Inbreeding

1. Author and Contact Info:

Dr. Robert A. Desharnais
Department of Biology
California State University, Los Angeles
Los Angeles, CA 90032-8201
Internet (NeXT Mail):   bob@biol1next.calstatela.edu
Phone: (213) 343-2056
Fax: (213) 343-2095

2. Category: Biology (Population Genetics)

3. Brief Description:

This application is used to simulate changes in the inbreeding coefficient for regular systems of inbreeding. The inbreeding coefficient represents the probability that both alleles an individual inherits from their parents are identical by descent, i.e. both alleles are ancestors of the same DNA molecule. Regular systems of inbreeding are systems where individuals with the same familial relationships mate in every generation (e.g. self-fertilization or brother-sister mating). In these situations, equations can be derived for the inbreeding coefficient.; those equations are simulated in this application. Five inbreeding systems are considered: (*i*) selfing (self-fertilization), (*ii*) full-sib mating, (*iii*) half-sib mating, (*iv*) parent-offspring mating, and (*v*) repeated backcrossing into a given genetic strain.

4. How the Application Can be Used:

Inbreeding.app was designed to be used in an upper division undergraduate course on population genetics. It could also be used in a course in quantitative genetics. Diagrams are presented for each of the inbreeding systems; students should study these first to make sure how the system of inbreeding is maintained. The rates of

change in the inbreeding coefficients can then be compared.

5. Developed under NeXTSTEP 2.1

6. Detailed Instructions:

The inbreeding system is selected using the pop-up menu over the diagram. A diagram of the inbreeding system is given together with the recursion equations. For backcrossing, one can vary the inbreeding coefficient of the genetic strain used in backcrossing. Click the "Plot" button to see a simulation of the currently chosen mating system. Each simulation assumes the population is completely outbred at the start ($F=$ 0). The results for different breeding systems can be superimposed on the same graph for comparisons. For detailed instructions, a description of the model, and some suggested questions, click the Help button in the Info submenu.

7. Comments:

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