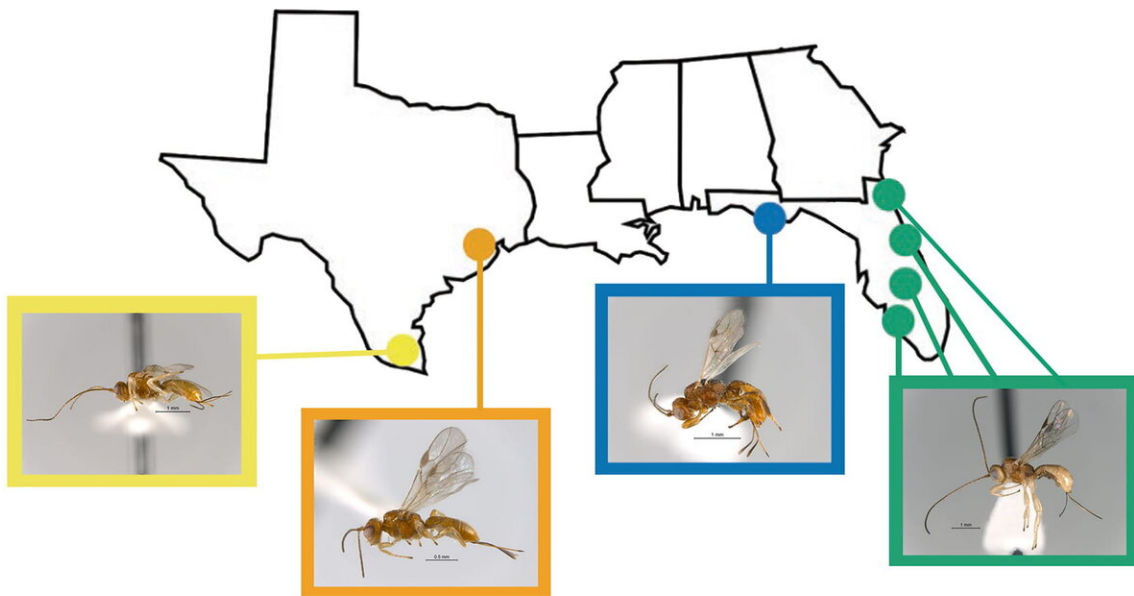


Researchers discover new species of gall wasp

October 26 2020, by Jade Boyd



More than 50 species of wasps in genus *Allorhogas* live in Central America, but only two species had been documented in the United States prior to the discovery of four new species described this month in a study by biologists from Rice University and the National Autonomous University of Mexico. The new species (left to right) are: *Allorhogas belonocnema*, discovered in McAllen, Texas; *Allorhogas gallifolia*, discovered at Rice University in Houston; *Allorhogas bassettia*, discovered in the Florida panhandle; and *Allorhogas caulinaris*, discovered at several locations in Florida. Credit: Egan lab/Rice University

A horrifying insect soap opera with vampires, mummies and infant-eating parasites is playing out on the stems and leaves of live oak trees every day, and evolutionary biologist Scott Egan found the latest character—a new wasp species that may be a parasite of a parasite—within walking distance of his Rice University lab.

Egan, an associate professor of biosciences at Rice, studies gall wasps, tiny insects that cast a biochemical spell on live oaks. When gall wasps lay their eggs on oak leaves or stems, they chemically program the tree to unwittingly produce a tumor-like growth, or gall, which first shelters the egg and then feeds the larval wasp that hatches from it.

Egan describes the wasps as "ecosystem engineers," because their galls are attractive morsels that harbor a supporting cast of opportunistic ne'er-do-wells, thieves and killers. It's a great setting to study how competition for resources drives evolution, and Egan and his students have spent more than a decade documenting the eerie, interspecies who's-eating-who drama.

The latest [species](#) they discovered at Rice, *Allorhogas gallifolia* (al-UHROH'-guhs GAHL'-ihf-ohl-eeuh), is one of four new wasp species from the genus *Allorhogas* that Egan and collaborators Ernesto Samacá-Sáenz and Alejandro Zaldívar-Riverón at the National Autonomous University of Mexico (UNAM) in Mexico City described in a study this month in *Insect Systematics and Diversity*.

"They lay their egg in another wasp's gall," Egan said of *A. gallifolia*, which his group first hatched in 2014. "They're using the gall as a resource, and we're still not certain how, but I think they're attacking herbivorous caterpillars that are feeding on the gall tissue, and the wasp larva are eating those caterpillars after they hatch."

He said more than 50 species of *Allorhogas* have been found in Central

America and Mexico, but only two species were previously documented in the United States, one at the University of Maryland campus in 1912 and another some years later in Arizona.



Allorhogas gallifolia is a new species of wasp discovered in live oak trees at Rice University. First collected in 2014 by students in the lab of Rice evolutionary biologist Scott Egan, *A. gallifolia* is one of four new wasp species described in a study this month by Egan and collaborators Ernesto Samacá-Sáenz and Alejandro Zaldívar-Riverón at the National Autonomous University of Mexico in Mexico City. Credit: Ernesto Samacá-Sáenz/UNAM

The *A. gallifolia* found at Rice was collected as part of an effort to describe the community of natural enemies for one species of gall wasp, *Belonocnema treatae* (behl-uh-NAHK'-nee-muh TREE'-tee). In that study and others like it that Egan's lab has published for other gall species, thousands of galls are collected across the southeastern United States, and everything that emerges from the galls is studied and cataloged. Egan describes the operation, which runs almost 365 days per year, as a "factory of discovery," and *A. gallifolia* was one of many mysterious specimens it has produced.

"It did not match any of the previously described species, so we documented that in our 2016 paper and raised the hypothesis that this might be a new species," Egan said. "A year or two went by and lead author Ernesto Samacá-Sáenz contacted us and offered to collaborate on determining if this lineage was, in fact, a new species."

Samacá-Sáenz is a graduate student in the UNAM lab of Zaldívar-Riverón, an expert in Allorhogas and similar predatory wasps, which can be used by farmers as biological controls for crop pests. By the time Samacá-Sáenz reached out about the 2016 paper, Egan's lab had collected a number of other undescribed specimens that they also suspected were new species of Allorhogas. The email kicked off a close collaboration that has taken Rice researchers on a number of trips to Mexico to conduct field work and science outreach in remote village schools.

While the jury is still out on exactly how *A. gallifolia* interacts with other species on the galls of *B. treatae*, Egan said he, Samacá-Sáenz and Zaldívar-Riverón have discussed a number of hypotheses.

"They think it could be phytophagous, meaning it's actually just eating [plant material](#), or that it could be a gallmaker itself," Egan said. "But I'm convinced that these guys are predators of caterpillars that live inside the

Belonocnema galls and eat the gall plant material. I think the larval wasp eats the caterpillar and then emerges out of the side of the gall."

Egan said it will take more research to determine whether that hypothesis is true. If it is, it would be "a whole new way of life that would be unknown to this entire genus." But it would not be the first—or the creepiest—interaction between species that Egan and his colleagues have found.



Dozens of smooth, round *Belonocnema treatae* galls dot the underside of leaves on a live oak tree. The wasps lay a mixture of venom and proteins alongside their eggs to coax the trees to form the tumor-like nurseries where the wasp larvae mature. Credit: Scott Egan/Rice University

Take [2018's discovery](#), for example, that the parasitic vine *Cassytha filiformis* (kuh-SIHTH'-uh FIHL'-ih-form-ihs), commonly known as the love vine, targets *B. treatae* galls and sucks so many nutrients out of them that it mummifies the larval wasps inside. That marked the first observation of a parasitic plant attacking a gall-forming wasp, but it could not match the ghoulish weirdness of the crypt-keeper wasp they discovered in 2017.

Euderus set (yoo-DEHR'-uhs SEHT') is so diabolical that it was named for Set, the Egyptian god who trapped, murdered and dismembered his brother in a crypt. *E. set*—which Egan discovered on a family vacation in Florida and later found on a tree in his front yard—lays its egg inside the gall of the *Bassetia pallida* (buh-SEHT'-eeuh PAL'-ih-duh) wasp. Both eggs hatch and the larvae live side by side, maturing inside the gall. When the pair are large enough to emerge as adults, *E. set* manipulates its step-sibling into trying to escape before its emergence hole is finished. When *B. pallida*'s head gets stuck in the undersized hole, *E. set* begins eating. Starting from the tail, it devours a tunnel through its roommate, emerging through the head to take its place in the world outside.

There are more than 1,400 known species of gall-forming [wasps](#), and Egan said he believes there are many more species waiting to be discovered in their plant/bug-eat-bug-eat-plant corner of the world.

"We've focused on the gall former *Belonocnema* a lot, and that's where we initially found this first *Allorhogas*," he said. "When we reared out that entire community and tried to key out each of the members, *A. gallifolia* was one of those things where we could not narrow it down to a species. Nothing fit the description.

"Twenty-five percent of all the things we reared out of *Belonocnema* fit that same type of uncertainty," Egan said. "We can't find anything that's

ever been described like them before. Some of those, including one I have on my desk right now, are also mostly likely new species. Considering there are 90 oak species in the United States, and I have studied only three of them, this is the tip of the biodiversity iceberg."

More information: Ernesto Samacá-Sáenz et al. Species Diversity in the Braconid Wasp Genus *Allorhogas* (Doryctinae) Associated With Cynipid Galls on Live Oaks (*Quercus*: Fagaceae) Using Natural History, Phylogenetics, and Morphology, *Insect Systematics and Diversity* (2020). DOI: [10.1093/isd/ixaa011](https://doi.org/10.1093/isd/ixaa011)

Provided by Rice University

Citation: Researchers discover new species of gall wasp (2020, October 26) retrieved 2 May 2024 from <https://phys.org/news/2020-10-species-gall-wasp.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.