<u>Part of the curriculum:</u> Genetics and evolution [1A3 – Mechanisms of Evolution]

Gut Microbes May Drive Evolution

By Carrie Arnold
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The human body harbors at least 10 times more bacterial cells than human cells. Collectively known as the microbiome, this community may play a role in regulating one's risk of obesity, asthma and allergies. Now some researchers are wondering if the microbiome may have a part in an even more crucial process: mate selection and, ultimately, evolution.

The best evidence that the microbiome may play this critical role comes from studies of insects. A 2010 experiment led by Eugene Rosenberg of Tel Aviv University found that raising *Drosophila pseudoobscura* fruit flies on different diets altered their mate selection: the flies would mate only with other flies on the same diet. A dose of antibiotics abolished these preferences—the flies went back to mating without regard to diet—suggesting that it was changes in gut microbes brought about by diet, and not diet alone, that drove the change.

To determine whether gut microbes could affect an organism's longevity and its ability to reproduce, Vanderbilt University geneticist Seth Bordenstein and his colleagues dosed termites with the antibiotic rifampicin. The study found that antibiotic-treated termites showed a reduced diversity in their gut bacteria after treatment and also produced significantly fewer eggs. Bordenstein argues that the reduction of certain beneficial microbes, some of which aid in digestion and in the absorption of nutrients, left the termites malnourished and less able to produce eggs.

These studies are part of a growing consensus among evolutionary biologists that one can no longer separate an organism's genes from those of its symbiotic bacteria. They are all part of a single "hologenome."

"There's been a long history of separating microbiology from botany and zoology, but all animals and plants have millions or billions of microorganisms associated with them," Rosenberg says. The forces of natural selection place pressure on a plant or animal and its full array of microbes. Lending support to that idea, Bordenstein showed the closer the evolutionary distance among certain species of insects, the greater the similarities in their microbiome.
Researchers believe that the microbiome is essential to human evolution as well. "Given the importance of the microbiome in human adaptations such as digestion, smell and the immune system, it would appear very likely that the human microbiome has had an effect on speciation," Bordenstein says. "Arguably, the microbiomes are as important as genes."

Using the text and your scientific culture show how gut microbes play a role in evolution through natural selection.
You can give other examples to illustrate this mechanism <u>or</u> you can present other evolutionary mechanisms.

You may use the following key words:
selective advantage – mating – non genetic-trait