

# Bugs on Bugs

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Bacteria — you can live without 'em, but it won't do you any good, according to a study of fruit flies by USC College biologists.

Fruit flies scrubbed clean of bacteria did not outlive their grubby siblings, the researchers report in *Cell Metabolism's* Aug. 8 cover story.

The finding challenges the conventional wisdom that even harmless bacteria — and the immune response they provoke — suck up the energy of the host organism and hasten its death.

“It seemed like it was dogma that if the organism has to spend energy doing something, it should shorten the animal's life,” said co-author Steven Finkel of USC College's biological sciences department.

A research team led by John Tower, associate professor of molecular and computational biology at the College, compared normal fruit flies to ones kept in an axenic (bacteria-free) environment.

“The surprise was that the flies grown under axenic conditions and the normal flies had the same life span,” Tower said.

The experiment cannot be replicated in higher organisms, which need bacteria for proper digestion and other functions. But the result in flies still may be relevant to human aging research.

In both flies and humans, the number of bacteria living on the organism increases with age. The innate immune response to bacteria is similar in

flies and humans, and it loses strength with age in both species.

The study suggests that all these factors may have nothing to do with aging.

“I think a lot of people would just assume that if you’re increasing bacterial load in an aging human, it must be bad,” Finkel said.

“And it might not just be bad, it just might be. Prior to this study, I would not have thought that.”

The study is part of a broader effort in the Tower lab to eliminate irrelevant factors in aging and close in on its fundamental causes.

“We want to determine what limits the life span of the fly, or any other animal,” Tower said.

Tower’s team eliminated bacteria as a factor by comparing normal fruit flies to specimens born from eggs washed in antibiotic, raised in an axenic environment and given disinfected food throughout their lives. A third group of flies was raised with bacteria and disinfected in adulthood.

Co-author Paul Webster, director of advanced electron microscopy and imaging at the House Ear Institute in Los Angeles, used scanning electron microscopy to visualize structures resembling bacteria biofilms on the surface of older flies.

Tower and co-author Chunli Ren, a graduate student, took bacteria samples from the surface and interior of the flies throughout their life span, confirming that the axenically grown flies were bacteria-free and that bacteria counts in normal flies increased dramatically as the flies got older.

But all the flies lived about as long — approximately three months.

Source: USC College

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