

NEWS

LIFE & EVOLUTION

Fly form of sexual frustration takes toll

Whiff of female but no mating causes males to die young

BY SUSAN MILIUS

Smelling female fruit flies but not mating with them can actually shorten males' lives.

Drosophila melanogaster males not allowed to mate despite receiving tantalizing chemical sex messages lose about 35 to 40 percent of their normal life span, says molecular geneticist Scott Pletcher of the University of Michigan in Ann Arbor. These males' fat stores also dwindle, and the flies prove less able to cope with starvation, Pletcher and his colleagues report November 29 in *Science*.

Creating the reciprocal situation of celibate females sniffing but not mating with males wasn't as easy, he says. But so far, experiments show female life span declining 15 to 20 percent too.

This marks the second time Pletcher and colleagues have linked premature demise with frustrated expectations. Fruit flies on a low-calorie diet, which normally would lengthen lives and sustain health, lost some of the diet's benefits if the flies lived with the smell of food they couldn't eat, he and colleagues reported in 2007.

Like a person salivating at the odor of a pie baking, flies pick up cues to likely events and start to prepare physically. Their brains may be monitoring the expected events as well as what the flies actually experience, Pletcher speculates, and "bad things happen when they don't match up."

To see whether odors of inaccessible mates would affect aging, Pletcher and his colleagues housed normal flies for two days or more with members of their own sex engineered to give off the distinctive signaling scents of the opposite sex. That deception let researchers look at the effects of the odor alone without any confounding behavioral or visual cues from the opposite sex.

Males escaped much of the damage of the frustrating experience if they could mate with females afterward, the



Fruit flies have their own version of anticipation, and failure to mate as expected turns out to have physiological costs.

researchers found.

Rescuing the expectation-denied males, however, required an unusually high 5-to-1 female-to-male ratio, notes Jennifer Perry of the University of Oxford. She points out that in Pletcher's experiments, routine 1-to-1 mating opportunities didn't much affect the premature demise of frustrated males.

The males, however, had been set up to have unusually high expectations: The researchers had surrounded five

males with 25 female-scented brethren.

The detectors for the sex-signaling compounds are particular molecules in male fruit fly forelegs, Pletcher and his colleagues determined. Fruit flies have abundant ways of sniffing and tasting their environment. When Pletcher and his team sabotaged a molecular sensor in the legs, scent-exposed flies had normal life spans.

The experiments may help explain why male animals of many species have shorter life spans than females, says Urban Friberg of Uppsala University in Sweden. Males often face "harsh" competition for mates, he says, and he thinks unfulfilled mating expectations may turn out to be less of a problem for females.

A nugget of support for the idea that many animals could experience frustration effects, Pletcher says, comes from a paper on longevity in nematodes also appearing in *Science*. Hermaphrodite nematodes that wriggle around on lab dishes where males once congregated have shortened life spans, report Anne Brunet of Stanford University and her colleagues. There's no mating between the males and the hermaphrodites — again, the mere perception of secretions from a different sex triggers physiological consequences. □

ATOM & COSMOS

Saturn's hexagon

A six-sided cloud pattern on Saturn has gotten its day in the sun. The Cassini spacecraft snapped high-resolution images of the hexagonal jet stream at the planet's north pole (center right). Using colored filters, the Cassini team identified large particles, shown in pink, swirling in the planet's lower atmosphere. Large particles at higher altitudes appear green, and tiny particles even higher in the atmosphere appear blue. Those tiny particles define the sharp boundary of the hexagonal jet stream, which fuels the clouds. The roughly 30,000-kilometer-wide cloud structure has been there for decades or even centuries. — Ashley Yeager

