Can't compete on dung? Try mating on apple pomace

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In the mating world of yellow dung flies, large, brawny males almost always get the girl. However, a new study suggests that smaller males rule if presented with an opportunity to woo females when they are not hanging out on cow dung. It is the first time alternative male reproductive strategies have been observed in this species.

In a study published in the June 24 Proceedings of The Royal Society B, a group of Syracuse University (N.Y.) undergraduate students found that small male dung flies, which are traditionally unsuccessful at finding and keeping mates on dung pats, successfully mated with females feeding on composting apple pomace. In fact, large males were generally absent from the pomace mounds.

"This is a new chapter in the story of yellow dung flies," says Scott Pitnick, professor of biology in SU's College of Arts and Sciences. "No one has carefully studied this species off the dung. Small male dung flies can't compete with their larger counterparts on the dung, so in this case, they developed a different tactic to successfully pass their genes to the next generation."

Pitnick co-authored the study with the students. The students were enrolled in an advanced biology course designed to teach them to conduct original scientific research. Pitnick co-teaches the course with J. Albert C. Uy. As part of the course, the students were tasked with designing a study around the size and mating success of yellow dung flies.

"After we made our initial field observations for the class assignment, we could tell from our professors' reactions that our discovery was a piece of important information in the field," says Stephen Maheux '09, a biology major who graduated in May. "The course was designed to teach us how to be biologists; as such, we made a unique observation that ultimately resulted in a publication."

Until now, it was thought that yellow dung flies mated almost exclusively on manure. Females are drawn to the dung only when they are ready to mate. Little is known about the feeding habits of females when they are not at the dung pats, Pitnick says. On the other hand, males were thought to hang out almost exclusively around the manure, awaiting the arrival of the females. Competition on the dung among males is fierce and can result in injury or death to smaller males as well as females caught up in the struggle.

But, on Toad Hollow Farms in Nedrow, N.Y., the students noticed large numbers of females feeding on apple pomace in a field adjacent to the cow pasture where they were observing flies on dung pats. Much to the students' surprise, the females were frequently mating on the pomace, and with males that were significantly smaller in size than those found in the cow pasture. Furthermore, none of the sexually aggressive behaviors normally observed on the dung pats occurred on the pomace.

Owned by Bill Guptill, Toad Hollow Farms produces natural compost made from manure, leaf and yard waste, and fruit and vegetable waste from grocers in and around Central New York. Apple pomace is the pressed pulp that remains after juicing. The students' initial observations suggested that the availability of the pomace seemed to provide male dung flies with alternative mating opportunities.

Maheux and biology major Kali Henn, who will be a senior in the fall, continued working with Pitnick after the class concluded to collect and

analyze additional data, re-confirm the initial class results, and help write the manuscript that was submitted for publication to The Royal Society.

"The class focuses on enabling students to experience the research process—from formulating questions and making the observations to designing the experiments, analyzing the data and writing the final manuscript," Pitnick says. "In this case, what started as a class exercise ended up as a significant finding in this field."

Source: Syracuse University