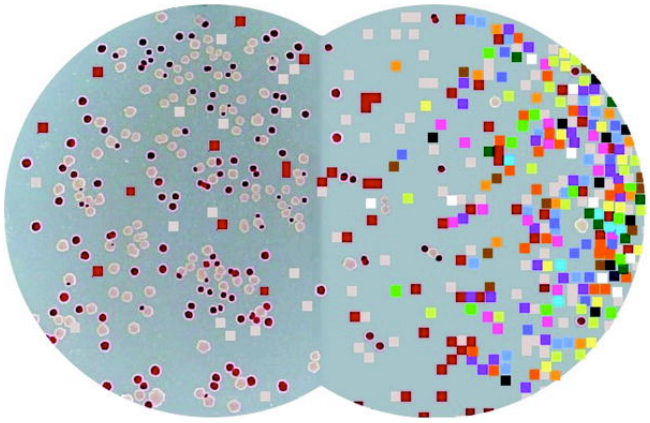
AVIDA-ED

Experimental Evolution Project with Evolving Digital Organisms



Two model systems: *E. coli* & digital organisms.

Background

Some evolutionary biologists, such as Richard Lenski at Michigan State University, conduct experiments using microorganisms like *E. coli* to answer questions about evolution. Bacteria are useful model organisms because they replicate quickly and their small size means that they don't take up much space in the laboratory. Lenski's work with *E. coli* has helped shed light on aspects of the evolutionary process and, having spanned 25 years and over 60,000 bacterial generations, is the longest-running investigation of its kind.

As far as biological organisms go, *E. coli* replicates—and evolves—at an incredible rate. Even so, it is still too slow to be of practical use in addressing certain questions about evolution. To pursue such questions scientists sometimes use digital organisms that model biological systems. Avida is just such a model system, used by researchers to study evolutionary processes and find solutions to engineering problems.

In this exercise you have the unique opportunity to pursue an evolutionary question of your choosing using evolving digital organisms in Avida-ED. It is up to you to generate, develop, and test a hypothesis to answer your question and report your findings in the style of a scientific publication.

Assignment Tasks

Hypothesize: Propose a hypothesis to an evolutionary question that can be tested using Avida-ED.

Predict: Indicate what outcomes you would expect in the event that your hypothesis is true.

Design an experiment: Develop an experimental protocol that you will follow to test your hypothesis. You should consider relevant variables, what data to collect, and how many replications you will need.

Conduct your experiment: Follow your protocol and record the appropriate data.

Analyze your data: Summarize your data and perform appropriate statistical tests. Decide how best to represent your data and create appropriate tables and/or graphs.

Report your findings: Write up your experiment as a standard scientific paper. Your report should include (i) introductory background information and a statement of your hypothesis, (ii) methods, (iii) results, and (iv) conclusions and discussion. The complete report should be no more than 5 pages long.