

Guide to Electronic Files
“Universal Biosignatures for the Detection of Life”
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The following files are included with the electronic edition (ETD) of this thesis.

Thesis-DornED-2005.pdf (5.3 MB)

The thesis itself in PDF format.

README-ListOfFiles.pdf (64 KB)

This file.

biosignature_movie_1.mpg (987 KB)

An MPEG format movie showing the development of the MAB in Avida as described in Chapter 2. This movie shows the relative abundances of 28 Avida instructions in a single typical evolutionary run. This run was seeded with the standard progenitor (listed in Table 2.1) and run for 200,000 updates with copy mutation probability $\mu=0.01$ randomizing mutations per execution of the COPY instruction. The red curve shows the initial distribution of instructions present in the progenitor population, while the blue curve shows the actual distribution of instructions at any particular point in time. The distribution was sampled every 100 updates. The run illustrated here is one of twenty-five runs used to generate the "0.01" curve in Figure 2.4a.

biosignature_movie_2.mpg (1.3 MB)

An MPEG-format movie that illustrates the experiment shown in Figure 2.5. The movie demonstrates how the concentration of six instructions varies over time as the point mutation rate is ramped down from lethal to non-lethal levels and back again in an environment continually re-seeded with viable organisms. This movie shows the distribution curve of all 28 instructions as it varies over the same time period.

As can be clearly seen in the animation, as long as the point mutation rate remains too high, the organisms cannot survive and the distribution of instructions in the environment is even, reflecting the random nature of the mutation function being continually applied. Once the environment becomes nonlethal, a population explosion quickly establishes a biosignature. As the population adapts to its environment the pattern rapidly comes to match the familiar "adapted" biosignature shown in Figure 2.4.

Once the point mutation rate is again increased to inhospitable levels a population crash ensues and the biosignature disappears as abiotic processes again dominate.

LTRB_movie.mpg (915 KB)

An MPEG-format movie demonstrating the development of the LTRB effect as described in Chapter 7. Three columns show two-dimensional maps of the concentration of resources A, B, and C in a narrow column containing an Avida population, while a fourth plots a vertical profile of the average concentration of the

three resources. As the population speciates, the most valuable resource, A, is rapidly consumed in the uppermost layers, while the less-energetic resources diffuse down to lower layers containing other species.

avida_1.6ED1.tgz (883 KB)

A zipped tar archive including both the source code and an x86 Linux binary of Avida version 1.6ED1, the customized version of Avida used to generate the results described in Chapter 2.

avida_1.6ED2.tgz (1.9 MB)

A zipped tar archive including both the source code and an x86 Linux binary of Avida version 1.6ED2, the customized version of Avida used to generate the results described in Chapters 3 and 4.

avida_2.0b7.tgz (3.3 MB)

A zipped tar archive including both the source code and an x86 Linux binary of Avida version 2.0b7. This standard release version of Avida was used to generate the results described in Chapter 7.

config_chapter2A.tgz (8 KB)

A zipped tar archive including all of the configuration files necessary for reproducing the Avida experiments described in Figure 2.4.

config_chapter2B.tgz (7 KB)

A zipped tar archive including all of the configuration files necessary for reproducing the Avida experiments described in Figure 2.5.

config_chapter3.tgz (11 KB)

A zipped tar archive including all of the configuration files necessary for reproducing the Avida experiments described in Chapter 3.

config_chapter4.tgz (12 KB)

A zipped tar archive including all of the configuration files necessary for reproducing the Avida experiments described in Chapter 4.

AminoAcids.xls (1.1 MB)

A Microsoft Excel workbook containing the collected amino acid data used in Chapters 2, 5, and 6. This is the most recent version and includes more recent data than that used in Chapter 5.

CarboxylicAcids.xls (262 KB)

A Microsoft Excel workbook containing the collected carboxylic acid data used in Chapter 2.