

Bacterial Evolution and Competition

- 1) Bacterial evolution lab - There are several ways that students can demonstrate evolution in the laboratory with several commercially available kits.
 - a) Carolina also produces a kit that can be used to demonstrate evolution in the laboratory [1]. In this activity, students can start up a culture composed of both ampicillin sensitive and ampicillin-resistant bacteria, in this case MM294, a type of *E. coli* with and without a plasmid with ampicillin resistance. They then split the culture and grow it in the presence and absence of the antibiotic. Each day over the next 7 days, students transfer the bacteria to tubes with new medium. On the 8th day, they test both populations for antibiotic resistance to determine how the two populations have evolved. After the lab, students answer questions to ensure that they understand the experiment and the interpretation of their results, as well as key concepts central to the lab.
- 2) Bacterial competition lab – when teaching students about competition with simulations, students can set up short and long term competition experiments that demonstrate fitness differences between strains
 - a) Students can set up a fitness experiment by using an isogenic pair of antibiotic-resistant and sensitive bacteria in the presence or absence of selective pressure. Microcosms are generated by using filtered river water containing populations of resistant and sensitive bacteria with competition between populations being measured in the presence or absence of antibiotics [2]

References

1. G. (2018, April 10). Evolution in Real Time: Bacteria and Antibiotic Resistance Kit. Retrieved from https://www.carolina.com/evolution/evolution-in-real-time-bacteria-and-antibiotic-resistance-kit/FAM_171206.pr
2. Marvasi, M., Choudhury, M., Vala, N. B., & Teplitski, M. (2017). Fitness of Antibiotic-Resistant Bacteria in the Environment: A Laboratory Activity †. *Journal of Microbiology & Biology Education*, 18(1). doi:10.1128/jmbe.v18i1.1257