

## ENTOMOLOGY

## Body-Snatching Flies

Scientists have uncovered a surprising clue to the causes of colony collapse disorder

The heap of dead bees was supposed to become food for a newly captured praying mantis. John Hafernik, a biology professor at San Francisco State University, had collected the belly-up bees (*Apis mellifera*) from the ground underneath lights around the university campus. "But being an absent-minded professor," he noted in a prepared statement, "I left them in a vial on my desk and forgot about them." He soon got a shock. "The next time I looked at the vial, there were all these fly pupae surrounding the bees," he said. A fly (*Apocephalus borealis*) had inserted its eggs into the bees, using their bodies as a home for its developing larvae. The pile of dead bees ended up revealing a previously unrecognized suspect in colony collapse disorder—a mysterious condition that for several years has been causing declines in U.S. honeybee populations, which are needed to pollinate many important crops. It turns out that the parasitic flies that had attacked Hafernik's bees have been taking over the bodies of honeybees in other parts of the country. A detailed description of the newly documented relationship was published online in January in *PLoS ONE*.

Hafernik believes that the fly, which also parasitizes bumblebees and paper wasps, may have only recently begun attacking honeybees. "Honeybees are among the best-studied insects in the world," Hafernik said. "We would expect that if this has been a long-term parasite of honeybees we would have noticed."



The fly lays eggs in a bee's abdomen. Several days later the parasitized bee bumbles out of the hive—often at night—on a solo mission to nowhere. Such bees often fly toward light and wind up unable to control their own body. After the bee dies as many as 13 fly larvae crawl out from the bee's neck.

The team members found evidence of the fly in 77 percent of hives they sampled in the San Francisco Bay Area, as well as in some hives in California's agricultural Central Valley and South Dakota. Earlier research had found signs that mites, virus or a fungus, or a combination of these factors, might be responsible for the widespread colony collapse. In the case of the affected hives that Hafernik's group studied, the bees—the parasitizing flies and their larvae—contained genetic traces of a parasite and a virus that were previously implicated in colony collapse disorder. This double infection suggests that the flies might be spreading additional hive-weakening traits.





—Katherine Hahn

## TECHNOLOGY

## Know Your Space Tycoons

How their plans stack up

You've probably used their technologies or shopped in their stores. But would you trust them to fly you into space? Microsoft billionaire Paul Allen is the latest to join the commercial space race with his new venture, Stratolaunch Systems. Stratolaunch plans to build the world's biggest airplane to launch rockets from the sky. The appeal of this kind of air launch is that the aircraft flies a rocket to the most favorable launch latitude for a specific mission. Here's how the entrepreneurs' aspirations (and fortunes, as estimated by *Forbes*) compare. —John Matson

NAME	SOURCE OF FORTUNE	NET WORTH	SPACE VENTURE	KEY HARDWARE	FIRST FLIGHT	POTENTIAL PASSENGERS
Paul Allen 	Microsoft	\$13.2 billion	Stratolaunch Systems	Launch aircraft for SpaceX rockets	2016 (planned unmanned test)	NASA astronaut
Jeff Bezos 	Amazon.com	\$191 billion	Blue Origin	Reusable rocket for suborbital flights	Undisclosed	Space tourist
Richard Branson 	Virgin (media, airlines, retail)	\$4.2 billion	Virgin Galactic	Suborbital space plane	2013 (planned)	Space tourist
Elon Musk 	PayPal	\$680 million	SpaceX	Rocket and orbital crew capsule	December 2010 (unmanned test)	NASA astronaut