

Inter-species microbial sharing in rural Madagascar: A study of environmental influences on the skin microbiome



Mandena, Madagascar

Objectives

- Characterize the human skin microbiome in a rural, non-Western community
- Understand how contact with domesticated animals and hygiene practices influence the skin microbiome



Collecting skin swab samples from a zebu.

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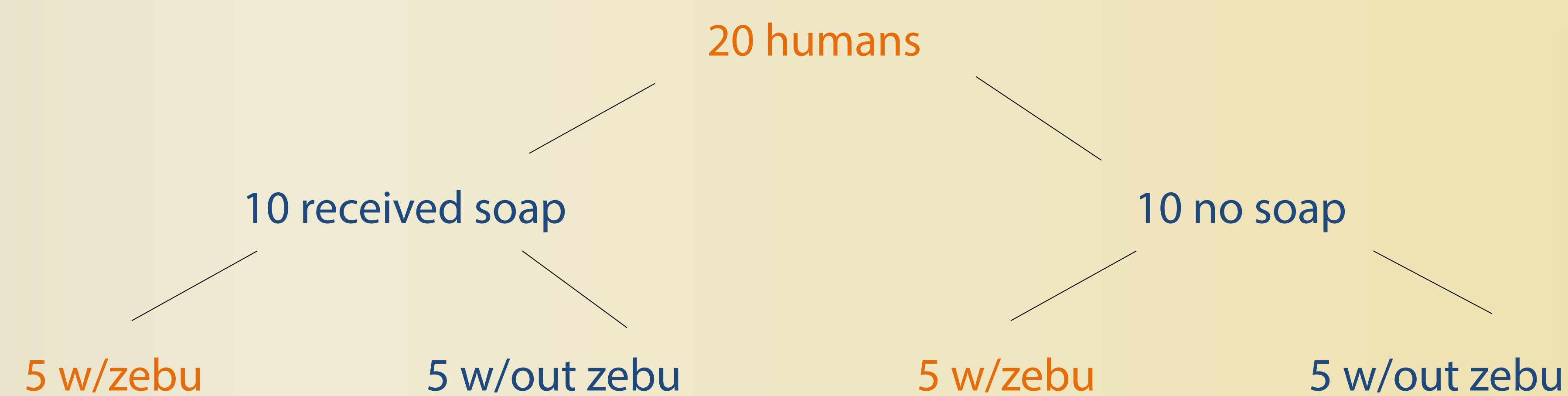
This project utilized a framework of *evolutionary mismatch*, the idea that many health outcomes are a consequence of the dissimilarity between our current environment and the one in which we evolved. Specifically, we investigated how contact with domesticated cattle (zebu) and modern hygiene practices can influence the microbes that live on the skin.



Collecting skin swab samples from a participant.

Human skin is home to trillions of bacteria^a and is constantly exposed to the external environment, making it susceptible to changes in its microbial community. Understanding which variables alter microbial community structure can provide insight into how the skin microbiome influences health outcomes, including susceptibility to vector-borne disease.

Experimental Design



Sample sites

- Human: back of hand, foot, forearm, & armpit
- Zebu: behind dorsal hump

3 sampling phases: before soap, directly after soap use, & after two weeks of no soap use

Lab work: Sept-Dec 2015 NC Museum of Natural Sciences, Genomics & Microbiology Lab

1. Bacterial DNA extraction
2. Bacterial 16S rDNA amplification
3. Sequencing bacterial 16S rDNA



Extracting bacterial DNA in the lab.

Microbiome and Mosquitoes

Bacteria contribute to our characteristic “sweaty” smell by metabolizing our sweat and releasing certain metabolites.^b Mosquitoes use olfaction during host identification and selection.^c Thus, future work will investigate the connection between the microbiome and mosquito susceptibility by experimentally testing mosquito preference in host selection.

References

- ^aFoxman, Betsy, and Deborah Goldberg. "Why the Human Microbiome Project Should Motivate Epidemiologists to Learn Ecology." *Epidemiology* 21.6 (2010): 757-59. Web.
^bScott, J. (2014). My No-Soap, No-Shampoo, Bacteria-Rich Hygiene Experiment. *The New York Times*.
^cTakken W, Verhulst NO. Host preferences of blood-feeding mosquitoes. *Annual Review of Entomology*. 2013;58:433-453.



Thanks to the “Shining Evolutionary Light on Global Health Challenges” Bass Connections Team, Dez Razafimatra, and the rest of the Duke Lemur Center Staff.