Two Gene Selection

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2. Category: Biology (Population Genetics)

3. Brief Description:

This application is used to simulate natural selection (viability selection) for two genes which can be linked on a single chromosome. Each gene has two possible alleles. The program displays a "phase plane trajectory" of the allele frequencies for the two genes as they change with time. The linkage disequilibrium parameter can also be monitored.

The fitness values for the various genotypes can be entered directly or the user can specify the parameters of a set of commonly studied models: additive fitnesses, multiplicative fitnesses, coadapted alleles, or symmetric fitnesses.

4. How the Application Can be Used:

TwoGeneSelection.app was designed to be used in an upper division undergraduate course on population genetics. Since the models are complicated, I would suggest assigning some illustrative examples before students are allowed to explore on their own. The application can be used to illustrate the concepts of linkage disequilibria, coadapted gene complexes ("supergenes"), multiple stable equilibria, and domains of attraction.

5. Developed under NeXTSTEP 2.1

6. Detailed Instructions:

Parameter values are entered into the fields or changed by sliders and then the Start buttons is pressed. Initial allele frequencies are specified by clicking in the graph. The initial and current allele frequency and disequilibrium values for each trajectory can be obtained from the lower right corner of the window. For detailed instructions, a description of the model, and some suggested exercises, click the Help button in the Info submenu.

7. Comments:

The help panel can be customized by opening TwoGeneSelection.app as a folder and editing the Help.rtf file. This is a good place to enter assignments, questions, exercises, etc.