Preparing Scientific Image for Plate Creation in Adobe Photoshop CS2

These tutorials were created with the intent that students will be working on Windows computers with an operating system of XP or newer or an Apple computer with an operating system of OS X (10) or newer. There are very few differences between how things are done between the Windows and OS X systems, but every effort has been taken to let you know about the differences throughout this entire tutorial. The majority of the screen captures shown in this tutorial will be taken from the Windows environment so if you are working on an Apple computer, everything will look very similar, but with a slight variation. Major differences will be noted and explained.

Before you begin, you will need to obtain copies of the source files necessary to complete this tutorial from your instructor. He or she will explain the procedure in which to do this.

1. Preparing and Understanding the Adobe Photoshop Workspace
   a. Launch Adobe Photoshop CS2
      i. Windows users – Start > All Programs > Adobe Photoshop CS2
      ii. Apple Users – Click on the Adobe Photoshop CS2 icon within the dock.

   b. Throughout this tutorial, you will be working with various tools, options and pallets. To give you an idea of where everything is located, please view the graphic below.
      i. You will be repeatedly asked to go to such and such a menu throughout this tutorial. Menus are found at the very top of the screen.
      ii. The main tool bar is shown at the left side of the screen. Notice that some of the tools have a small black triangle in the bottom right corner. This denotes that there are more than one tool stacked up underneath the one currently being shown. If Adobe showed each tool by itself, the tool bar would take up way too much screen real estate. You can view the additional tools by (left) clicking and holding on any of the icons. Later in the tutorial we will be using the measure tool as shown below.
      iii. Once you have selected a tool in the tool bar, the options for that tool are shown at the top of the screen.
      iv. Lastly, more extensive options and important information can often be found within the floating pallets shown at the right of the screen.
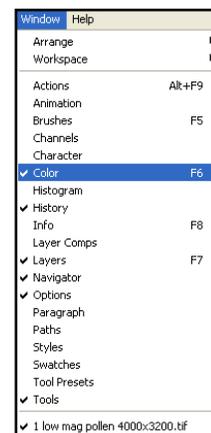
c. Resetting the Workspace
  i. To assure that everyone is starting from the same point with the same settings applied to all of the tools and options within the software, we need to reset the software interface. This is especially important if you are working on a computer that is not yours, such as in a public lab. You never know what kind of crazy settings the last user was using.
  ii. Go to the WINDOW menu and from the drop down choose and click on DEFAULT WORKSPACE. Your screen will reset itself to the default workspace that Adobe deems "out of the box". This is a very important step because you will need to navigate to many different areas of the interface to successfully complete this tutorial. Starting from the same defaults will assure that you will be able to locate everything need be.

d. What's on the menu? – This section is intended to show you where the majority of things that you will be asked to work with appear within the workspace.
  i. From the FILE menu, choose OPEN.
  ii. Navigate through your hard drive to the folder that holds the tutorial images that were provided to you.
  iii. Choose the *low mag pollen 4000x3200* image. Click OPEN.
  iv. There are many of the floating pallets that we will not be using for this exercise, so in order to rid ourselves of some clutter, we will close the floating pallets that we will not need. This is done by returning to the WINDOW menu and turning off the check marks that indicate whether the specific floating pallet is to show or not. A check mark next to a word indicates that the pallet is showing, while no check mark indicates that it is not showing. For our needs today, you will want to have the HISTORY, LAYERS, PARAGRAPH and TOOLS pallets all showing (checked). Uncheck any of the other pallets to hide them. You can then rearrange and stack up the pallets so that they are all on the right hand of your screen in order to see as much of the l*ow mag pollen 4000x3200* image as possible.
  v. The most commonly used menu items for your needs will be the following…
    1. File – Open, Close, Save As, Save, Print
    2. Edit – Undo, Copy, Paste
    3. Image – Mode, Adjustments, Images Size, Rotate Canvas
    4. Layer – New, Layer Style, New Adjustment Layer, Flatten Image
    5. Select – All, Deselect
    6. Filter – Sharpen
    7. View – Zoom In & Out, Extras, Show, Rulers
    8. Window – Workspace reset, which pallets show or don't show
  vi. From the FILE menu, choose CLOSE and if prompted, DO NOT SAVE CHANGES.

e. Template Creation
  i. From the FILE menu, choose NEW
  ii. Type in a name for your final plate
  iii. For WIDTH enter the number and unit of measurement at directed in the specification sheet that you are working from.
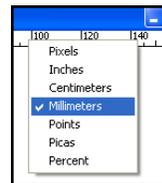 iv. Enter the HEIGHT in the same manner
    • NOTE - In older versions of Photoshop, you may have to change the units of measurement independently.
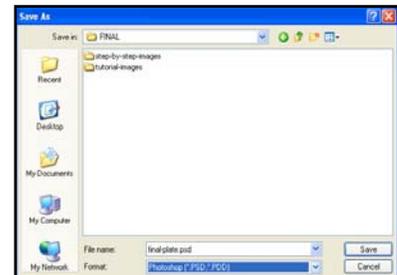 v. Set the RESOLUTION number as directed on the spec sheet making sure that the unit is set to PIXELS/INCH.
  vi. Set the COLOR MODE accordingly. For this tutorial we are working with GRAYSCALE in 8 BIT MODE.
  vii. BACKGROUND CONTENTS should be set to WHITE.
  viii. Click OK to create the document.
  ix. If they are not already showing around the border of your newly created image window, you will need to turn the RULERS on. Do this by going to the VIEW menu and click on RULERS to activate the CHECK MARK.
  x. With the rulers now showing, make sure that they are set to the designated unit of measure that you wish to work in per your specification sheet, in this case, millimeters. To do this on a Windows computer simply RIGHT-CLICK on the ruler itself and choose MILLIMETERS from the drop down menu. On an Apple computer, you will need to hold down the CONTROL KEY near the bottom left of your keyboard and then CLICK on the ruler and choose MILLIMETERS from the drop down menu.
  xi. SAVING OFTEN is something that you will want to train yourself to do in order to avoid losing a lot of very detailed work should there ever be a power outage or error thrown my the computer that you are working on.
  xii. To save your document, go to the FILE menu and choose SAVE AS. Navigate to the place on your hard drive that you wish to store this file and set the FORMAT to *Photoshop (*.PSD, *PDD)* which is the first choice in the drop down menu. CLICK OK to save the document.
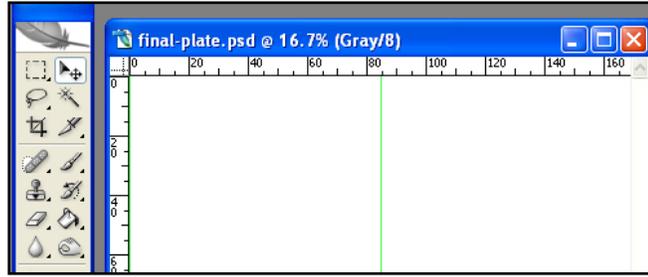 xiii. Setting Guides – Your specification sheet will likely designate some sort of recommended grout/gutter/spacing between images within the plate that you are creating. The easiest way to measure these is to use Photoshop's GUIDES. If your specs do not call for a grout, it is recommended that you set just the center guide in order to align your images correctly into a two column format.
    1. Do the math to come up with whatever ½ of the width of your document is. Make a note of this number.
    2. Choose the MOVE tool from the toolbar.
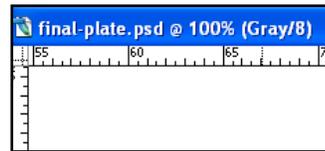   3. Left-click on the RULER and hold.

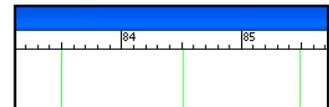4. Drag slowly to the right and you will see a colored line appear on the screen. Continue dragging this line to the approximate center of the image (the number you wrote down from #1). Keep an eye on the ruler as you continue dragging the line to get an idea of roughly where the guide should be set. Once you are close, let go of the mouse and it will lock that line into place. Don't worry if you think it's not precisely in the dead center. It is unlikely that you will nail the exact center during this process, unless it is a large round number that has a hash mark on the ruler that you can easily see.

5. To lock the guide into the exact center of the image, you will need to ZOOM IN so that you can see an enlarged scale of your document. Notice at the top of the document window, it shows a percentage. This percentage tells us that the image contains a lot more detail that we can work with if we simply zoom in. From the VIEW menu, choose ZOOM IN. You will see the image enlarge on your monitor. Repeat this ZOOM IN step until the percentage reads 100%. If you still can't find the appropriate hash mark on the ruler, continue zooming in until you can. Adjust the guide until it is set in the dead center of the width of the image.
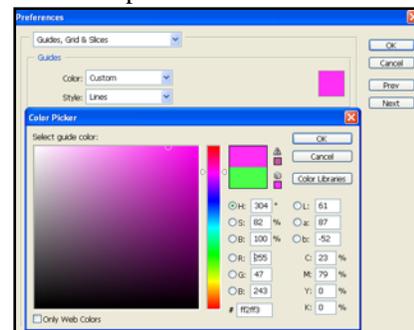
6. While still zoomed in to 100% or more, drag two more guides out of the ruler to designate the specified grout/gutter/spacing you need using the same method we just used for the center mark.
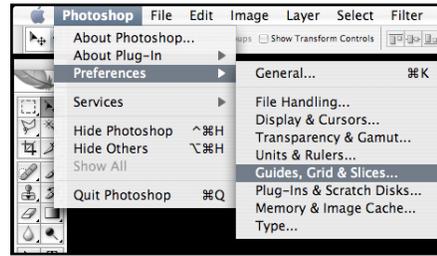
7. Once you have set these vertical guides, if for some reason you don't like the color that they have appeared in because it's not your favorite or maybe you are going to be working with color images and this color of line won't show up because they are too similar to the color of the image content, there is a way to change the color of them. It is common practice to pick something so horribly ugly that it would never be used in the images you add to this plate later.

   a. On a Windows computer, go the EDIT menu and choose PREFERENCES from the initial drop down menu and then GUIDES, GRID & SLICES from the secondary drop down. Within this window, you can choose the COLOR of the guides from the presets in the drop down menu or a custom color from the color picker. Click OK.
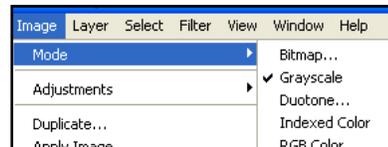
b. On an Apple computer, go to the PHOTSHOP menu at the top left of your screen and choose PREFERENCES from the drop down menu and GUIDES, GRID & SLICES from the secondary drop down menu. Within this window, you can choose the COLOR of the guides from the presets in the drop down menu or a custom color from the color picker. Click OK.

xiv. Saving your work …
1. For those of you playing along at home, now would be a great time to SAVE your work. From the FILE menu, choose SAVE.
2. AFTER SAVING the document, from the FILE menu, choose CLOSE to close the file. You will re-open it later when you are the point where you are ready to start inserting source images into this template.

2. Making Copies & Prepping Source Images
a. In order to assure that you do not accidentally make irreversible changes to your original image files, you are encouraged to SAVE COPIES of your source images. The process described in the following steps should be followed and repeated for each of your original source images.
b. From the FILE menu, choose OPEN.
c. Navigate to the folder the contains your source image, in this case, the file named *low mag pollen 4000x3200.psd* . Choose it and click OPEN.
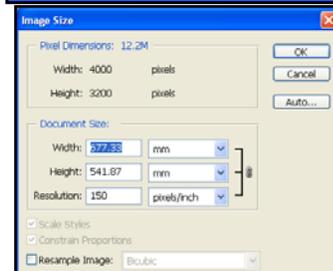d. Once the image has loaded onto your screen, proceed to the IMAGE menu and from the drop down choose MODE and then GRAYSCALE. You will likely be prompted with a follow up alert asking you if you want to discard color changes. If so, click YES. What we have essentially done so far is to convert the image mode / format that the microscopes are set up to capture into a grayscale or black and white version since that is what your spec sheet tells us it wants.
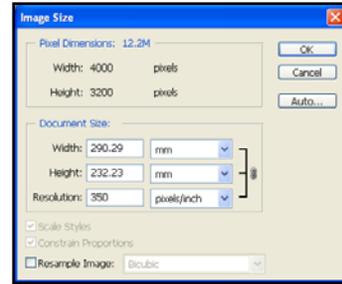
e. Now in the correct mode, we need to make sure that the image is converted to the correct output resolution per the publisher's specification sheet. From the IMAGE menu, choose IMAGE SIZE (not canvas size) from the drop down menu. You'll notice that the window shows the measurements of the image in both pixel count as well as in millimeters. It also shows that the image is currently set to work with at an output resolution of 150 pixels/ inch (ppi).
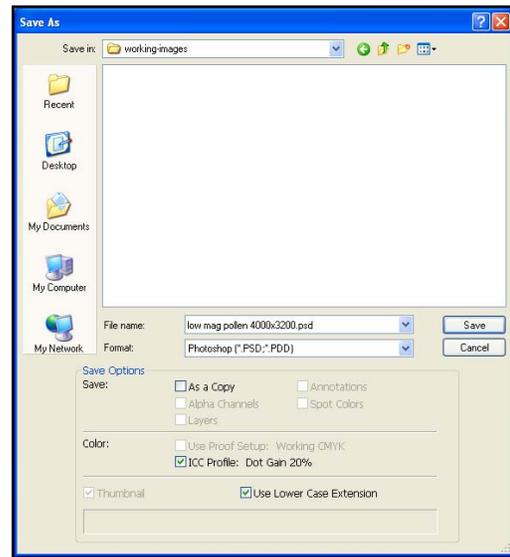f. In this very specific order … first make sure that both the SCALE STYLES and CONSTRAIN PROPORTIONS boxes are CHECKED. As soon as they are both checked, the areas will *gray out* on the screen.

g. Next, HIGHLIGHT the resolution number of 150 and type in the resolution specified by your publisher's specifications. You will notice that the numbers within WIDTH and HEIGHT change at the same time. What you are seeing is the manner in which the software resamples / reshuffles pixels within the image in order to allow to you print at varying resolutions and physical sizes. You have not added or deleted any pixels from this image at this point, rather just rearranged them to a different physical size and resolution to match that which is need for the publisher. If you noticed, the number of actual pixels did not change within the *pixel dimension* area of the window.

h. Click OK to make this change happen.

i. Now that the image is resized and adjusted in resolution, you need to save a working copy of this file that you will continue working with throughout this tutorial rather than working on the original image. Simply proceed to the FILE menu and choose SAVE AS from the drop down menu. When the *save as* window appears, it is suggested that you CREATE A NEW FOLDER and name it something to the effect of *WORKING-IMAGES*. Again, you are saving copies of the images so as to not do damage to the originals. Once this new folder has been created, NAME THE FILE and choose a format of *Photoshop (*.PSD, *PDD).* Click SAVE to save the file.
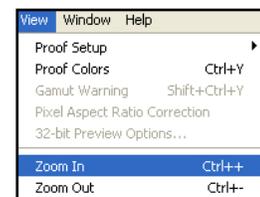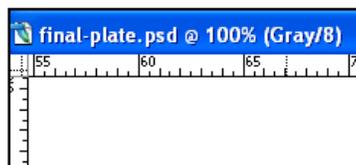
j. Repeat steps 2b – 2i on each of your original source images. Each of these images should be saved and closed before proceeding to step #3.

3. Defining Measurement Scale
    a. Open your copy of *low mag pollen 4000x3200.psd ,* the one that was resampled to 350ppi.
    b. Grab the MOVE TOOL from the tool pallet and click and hold and drag a guide out of the vertical ruler so that it approximately lines up with the far right side of the micrometer scale bar in the image. Drag another guide out of the vertical ruler and place it at the far left end of the micrometer scale. In the next step we will fine tune the placement of these guides.
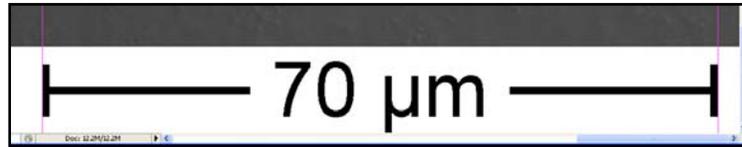   c. Since your image opened up at a "zoomed out" view of itself, you could only set the guides into an approximate place within the image. Go to the VIEW menu and choose ZOOM IN from the drop down menu. The image will change on the screen. Repeat this step until the top of the image window shows 100% as the scale view. Once it is 100% view, it represents a 1:1 ratio of the detail that will be in the final printed version of the file.

d. Now that the image is zoomed into and enlarged on the screen, you likely can't see the guides any longer. You can either use the window sliders to move to the bottom right portion of the image or you can click on the HAND tool in the tool pallet, then go into the image and click, hold and drag around to get to the same area.

e. Once you can see one or both of the guide lines, you can use the move tool

to adjust the placement of the lines to match the exact ends of the micrometer scale.

f. Now that your guides are in place, it is time to measure the scale to see how many millimeters = whatever number micrometers, in this case 70. Remember how we told you that Photoshop stacks tools on top of each other in the tool pallet? Well, this is the first instance of that. On the tool pallet, click and hold on the tool that looks like a turkey baster. It is actually called the eyedropper. From the drop down tools, choose the MEASURE TOOL.

g. The tool will appear as a crosshair with a ruler next to it. Move the tool overtop of the left most guide

so that it matches up perfectly on the vertical axis. Hold down the shift key and then click and drag over to the right hand guide. Holding the shift key assures that you will be drawing a perfectly straight line. Once you get to the far right guide, let go.

h. Look up towards the top left corner of the monitor and you will find the number that indicates how many millimeters are between the guides. This is listed as w: #. Make note of this number as you will need to know later how many millimeters (mm) = 70 micrometers.
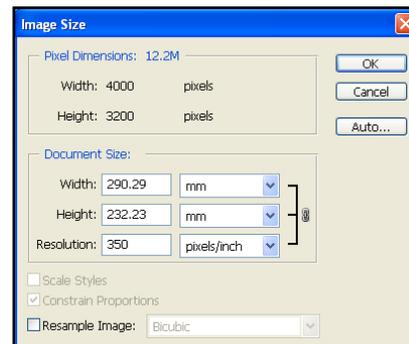

i. Save your image

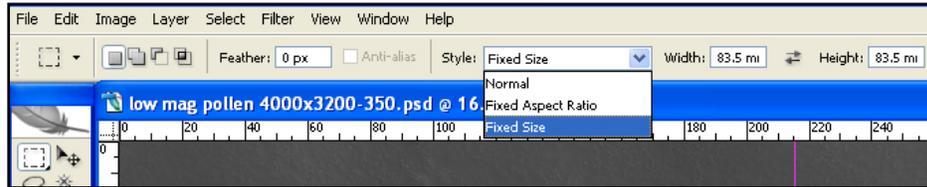4. Selecting the area of the image that you wish to place into the final plate.
    a. There are times when you will not want to include the entire image as framed within the microscope viewfinder. We will first work with an image in this manner and later on we will talk about how to use the entire image area.
    b. Still working on the same source image that you just measured in step #3 above, if you check the image size by going to the IMAGE menu and choose IMAGE SIZE, you find that the image at 350ppi measures 290.29mm wide. Since your final plate has a maximum half page width of 83.5mm wide, you find that you will only be able to take a portion of the entire frame and paste it into the final plate.
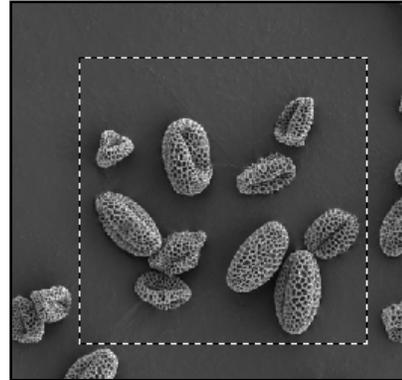

    c. Choose the RECTANGULAR MARQUEE TOOL from the tool pallet. As soon as it is selected, the OPTIONS BAR will reflect all of the choices available for this tool. Within the options bar at the top, we will set up the tool to select a certain portion of the image that we wish to use.

d. Set up the OPTIONS BAR exactly as it shows up in the example below with a feather of ZERO, a FIXED SIZE STYLE and a HEIGHT and WIDTH of 83.5mm. You HAVE to type in the MM to assure that you are working in the correct unit of measurement.

e. With these settings in place, simply move your cursor into the image area and CLICK ONE TIME. This activates the selection tool to select an exact 83.5 x 83.5mm selection for you to work with. You can move the selection around by moving the cursor within the selected area and clicking and holding. When you mouse over the box, the cursor turns into a white arrow, but when you click and hold, it turns black and you can then move the box so that it is surrounding the area of the image that you wish to work with.

f. If you think that you have selected a little bit more image area than you ultimately need by using the 83.5 x 83.5mm measurements, it's ok to edit the selection in height, but not in width. The width of 83.5mm assures it will fill the entire column of your plate template.
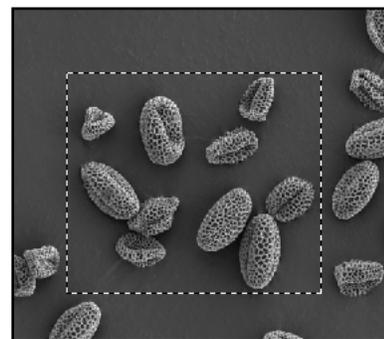
g. You can edit the height in two different ways.

    i. You could go back to the OPTIONS BAR and edit the height of the FIXED SIZE to a lesser number and then click again within the image to set the new size selection area …

    …or…

    ii. You can switch the STYLE of the selection back to NORMAL and then at the far left of the OPTIONS BAR, mouse over the THIRD FROM THE LEFT icon and click it to set the tool to SUBTRACT FROM THE SELECTION. When you move your cursor back into the image area, you will note that the tool crosshair has a MINUS SIGN next to it. This indicates that whatever you select will be removed from the current selection. All you have to do is draw a selection around the area that you wish to remove from the current active selection. When you let go, it will remove it resulting in a smaller selection area height wise, but the same in width.
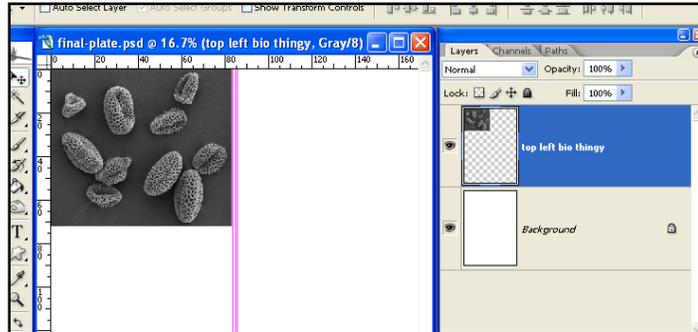

    iii. Once you have nailed down your selection, proceed to the EDIT menu and choose COPY from the drop down list.

    iv. Open your TEMPLATE document and from the EDIT menu, choose PASTE and the image will appear within the document.

    v. Click on the MOVE tool in the tool pallet to activate it and then click and hold on the newly pasted image to move it into place in the top left corner of the template. It should snap right into place, but if not, feel free to zoom into the image and use the arrow keys to bump the image into alignment.

     vi.   If the LAYERS pallet isn't already showing on the screen, go to the WINDOW menu and check it to make it appear.

    vii.   The pallet will reflect a white Background layer and a newly pasted LAYER 1. You'll want to rename this layer in order that things are kept as organized as possible so that if you need to come back later and make changes or edits, you can find the layer that you want to work on easily. Doubl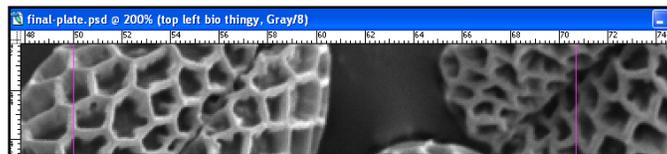e click on the words LAYER 1 and it will select the text and allow you to type in a more appropriate name for this layer. Once you have entered your new name, click ENTER/RETURN to apply the change.

    viii.   If at any point, you wish to move this, or any other layer, it is as simple as selecting the layer (highlighting it in the LAYERS pallet) and choosing the MOVE tool and then click and holding to move the contents around the screen within the constraint of the image window. Remember, you can also use the arrow keys to fine tune movement.

5. Creating the measurement bars
   a. Evaluate your image and decide how long of a bar you want/need and where you wish to place the measurement bars. It is best to keep them uniform in size, thickness and location if at all possible.
   b. Do the math to figure out how many mm = however many micrometers. In this case, 72.4mm = X micrometers so here's how to do that 'ciphering…
      i. 72.4mm / 70micrometers = 1.0342857mm per micrometer.
      ii. 1.0342857 x 20 = 20.685714 … rounded to 20.7 for our purposes.
   c. Making sure that your newly named layer is chosen in the layers pallet, grab the MOVE tool and drag a guide out of the VERTICAL ruler and 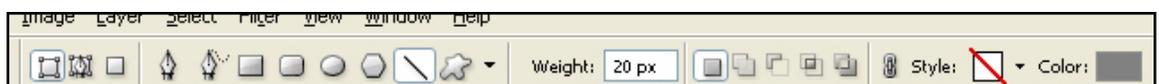place it so that it locks in on an even number. Remember to zoom in to an enlarged (100% +) view to fine tune the placement.
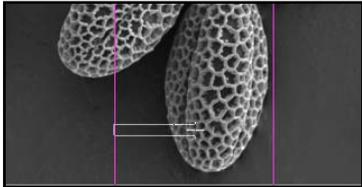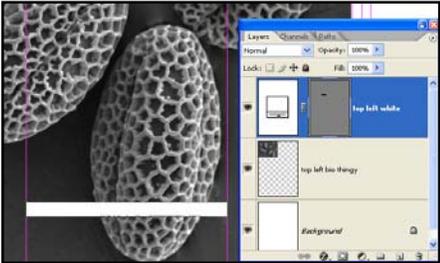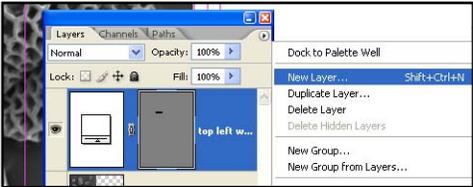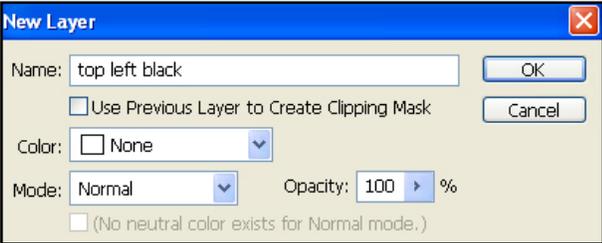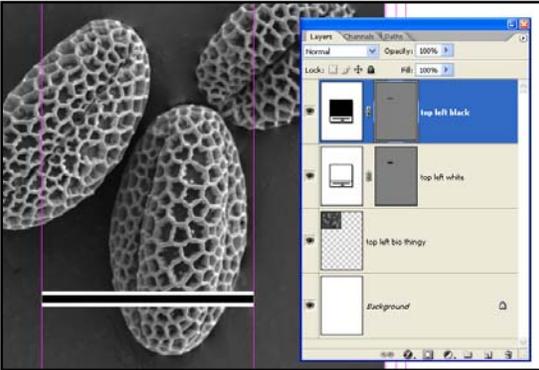   d. Drag another VERTICAL guide out of the ruler and lock it into place 20.7mm from the first one. This might take a little more zooming of the VIEW.
   e. From the TOOLS, click and hold on the RECTANGLE TOOL towards the bottom left of the pallet to show the tools stacked underneath it. From the drop down menu, choose the LINE TOOL.
   f. Within the OPTIONS bar at the top, set the WEIGHT to 20 px.
      i. Depending on the dimension and resolution of any specific image, the WEIGHT of your line may differ. Pick your weight visually by what looks "heavy" enough to show in the final plate.
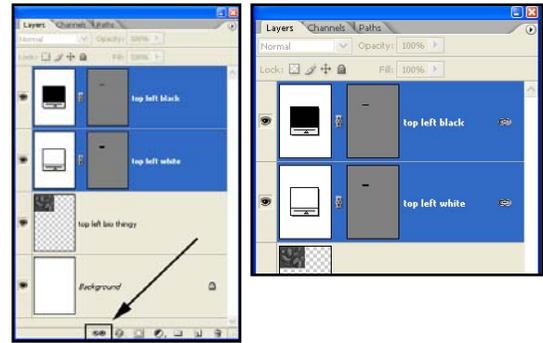   g. Click on the COLOR picker and set it to WHITE and click OK.
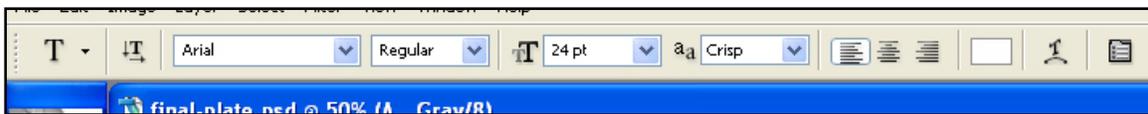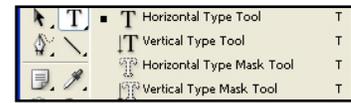   h. Make sure that the other options are set so that they reflect what is shown in the image below.

i.   For this image we are using a method which will show a combo black and white bar stacked on top of one another. In any given image or layer set, the issue of whether you will choose black or white first will be dependent on which will show better on any given image. White over black or black over white. The weight of the line can also be adjusted depending on your preference for how prominent it is within your final layout. Just be sure to be consistent in weights throughout the project.

j.   Place your cursor overtop of one of the guides that you drew in steps 5c & 5d.You will know that you are right on top of the guide when the cursor changes color. Once in place, HOLD THE SHIFT KEY and draw from the first guide to the second. Holding the shift key assures a perfectly straight line. As you draw, the line appears as an outline of sorts. Once you let go, it prompts the screen to update and show the line in WHITE as you intended.

k.   Note that your LAYERS pallet has updated itself to reflect the new line.

l.   DOUBLE-CLICK on LAYER 1 in the LAYERS pallet to change the name of it to something more appropriate.

m.   In the LAYERS pallet, make sure that you have the top most layer selected and then click on the small arrow near the top and choose NEW LAYER.

n.   When the NEW LAYER options box appears, name the layer appropriately and to reflect the rest of the settings as shown in the screen capture at the right in order to assure it shows up correctly in the final document.

o.   Return to the TOOLS and choose the LINE tool.

p.   From the OPTIONS BAR at the top, change the WEIGHT to 10 px and the COLOR to BLACK.

q.   Place your cursor over top of one of the guide lines and draw a line between them just like you did in 5j. It will turn black when you let go.

r.   Select the MOVE tool and then drag around or use the ARROW KEYS to move the black line on top of the white one and center it as best you can. You may want to zoom in to do this. Your LAYERS pallet will appear as it does in the screen capture to the right.

s. Once you have the two lines adjusted accordingly, the easiest way to deal with them is to link them together so that they move as one. To do this, simply click and highlight the top-most layer (top left black) and then while holding the SHIFT key, click on the other line layer (top left white).

t. With both layers highlighted, click on the LINK icon on the bottom of the LAYERS pallet. This links the layers into one object.

u. When the layers have been linked, they appear with a link icon on the right hand side of the preview within the layers pallet.

v. Lastly, choose the MOVE tool and move the two lines wherever you want them to appear in the final image layout. They don't have to sit right where you set the guides, rather the guides were just used as measurement assistants.
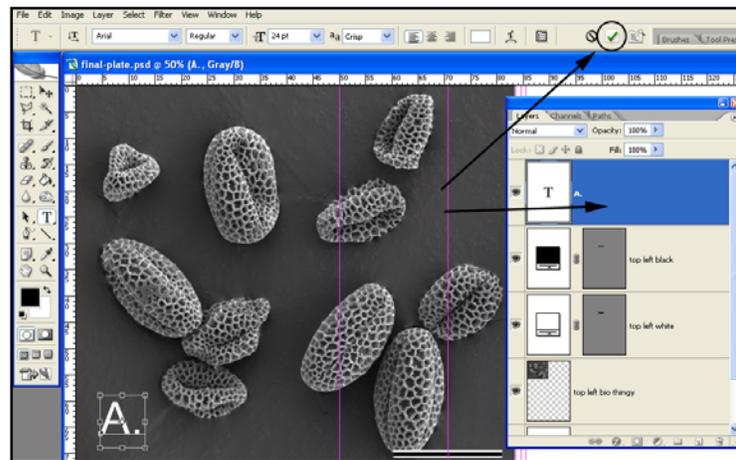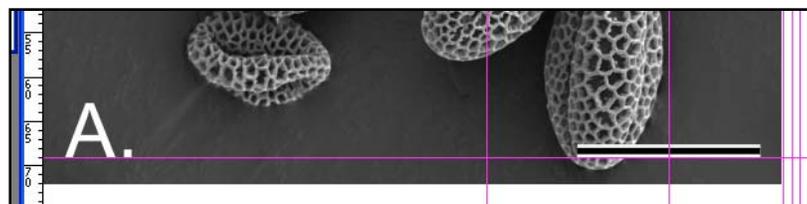
6. Adding Text

   a. Choose the HORIZONTAL TEXT tool from the TOOL pallet.

   b. Within the OPTIONS bar at the top, set the FONT, STYLE, SIZE, ANTI-ALIASING, ALIGNMENT & COLOR as shown in the screen capture below.

   c. Click your CURSOR (which will appear similar to the text tool) into the image area and a blinking line will appear.

   d. Type in whatever lettering you wish. (Keep all text uniform throughout the project) and then once you have the text entered, click on the CHECKBOX next to the NO SMOKING looking icon at the top of your screen to apply the text and settings. You'll notice in your layers pallet that a new layer was automatically created for the next text so that if you ever wish to return and edit the text you can do so by clicking on the layer and editing it with the text tool
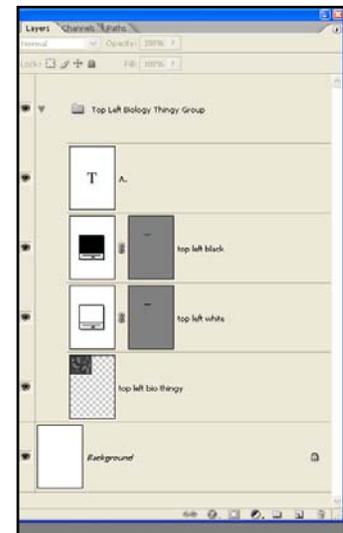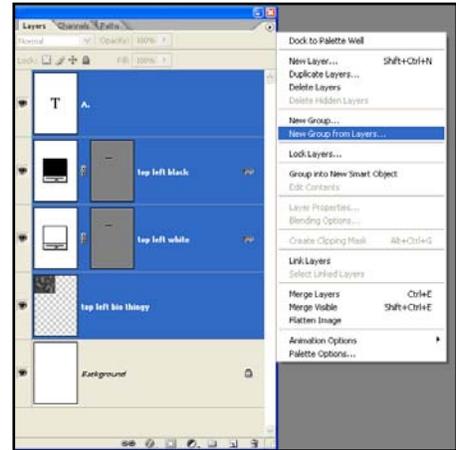
   e. You can move this text layer anywhere in the image window using the MOVE tool or the ARROW KEYS. If you really want to be meticulous about their placement, you can drag a guide out of the HORIZONTAL RULER wherever you like and then move the measurement bars and text to sit on it.
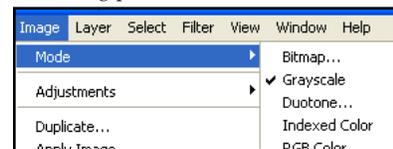
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7. Creating a Group
   a. With the many layers as have been created and the many more that will be for other portions of the final image, you are going to end up with A LOT of layers in your final image. Wouldn't it be nice if there was a way to group the various "sections" into their own grouping? Woo Hoo! There is!
   b. Within the LAYERS pallet, click on the TOP MOST LAYER to highlight/activate it. Then while holding the SHIFT key, click on bottom-most layer, NOT including the BACKGROUND layer to highlight all of the layers at once.
   c. Click on the small black triangle at the top right of the pallet and choose NEW GROUP FROM LAYERS from the drop down menu.
   d. In the window that pops up, NAME the group something logical, set the COLOR to NONE, MODE to NORMAL and OPACITY to 100%. Click OK.
   e. Looking back into the LAYERS pallet, you will notice that there has been a new group created. You can open the GROUP by clicking on the triangle icon. You can work on any layer within the group by selecting it. Turning the EYEBALL icon on and off on the entire group or any layer within the group designates whether that item shows or not. Everything that was linked is still linked, it's just that now all of the items for that top left corner are now dumped into one easy to find and navigate folder.
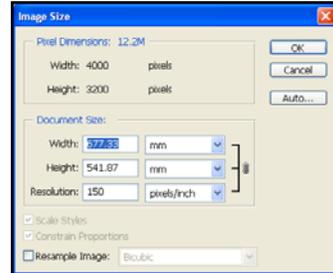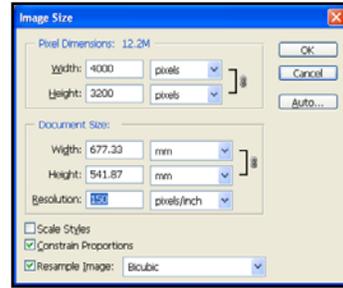   f. Save your image. Close your image.

8. What if you want to use the ENTIRE image area that you captured in the microscope and not just a portion of it?
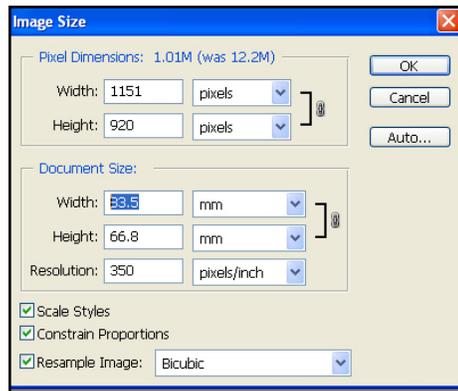   a. That's right … everything changes … pixels, resolution, measurements, etc. This portion of the tutorial will be very similar to the previous section, but PLEASE follow along in a very detailed manner as some portions are VERY different and not following along could prove disastrous in your final image.
   b. From the FILE menu, choose OPEN. Navigate to your folder of "original images", the ones that were taken and saved directly off of the microscope. Re-open your source image, in this case *"low mag pollen 4000x3200"*
   c. Once the image has loaded onto your screen, proceed to the IMAGE menu and from the drop down choose MODE and then GRAYSCALE. You will likely be prompted with a follow up alert asking you if you want to discard color changes. If so, click YES.
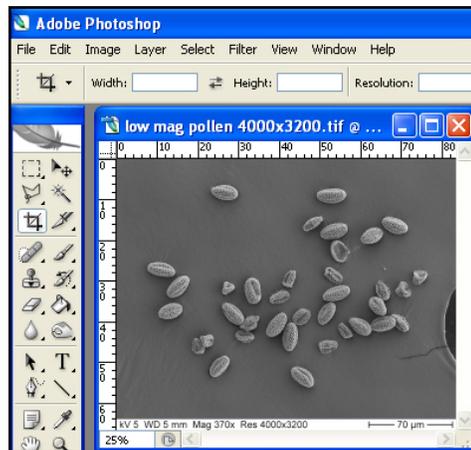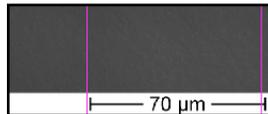
d. Now in the correct mode, we need to make sure that the image is converted to the correct output resolution per the publisher's specification sheet. From the IMAGE menu, choose IMAGE SIZE (not canvas size) from the drop down menu.

e. Make sure that both the SCALE STYLES and CONSTRAIN PROPORTIONS boxes are CHECKED. UNCHECK the RESAMPLE IMAGE box. The PIXEL DIMENSION area will *gray out* on the screen.

f. Next, HIGHLIGHT the resolution number of 150 and type in the resolution specified by your publisher's specifications, again in this case, 350ppi. Click OK to make this change happen.

g. Now that the image in the correct output resolution, we need to work on the physical dimension adjustments, but remember, we are going to use the ENTIRE image area this time.

h. From the IMAGE menu, choose IMAGE SIZE again. Within the options window, first TURN ON (CHECK) the RESAMPLE IMAGE box (BICUBIC), The CONSTRAIN PROPORTIONS and SCALE STYLES boxes should still be checked. Now that those are active, we will change the physical dimension of the image by highlighting the WIDTH and changing it to 83.5mm. Click OK to make this change. The image will adjust it's viewing accordingly on your monitor (shrink).

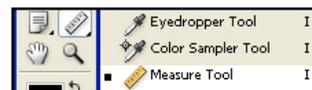i. Use the VIEW menu and the ZOOM IN option to make the image appear larger on your monitor.

j. Grab the MOVE TOOL from the tool pallet and click and hold and drag a guide out of the vertical ruler so that it approximately lines up with the far right side of the micrometer scale bar in the image. Drag another guide out of the vertical ruler and place it at the far left end of the micrometer scale. Remember that in order to nail the precise edges, it is best work on the image at a view of 100% or more.

k. Now that your guides are in place, it is time to measure the scale to see how many millimeters = whatever number micrometers, in this case 70. From the TOOLS pallet, select the MEASURE TOOL. If you don't remember from earlier, click and hold on the tool that looks like a turkey baster. It is actually called the eyedropper. From the drop down tools, choose the MEASURE TOOL.
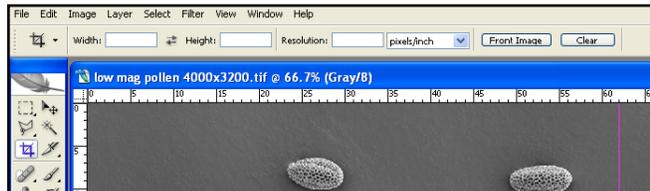
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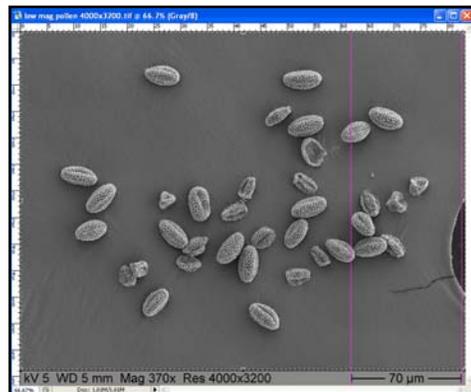l. The tool will appear as a crosshair with a ruler next to it. Move the tool overtop of the left most guide

so that it matches up perfectly on the vertical axis. Hold down the shift key and then click and drag over to the right hand guide. Holding the shift key assures that you will be drawing a perfectly straight line. Once you get to the far right guide, let go.

m. Look up towards the top left corner of the monitor and you will find the number that indicates how many millimeters are between the guides on the x axis which is listed as the WIDTH. Make note of this number as you will need to know later how many millimeters (mm) = 70 micrometers, in this case, 20.8mm.

n. Now that you are set with your new measurements, we need to crop the image to only the portion that we wish to use in our final layout. Basically, get rid of the data that is shown at the bottom. We do this by CROPPING the image. From the TOOLS bar, select the CROP TOOL. Within the OPTIONS BAR at the top of the screen make sure that each of the fields is CLEAR. If for some reason numbers appear in the width, height or resolution boxes, click the CLEAR button to dump this information.
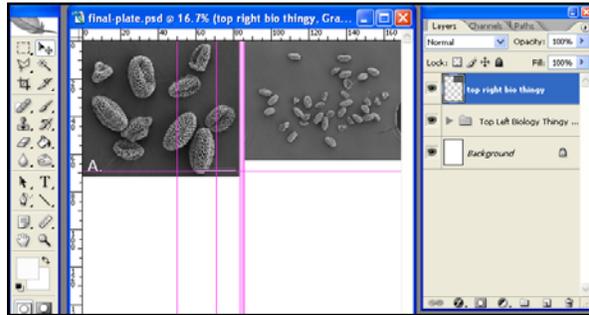

o. Move your crop tool into the image area. Click and hold in the top corner of the image area and drag down to the bottom right corner and select everything except the white bar with the letters and numbers in it at the bottom of the image. What you are doing is selecting the area that you want to KEEP and anything outside of this selection area is going to be deleted. When you let go, you'll notice that the area that is going to be deleted is GRAYED OUT to indicate such. If you need to adjust the crop at all, you can use the ANCHORS surrounding the selection

area to make fine tuned adjustments. Once you are happy with the selected area to crop, simply click the CHECK MARK at the top of the screen to make it take affect. The screen will update itself accordingly to show you the new image area.
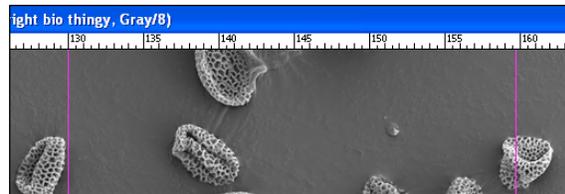

p. From the SELECT menu, choose SELECT ALL. A selection area shows up around the entire image area. From the EDIT menu, choose COPY.

q. Re-Open your final layout image.

r. With that final layout image open and active, make sure that the GROUP that you created earlier is highlighted in the LAYERS pallet, then from the EDIT menu, choose PASTE to paste the image into the layout. This will assure that the newly added layer is ON TOP of the previously created group and not part of it. Use the MOVE tool or the ARROW KEYS to nudge the newly pasted image into the top right corner of your layout so that it fits within the column guides set earlier.
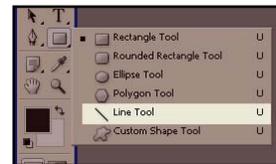

s. Double click on the layer name (LAYER 1) and change the name of it to something more appropriate as you have done for previously created layers.

t. Now we need to insert some guides to reflect a new measurement scale line that equals 100micrometers because we are now working with a much different scale of image. Find the note you jotted down as to how many mm = 70micrometers in this case. That's right, 20.8mm

u. Do the math to figure out how many mm = however many micrometers. In this case, 20.8mm = X micrometers so here's how to do that ciphering…
   i. 20.8mm / 70micrometers = .2971mm per micrometers.
   ii. .2971 x 100 = 29.71 … rounded to 29.7mm for our purposes.

v. Grab the MOVE tool and drag a guide out of the VERTICAL ruler and place it overtop of this image that you just inserted so that it locks in on an even number. Remember to zoom in to an enlarged (100% +) view to fine tune the placement.

w. Drag another VERTICAL guide out of the ruler and lock it into place 29.7mm from the first one. This might take a little more zooming of the VIEW.
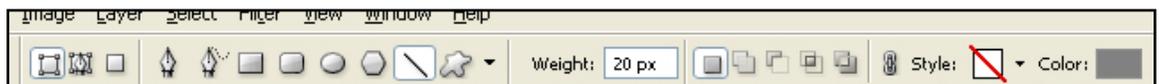

x. From the TOOLS, click and hold on the RECTANGLE TOOL towards the bottom left of the pallet to show the tools stacked underneath it. From the drop down menu, choose the LINE TOOL.
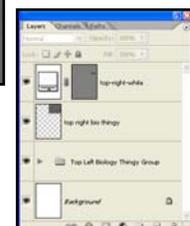
y. Within the OPTIONS bar at the top, set the WEIGHT to 20 px.

z. Click on the COLOR picker and set it to WHITE and click OK.

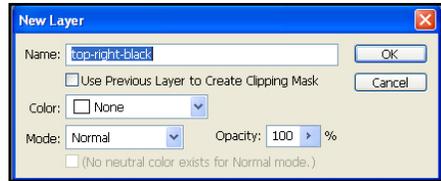aa. Make sure that the other options are set so that they reflect what is shown in the image below.

bb. For this image we are using a method which will show a combo black and white bar stacked on top of one another. In any given image or layer set, the issue of whether you will choose black or white first will be dependent on which will show better on any given image. White over black or black over white. The weight of the line can also be adjusted depending on your preference for how prominent it is within your final layout. Just be sure to be consistent in weights throughout the project.

cc. Place your cursor overtop of one of the guides that you drew in steps 8v & 8w. You will know that you are right on top of the guide when the cursor changes color. Once in place, HOLD THE SHIFT KEY and draw from the first guide to the second. Holding the shift key assures a perfectly straight line. As you draw, the line appears as an outline of sorts. Once you let go, it prompts the screen to update and show the line in WHITE as you intended.

dd. Note that your LAYERS pallet has updated itself to reflect the new line.

ee. DOUBLE-CLICK on LAYER 1 in the LAYERS pallet to change the name of it to something more appropriate.

ff. In the LAYERS pallet, make sure that you have the top most layer selected and then click on the small triangle near the top and choose NEW LAYER.

gg. When the NEW LAYER options box appears, name the layer appropriately and to reflect the rest of the settings as shown in the screen capture at the right in order to assure it shows up correctly in the final document.
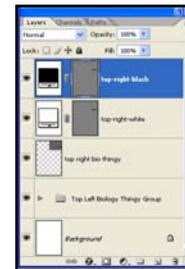
hh. Return to the TOOLS and choose the LINE tool.

ii. From the OPTIONS BAR at the top, change the WEIGHT to 10 px and the COLOR to BLACK.

jj. Place your cursor overtop of one of the guide lines and draw a line between them just like you did in 8cc. It will turn black when you let go.
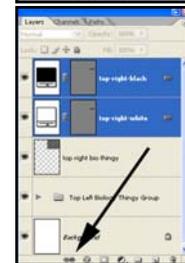
kk. Select the MOVE tool and then drag around or use the ARROW KEYS to move the black line on top of the white one and center it as best you can. You may want to zoom in to do this. Your LAYERS pallet will appear as it does in the screen capture to the right.
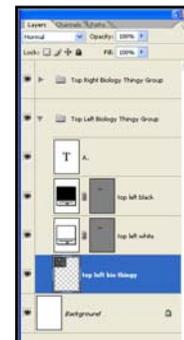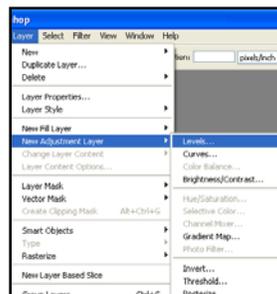
ll. Once you have the two lines adjusted accordingly, the easiest way to deal with them is to link them together so that they move as one. To do this, simply click and highlight the top-most layer (top right black) and then while holding the SHIFT key, click on the other line layer (top right white).

mm. With both layers highlighted, click on the LINK icon on the bottom of the LAYERS pallet. This links the layers into one object.
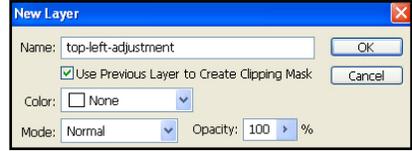
nn. When the layers have been linked, they appear with a link icon on the right hand side of the preview within the layers pallet.

oo. Lastly, choose the MOVE tool and move the two lines wherever you want them to appear in the final image layout. They don't have to sit right where you set the guides, rather the guides were just used as measurement assistants.
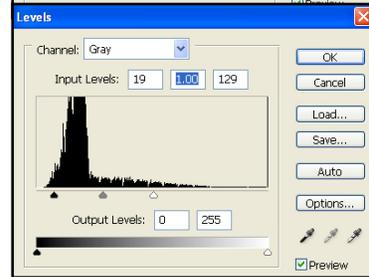
9. Follow steps six and seven to add labels and create a group for this portion of the image.

10. Repeat each of the skills and steps that you have done to this point to prep, insert, label and group the additional images and content that you wish to make part of your final plate.

11. SAVE OFTEN.

12. Once you have all of the images prepped, inserted, labeled and grouped into your final plate, we need to make sure that the images reproduce correctly in print in regards to the contrast, brightness or color balance as appropriate.

a. Select the MOVE tool.
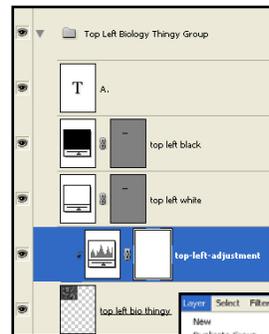b. Within the LAYERS pallet, open a group by clicking on the small triangle at the lefthand-most side of the GROUP layer. Each layer within that group will then reappear.
c. Click on the image layer within that group.
d. From the LAYER menu at the top of the screen click and choose NEW ADJSUTMENT LAYER from the drop down menu and then LEVELS from the sub-menu.
e. A NEW LAYER dialog box will pop-up. Name the layer appropriately, CHECK the "Use Previous Layers to Create Clipping Mask" box, set the color to NONE, mode to NORMAL and opacity to 100%.
f. Click OK and the LEVELS option box appears. This box shows us the amount or value of the various shades within the image. The area that you want to concentrate on is the center of the box and the three sliders within it. The BLACK slider represents the SHADOWS or darkest areas of the image. The WHITE slider represents the HIGHLIGHTS or the lightest areas. The GRAY slider represents all of the shades between black and white known as the mid-tones. In this example, it shows that there are a LOT of dark shadow areas of the image, but not a lot of mid-tones or highlights. You can adjust this range by simply sliding the controls around until the image looks like you want it to on the screen. Realize that the sliders are linked together in that if you move one, it affects the others as well. You may need to tweak each multiple times before you get the "look" that you want. As long as you have the PREVIEW box in the bottom right corner of the pallet CHECKED, the changes will reflect in your plate in real time.
g. Once you have achieved the look that you want, go ahead and click OK to make the adjustments take hold. You will notice in the LAYERS pallet that yet another layer has been created. This is a "mask" of sorts that applies the adjustments over each of the layers in that group that are underneath the adjustment layer. The beauty of adjustment layers is that you can return to these adjustments as many times as you wish and tweak the sliders a little if the image is appearing to light, dark, contrasty, whatever. You do this by simply double clicking on the little mountain looking icon on that adjustment layer. Make sure it's the mountain looking icon and not the blank white area.
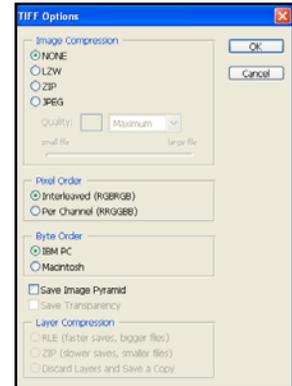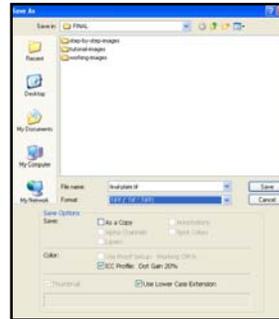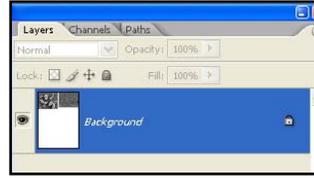h. Repeat all of step 12 for each of the images within your final plate.

13. SAVE your work. To this point you have been saving your work as a .psd file which holds all of your layers as part of the file. You ALWAYS want to save your working document in this file format to assure that if need be, you can return to any given layer and make adjustments if necessary.

14. When you are COMPLETELY DONE with all of your prep, inserting, labeling, adjusting, etc. you will need to save a version of your image into whatever file format that your publisher requires. Most file formats do not support the inclusion or saving of these many many layers. To avoid

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problems, you will want to save another version of your image into the format which is requested by the publisher, in our case .TIFF.

    a. FOLLOW CLOSELY or you will lose all of your layers and a LOT of work.

    b. With your final plate active, proceed to the LAYER menu at the top and from the drop down menu, choose FLATTEN IMAGE. If you watch your LAYERS pallet, you will notice that all of your layers disappear.

    c. From the FILE menu, choose SAVE AS, choose a location to save this new version of your image, name it appropriately, and choose the requested file format from the drop down menu. Click SAVE. A dialog box will appear.

    d. Within this box, set the IMAGE COMPRESSION to NONE, PIXEL ORDER to INTERLEAVED RGB RRB and the BYTE ORDER to IBM PC. Click OK.
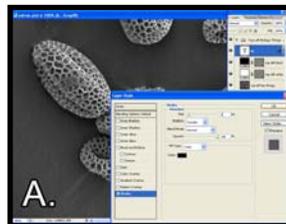
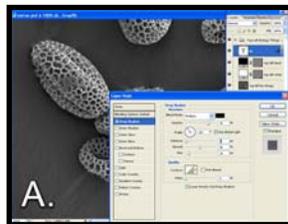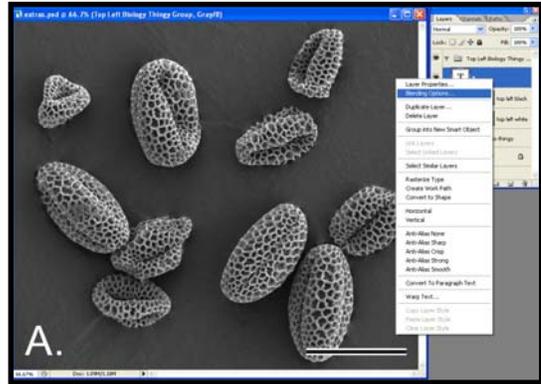15. Congratulations! You have created your first plate from start to finish. Take your newly found knowledge … run away … run fast … put it to good use before you forget it! Don't lose your handout. We've already killed a lot of trees, so if you lose your copy, you're on your own to make another. Go … go now … put your new skills to good use and learn to understand it well enough to tweak it for your own needs.

Extras

1. Text Effects – At times, depending on the brightness of the image, the contrast of the color of letter as it hovers overtop of a background images, you may find it necessary to add some sort of text effect to assure that your labels stand out accordingly. There are many possibilities, but the two most common would likely be a DROP SHADOW or a STROKE to enhance the text.

    a. With your LAYERS pallet showing, make sure that you have the specific TEXT layer selected that you wish to work with.

    b. RIGHT CLICK or CONTROL CLICK on the layer within the LAYERS pallet and choose BLENDING OPTIONS from the drop down menu.

    c. Once the blending options appears, CHECK THE BOX and highlight the words of the blending option that you wish to work with. The choices for each show up and allow you to adjust them to your specifications. Make sure that the PREVIEW BOX is CHECKED within the blending options in order to see real time updates to the text. See examples below.
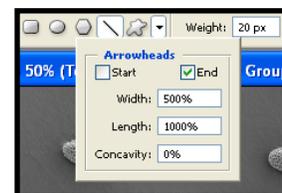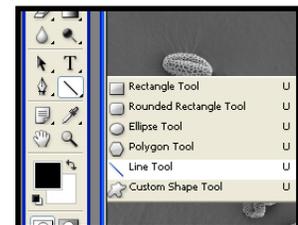
    d. In order to assure consistency in labeling, it is recommended that you use the same BLENDING OPTIONS to enhance all of your text uniformly. Fortunately, there is an easy way to copy the options, known as LAYER STYLES, from one layer to another.

        i. RIGHT CLICK or CONTROL CLICK on the layer that has the style you want to copy and choose COPY LAYER STYLE from the drop down menu.

        ii. CLICK on the TEXT LAYER that you wish to copy the style to and then RIGHT CLICK and choose PASTE LAYER STYLE from the drop down menu. The style is automatically applied to your text.
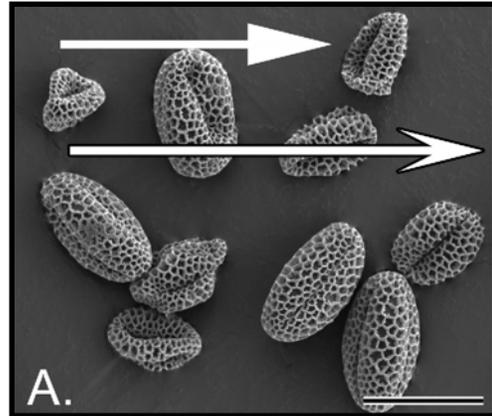
2. Arrows – You may run across a time in which you would like to point out something specific within an image. One common way to do this is using arrows. Here's how to create arrows …

    a. Choose the LINE TOOL from the tool pallet.

    b. Once the LINE TOOL is selected, proced to the top to the OPTIONS BAR and set the WEIGHT of the arrow line to 20 px. This can of course be adjusted to your visual preference. The WEIGHT of the line can also be thought of as the THICKNESS.

    c. Click on the small drop down arrow just to the left of the WEIGHT to set up the "look" of your arrow. Below are example of various settings for reference sake. Again, it is best to use a consistent style and color of arrows throughout your document as best you can.

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d. If you are working on a color image, you can change the COLOR of the image within the options bar.
e. Just like text, you can also apply BLENDING OPTIONS or LAYER STYLES to any arrow.
f. Below are samples of various settings that you may wish to start with and adjust from there.
   i. Top Arrow - Width 500%, Length 1000%, Concavity 0%
   ii. Bottom Arrow – Width 500%, Length 1000%, Concavity 50% (with layer style applied)

3. Resolution vs. Dimension
   a. Resolution
      i. Resolution is the QUALITY of the image.
      ii. Resolution is measured in PIXELS or DOTS PER INCH (ppi / dpi). The biggest difference between a pixel and a dot is that a pixel is a hard edged element while a dot is rounded off. PIXELS are what make up images when they are viewed onscreen, dots are what are sprayed onto paper with ink. For all intensive purposes, the phrases DPI and PPT are interchangeable.
      iii. The more pixels per inch, the better PRINT OUT will look.
      iv. Screens, monitors, etc. are actually very low quality devices and require a much lower resolution than is needed for printing images.
      v. Images that are to be viewed onscreen only are generally created at 72 – 96ppi/dpi.
      vi. Images that are to be printed out have a great range of quality depending on the output device you are using from 150ppi/dpi to 1200. Your publisher/printer will give you a target resolution to work with. Within the tutorial, you'll learn how to convert/resample pixels in the proper way.
      vii. Just because an image looks good on screen, doesn't mean it will print out well. Each of these images would look great on the monitor, but the two examples below show the images in print format which is what you are ultimately working towards. Basically, the more pixels in a square inch, the smoother and higher quality the print.
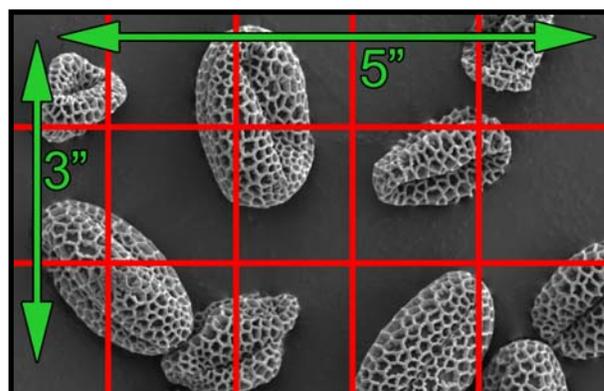

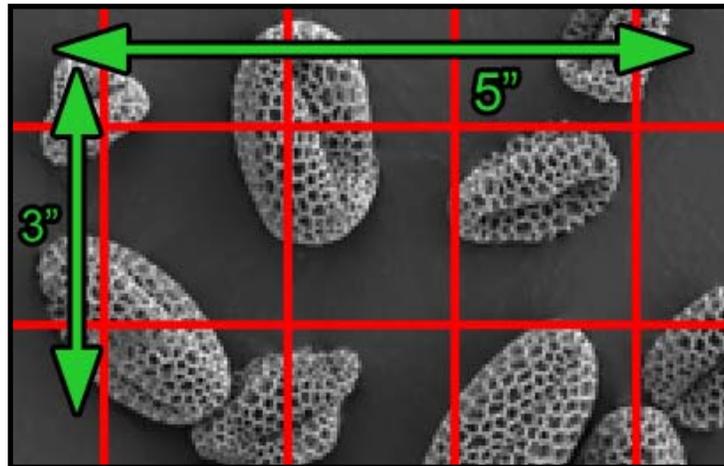FIGURE 1: 3x5 inches with 350 pixels in every

square inch.

FIGURE 2 - BELOW: 3x5 inches with 72 pixels in every square inch.
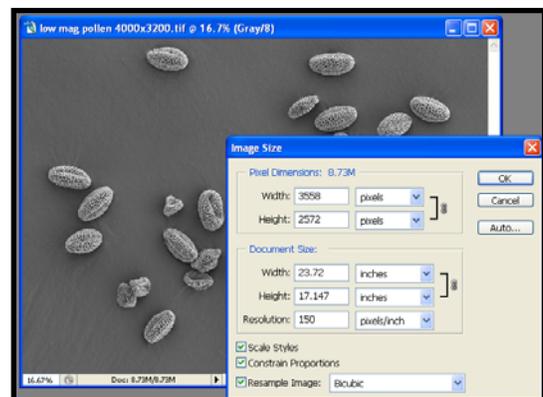
  b. Dimension
      i. The dimension of an image can be measure in either pixels or a number of other units.
      ii. The images above are listed as being 3: x 5".
      iii. FIGURE 1 – The image is 5" wide and has 350 pixels in each square inch which when multiplied means that the image is also 1,750 pixels across. Likewise, 3" x 350ppi would mean that the image is 1,050 pixels tall. So, in the long run, 3x5" @ 350ppi is the same as saying that they image is 1,750 x 1,050 pixels.
      iv. That said, it stands to reason that in FIGURE 2 which is 3x5", at a lower quality of 72ppi, that the image is 360 pixels wide x 216 pixels tall.
      v. In print, the 350ppi image would look better on paper as you can see by the example figures.

4. Resampling / Reshuffling of Pixels
   a. Depending on the hardware that you are using, it will produce different dimensions and resolutions (quality). Understanding the do's and don't of working with these specifications is very important both scientifically and quality wise, but ethically as well.
   b. Each of the examples below is showing the options available to you under the IMAGE menu and the IMAGE SIZE option within it.

      i. The image are the right shows the PIXEL DIMENSIONS, DOCUMENT SIZE and the RESOLUTION of our sample image. Notice that there is a direct connection between the resolution and the document size in inches to the pixel dimensions. 23.72 x 150 = 3,558 pixels. Same for the height.
      ii. The file size of the images at this size and resolution equals 8.73mb.
      iii. Out specifications call for a RESOLUTION of 350ppi/dpi. You SHOULD NOT just go into the IMAGE SIZE options and switch the resolution to 350. You CAN NOT add pixels to an image after it has been created. What was recorded

is what you have to work with, period. You can however reshuffle the pixels that exist to the quality that you need. This is not throwing away or adding pixels, it's just reworking the ones that are already there.

iv. If you TURN OFF the RESAMPLE IMAGE check box, you'll notice that that you are still allowed to change the DOCUMENT SIZE, but the PIXEL DIMENSIONS are grayed out. So, knowing that you have a 23.72" x 17.147" and a resolution of 150, it stands to reason that if you need to increase the resolution that the physical size of the document has to change accordingly.

v. Of you change the RESOLUTION to twice what is there right now, you will see that the physical dimensions of the document are cut in half. The number of PIXELS at the top do not change at all. Rather, it stays the same because we have not added or deleted any pixels.

vi. We used exact double and half math for this example, but the same concept holds true no matter what resolution you switch it to, Photoshop automatically reshuffles the pixels to the max size that it can at whatever resolution you wish to input.