ScienceWatch – Transylvania in the Galápagos

"When I found out about vampire finches I was pretty shocked." – S. J. Song

Darwin's finches, now numbering 19 species on the Galápagos Islands, are a classic example of adaptive radiation and were instrumental in leading Charles Darwin to formulate his revolutionary theory of evolution by natural selection (http://hras.org/sw/Sw1-04.html; http://hras.org/sw/swjan07.html).

Each species has evolved a specialized beak to feed on one or another food source. But one, the vampire finch (*Geospiza septentreonalis*), supplements its diet of seeds, insects and nectar with blood. During the dry season, when their usual food sources are scarce, the birds will peck at the base of the wing of a Nazca booby (*Sula granti*) or Blue-footed booby (*S. nebouxii*) to draw blood and feed.

The intestines of animals, including humans, contain trillions of microbes (bacteria, viruses and fungi) collectively known as the microbiome, which helps to break down food, produce vitamins and protect against disease-causing germs (http://hras.org/sw/swjanfeb2014.htm). Diet greatly affects the number and types of bacteria in the microbiome. For example, a diet high in fiber promotes the growth of "good" bacteria and leads to better health. Moreover, highly specialized diets have been found to promote similar microbiomes in different animals—convergence of the microbiome—as is the case for ant and termite-eating animals like aardvarks, armadillos and anteaters.

Researchers in 2018 examined the gut microbiome of 12 species of Darwin's finches and found that the intestines of vampire finches contained several unique bacterial groups. Presumably these microbes aid in digesting blood, which is difficult to do because blood contains potentially toxic levels of iron and salt.

Now another team, led by Se Jin Song, University of California San Diego, La Jolla, CA, reports in the June 3, 2019 issue of the journal of the *Philosophical Transactions of the Royal Society B*, that even though the vampire finch and the vampire bat are separated by 300 million years of evolution, their microbiomes show some convergence.

To look for convergence Song *et al*. compared the composition of the gut microflora from fecal samples of the common vampire bat (*Desmodus rotundus*) with that of vampire finches. They identified thousands of bacterial genomes from each sample set by sequencing a gene (16S rRNA gene) commonly used to identify all bacterial species. Few similarities stood out, with

one exception. Both animals had high levels of a particular bacterial group, Peptostreptococceae, which are thought to metabolize both salt and iron.

According to Dr. Song, even though finches and bats have followed a very different evolutionary path to a blood-drinking life style, they still converged on having Peptostreptococceae enriched in their gut microbiome. “It was still interesting that we were able to find something that they did share,” she said.

Currently, Dr. Song and her co-workers are testing vampire finches for the kind of pain-numbing and anti-clotting proteins commonly found in vampire bats.

Saul Scheinbach