

Creating and manipulating Mesquite morphological matrices

1. Double click the Mesquite icon; click *File->New*; a menu will appear asking you to name your “.nex” file. Name it anything you want, but make sure you leave the “.nex” on as the file extension. You can save the file anywhere, it does NOT have to be in the Mesquite program folder. Click *Save* when you are finished.
2. The **New File Menu** will appear. The *Make Taxa Block* box is already checked, so do not uncheck this. The name of the Taxa Block is *Taxa* and can be changed. You could change this to the name of the group you are working on (e.g., family, genus, etc.). You have the option of entering the number of taxa you will be working on. If you are unsure, you will be able to add/delete taxa later. Since we will be making a character matrix, you want to check the box next to *Make Character Matrix*. When you are done click *Ok*.
3. The **New Character Matrix** menu will appear. You can change the name or you can change the name later. You can enter the number of characters or add/delete characters later. The last option is selecting the type of data. Since we are going to be creating a morphological character matrix, select *Standard Categorical Data*. Click *OK*.
4. Your character matrix will now appear. If you want to add more characters or taxa (individuals), click (*Matrix->Add Characters*) or (*Matrix->Add Taxa*). If you want to delete taxa or characters, simply highlight those taxa/characters and select (*Matrix->Delete Selected Chars or Taxa*). If you want to change the name of your Taxa Block or Character Matrix, find them on the left-hand side, right-click and select *Rename Taxa Block* or *Rename Matrix*.
5. Next we will be entering taxon names, characters, and character states. First click the blue “i” in the bottom left-hand part of the screen. A new menu will appear to the right of your matrix. You will notice that if you move the cursor over your characters the menu on the right will change too. This menu allows you to name your characters and associated character states. To begin entering characters and states, first click the character number above the matrix (e.g., “1”). This will highlight the character column. Next, click the “cursor” button immediately to the left of the matrix. Now you can enter the name of the character and character states in the menu on the right. Once you enter your characters and character states you can scroll over the individual cells and Mesquite will display the character and character state info on the right. You can also edit characters and character states by clicking *Matrix->Edit State Names*. You can also enter character names, but **NOT** character state info, by selecting the *List & Manage Characters* on the left hand menu under Character Matrix. This will bring up your characters and if you select the “cursor,” you can alter the character names.

You can also enter notes for each cell (for a particular character for a taxon). This may be helpful if you want to add some notes or annotations, e.g., you want to recheck a character score or want to record why you chose a character state. Click the “arrow” button, and then highlight a character cell. Next, click the “cursor” button and this will allow you to enter information in the right-hand menu under the “Footnote” space.

To alter the font, click *Edit->Font* or *Edit->Font Size*.

6. There are two ways to enter taxon names. You can select the cursor button and write over the default taxon name in the data matrix. Another option is to click the *List & Manage Taxa* on the left-hand menu under the Taxa block. This will bring up your Taxa block, which lists your taxa. Here, you can select the cursor button and change the names the same way you did on the character matrix. Whatever changes you make here will automatically be made to your character matrix.

7. When looking at your character matrix, you will notice that the character state name is shown and not the character state (i.e., 0, 1, 2, etc.). In order to view just the character states, click *Matrix->Display->Show State Names*. The *Matrix->Display* option also offers ways to alter cosmetic features of your matrix, for example column and row width, diagonal/non-diagonal character state column, etc.

8. Next you will attach detailed notes and pictures for each character state. To do this we first need to click *Matrix->Show Annotations Panel*. The annotations panel will now appear on the right-hand side of the character matrix. To have the ability to alter the annotation panel, first select a cell of interest in the character matrix using the arrow button. Once selected, use the “arrow” button and select the “plus” button on the annotation panel. Once pressed, the fields will open and now data can be entered using the “cursor” button. Information such as comments, references, images, and author & modification dates can be entered. The author & modification date field is useful if you are working collaboratively on a matrix and passing Mesquite files back and forth. You have two options to attach a picture to a taxon-character state. You can either add a picture locally (aka pic is on your computer) or remotely (on a server at some web address). To add a pic locally, use the “arrow” button and select a character cell in your character matrix. In the annotation panel, select the “plus” button next to the word “Image.” A menu will appear on your screen that allows you to select a pic (image) on your computer. (Note: Mesquite is loading the link into the cell--**if you move the image to a new folder, Mesquite will not be able to track/display it.**) It may be a good idea to have a single folder of pictures only used for your character matrices. If you want to use pictures from a remote server, click the “blue-green” button to the right of the “plus button” and you will be prompted to enter a URL. Again, **if the picture is moved from its original folder, Mesquite will not be able to find and display the image.**

The instructions above provide a quick way to display character state pictures. There is actually an entire Mesquite module devoted to indexing images called *Silk*. It was created as part of the Spider Tree of Life project. You can find out more information about it at <http://mesquiteproject.org/packages/SILK/>.

9. To color-code character states in your character matrix, character states must be already entered into your character matrix. Once they are entered, click *Matrix->Color Matrix Cells->Character State*. (I am unsure how to change the default color settings).

10. To export a list of your characters and states, click *File->Export->Character/State Information*. To export your character matrix to run in MrBayes or PAUP, click *File->Export* and then the appropriate file format.