

## **Fruit-bats and their bacteria, in health and in sickness**

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The host-associated microbiome affects individual health and behavior, and may be influenced by local environmental conditions. However, little is known about microbiomes' temporal dynamics in free-living species compared to those of humans and model organisms, especially in body sites other than the gut. We have investigated longitudinal changes in the fur microbiome of captive and free-living Egyptian fruit bats (*Rousettus aegyptiacus*) a highly common bat all across Israel and neighboring countries, which tends to live in crowded colonies and in high proximity to people in the urban surrounding. We find that in contrast to patterns described in humans and other mammals, the prominent microbiome dynamics are of change over time at the level of the colony as a whole. On average, a pair of fur microbiome samples from different individuals in the same colony collected on the same date is more similar to one another than a pair of samples from the same individual collected at different time points. This pattern suggests that the whole colony may be the appropriate biological unit for understanding some of the roles of the host microbiome in social bats' ecology and evolution. This pattern of synchronized colony changes over time is also reflected in the profile of volatile compounds in the bats' fur, but differs from the more individualized pattern found in the bats' gut microbiome. Less is known about fruit bat's bacterial pathogens that cause morbidity and mortality (unlike viral, fungal etc). In the clinical point of view we encounter persistent seasonal illness throughout the fruit bat colony due to gram positive bacteria. This raises questions about the immunological process evoked in bacterial inflammation of fruit bats and how they cope with bacterial illness. Those questions are yet to be answered.

### **Research questions -**

1. How do bats acquire their own fur and intestinal microbiome? How different events in a bat's life (e.g. meeting conspecifics or visiting new food sources) contribute to the development of this certain microbiome?
2. How do bats transmit bacteria among themselves in a certain colony and among other bat colonies? What is the pace and what is the pattern of this transfer?

3. The bat immune system reaction (innate and acquired) under exposure to bacterial pathogens, in captivity and in nature- How it reflects in physiological and behavioral aspects?

**Further Reading-**

1. "Coordinated change at the colony level in fruit bat fur microbiomes through time." *Nature ecology & evolution* 3.1 (2019): 116.
2. "Microbiome analysis reveals the abundance of bacterial pathogens in *Rousettus leschenaultii* guano." *Scientific reports* 6 (2016): 36948.