Instructor's guide to the Popsim program

The Popsim program comes with:

(a) A number of pre-set population models

(b) Some exercises and questions

For an elementary use of the program, it may be appropriate to present a simpler version of the program which omits these features. Alternatively you may wish to modify the parameters and exercises. The purpose of this file is to explain how to make these changes.

The program is designed to be self-explanatory for the student, using Help screens. The main content of the Help screens is included in the instructions to studends. The topics in the present file may be more easily understood if you first read through these instructions and/or try out the program.

Modifying the program may lead to changes which are difficult to reverse. It is suggested that you use a copy of the program and work on this rather than on the original version of the program.

Setting parameters for the exercise

The primary menu for setting of parameters for the exercise is the **Parameters** menu:
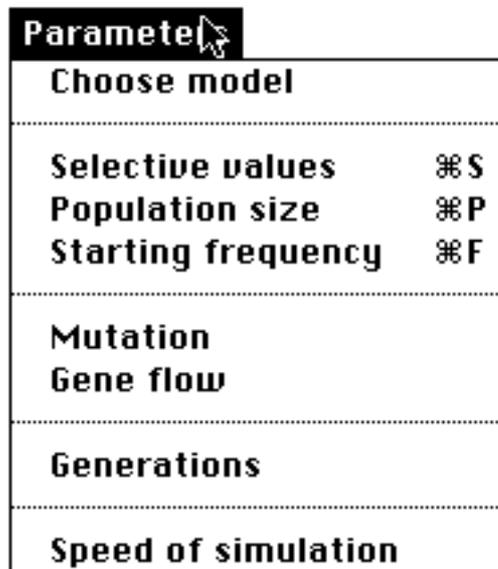
The first item, **Choose model**, refers to the choice of pre-set models. In setting up the program for student use you have the choice of:

(a) Leaving the pre-set models unchanged

(b) Simplifying the exercise by eliminating the pre-set models altogether.

(c) Changing the description and/or parameters of the pre-set models

These settings are now described in detail.

(a) Leaving the pre-set models unchanged

Strictly speaking, it is not necessary to alter the program at all in this case. It can be copied and supplied to the students. However this has one potentially undesirable consequence. The **File** menu of the program which is supplied to you has the following structure:

```
File
   New
   Repeat
   Get Info          ⌘I
   Set defaults
   ..........................
   Save As...
   Print...
   ..........................
   Quit              ⌘Q
```
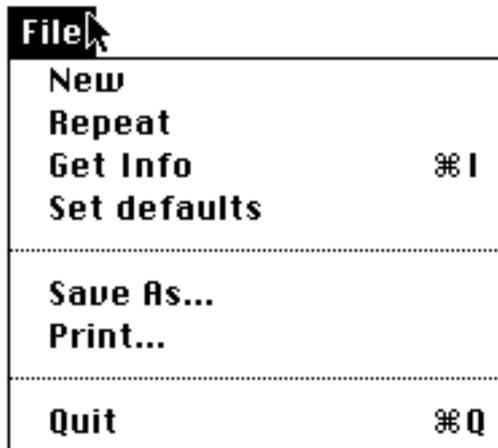
The **Set defaults** item of this menu is intended for the instructor rather than for the student. If this menu item is left in the program, it means that any student can alter the program for other students. It is best, therefore, that this item be disabled.

To do this, access the **Set defaults** item. The following screen will be seen:

```
✋   Are you sure that you want to save the      [ Cancel ]
     current defaults to disk?

   Set number   [ 0 ]    ☐ Change set description?    [ Do it ]
   ○ Infinite
   ○ Finite

              [ Change program menus ]
```
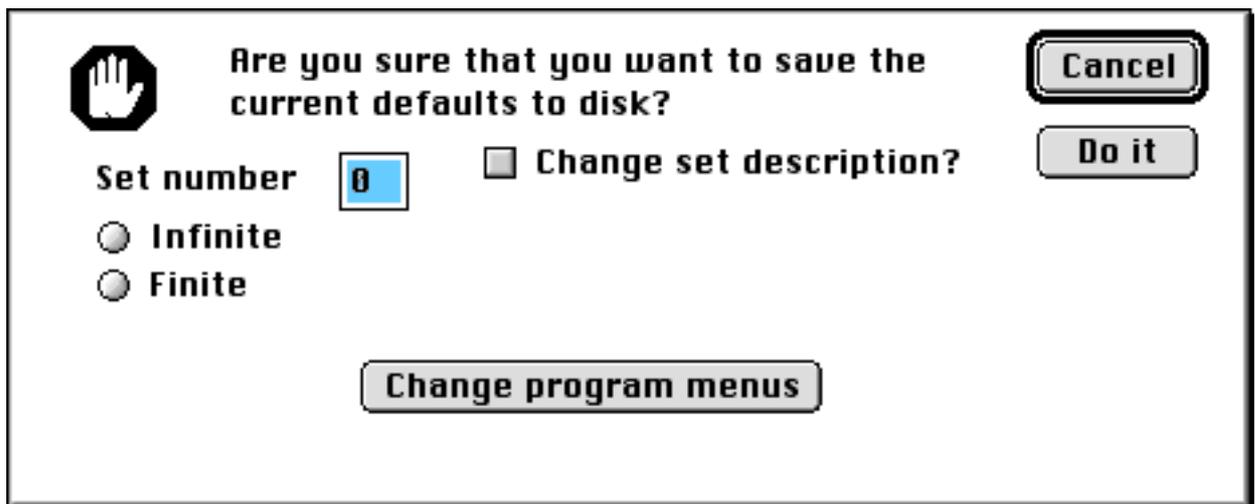
Check the **Change program menus** item. This leads to the following screen:

(1) Choose between standard form of program and short form which eliminates the 'Choose set' menu.

[Cancel]

[Do it]

- ⦿ **Standard program**
- ○ **Short version**

(2) Should the 'Choose set' menu automatically supply parameters to the student or just supply prompts for parameter choice?

- ⦿ **Supply**
- ○ **Prompts only**

(3) Choose whether to include the exercises and questions. If you choose the short version of the program, it is probably appropriate to omit exercises and questions.

- ⦿ **Include E and Qs**
- ○ **Omit E and Qs**

(4) Choose whether to allow students to save the results of their simulation to disk.

- ⦿ **Allow Save**
- ○ **Disallow Save**

(5) Choose whether to dim 'Set default' menu item. It is suggested you do this before releasing the program to students. NB. Keep an unchanged copy for yourself.

- ⦿ **Don't dim**
- ○ **Dim 'Set Default'**

Check the **Dim 'Set Default'** button, and then click the **Do it** button.

(b) Simplifying the exercise by eliminating the pre-set models altogether.

```
Parameters
    Selective values        ⌘S
    Population size          ⌘P
    Starting frequency       ⌘F
    ..............................................
    Mutation
    Gene flow
    ..............................................
    Generations
    ..............................................
    Speed of simulation
```
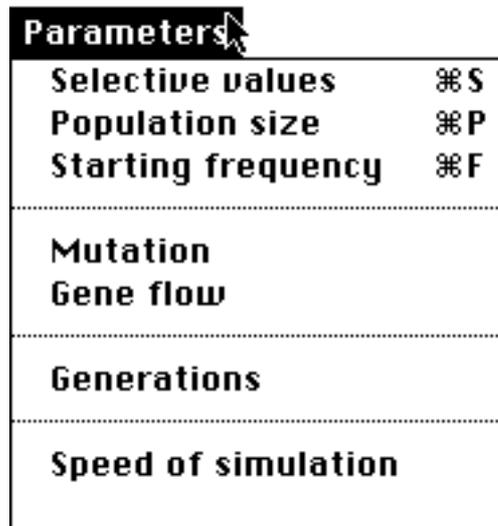
The procedure in this case is identical to that described above, except that you should also click on **Short menus** button. The student will then see the menu shown above. You will also be prompted in this case to omit the exercises and questions, by checking the **Omit E & Qs** button.

(c) Changing the description and/or parameters of the pre-set models

Accessing **Choose model,** the first item of the **Parameters** menu, leads to the following screen:

		Infinite	Finite	
1.	Neutral gene	○	●	
2.	Deleterious recessive	○	○	
3.	Heterozygote advantage	○	○	[Cancel]
4.	Heterozygote disadvantage	○	○	
5.	Mutation	○	○	[OK]
6.	Gene flow	○	○	
7.	New mutant	○	○	
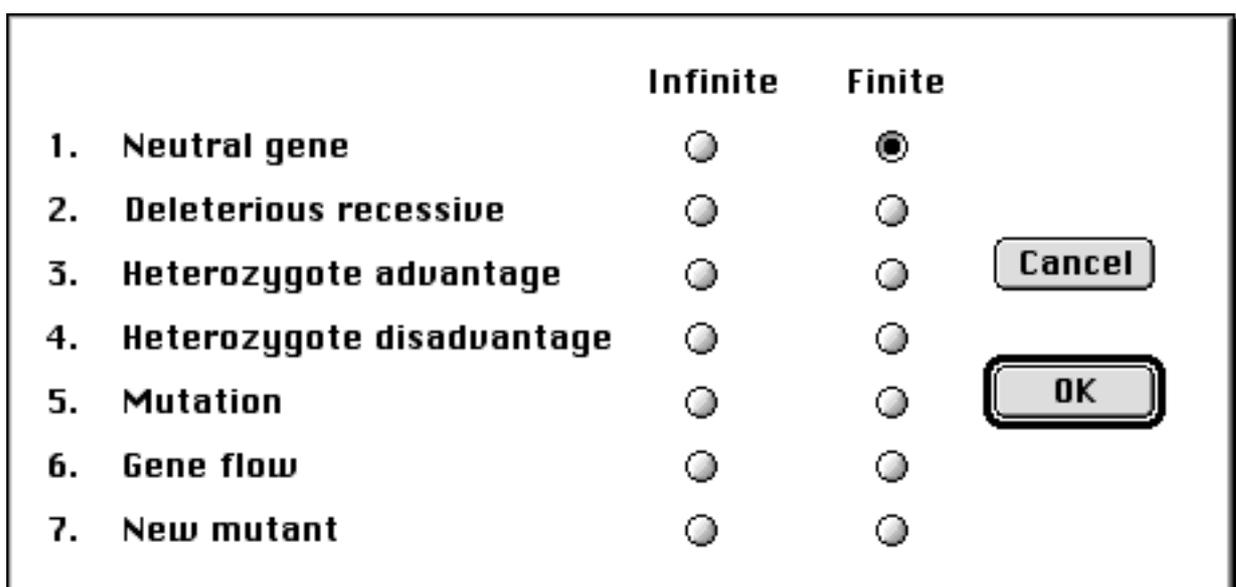
This is the screen the student uses to select different simulation models. As can be seen, there are seven pre-set models. Each model can be applied to the case of an infinite population, in which case the simulation becomes a deterministic calculation. Alternatively the program presents a simulation of a number of finite populations.

Supply or prompt?

The seven pre-set exercises each suggest parameters for the particular exercise. In the defaultm mode of the program, clicking on a model prints the chosen parameters to the screen, leaving the student ready to start the simulation. You may prefer to make the student think more about the choice of parameters. In this case, the **(2) Prompts only** button should be clicked. The student will then need to set each parameter separately before starting the simulation, prompted by the value in the pre-set model.

Changing parameters

For example, for Model 1, 'Neutral gene', the suggested population size is 50 (2N = 100), and the suggested starting gene frequency is 0.4. Both of these are, of course, arbitrary.

Say that you wish to change the default values for the model. As described above, you would first go to the **Choose set** item in the **Parameters** menu, and select the first model. You would also need to nominate either 'Finite size' or 'Infinite size'. Now go to the appropriate item(s) in the **Parameters** menu and make the desired changes, for example to the population size. Then go to the **Set defaults** menu item. If you have selected 'Finite size', the screen should now show that Model 1 with Finite size is being considered:
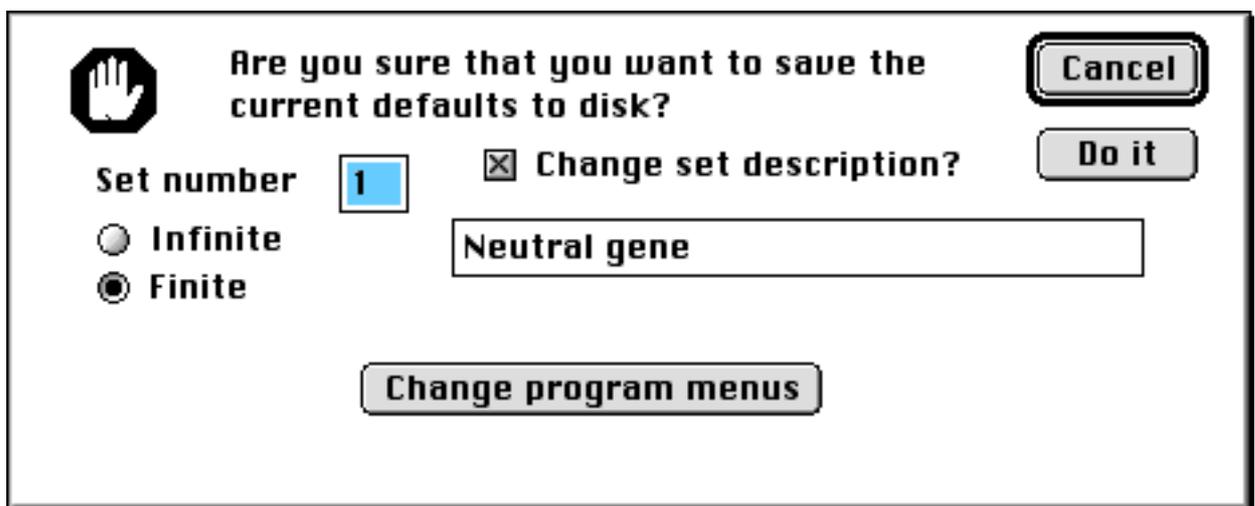
Click the **Do it** button to change the default values to whatever parameters you have set.

Note that the program stores separate parameters for the 'infinite' and 'finite' models. If you wish to change both sets, you will need to go through the operation of setting parameters and accessing the **Set defaults** item twice.

In addition to the nominated selection models, there is a 'default model', which is in place if **Choose set** is not activated. In other words, if a student starts up the program and goes immediately to the various parameters items, the default set will be shown. This set can be edited as Set 0. If the **Set defaults** item is accessed before the **Choose set** item, it is this default set which is edited.

The **Set defaults** menu also allows you to change the model name(s). To do this, click on **Change set description**, edit the name, and click **Do it**. You can also edit the model number, e.g. if you wish to add a new model. Up to ten models can be set, and the **Choose set** screen automatically adds new models to the screen or deletes them if there is no model name.

Note that if you check **Dim command** and then click on **Do it**, the **Set default** command will still be accessible. However then next time the program is started up it will be inaccessible. So only the copy of the program provided to students should have the command dimmed.

Saving output to disk

By default, the program allows students to save the results of simulations to disk. The output is tab-delimited, so that it can be read into a spreadsheet program, plotted out and analysed.

The use of disks may at times cause complications, eg. if the program is run over a network. Therefore the option has been provided in the setup menu to disable this command.