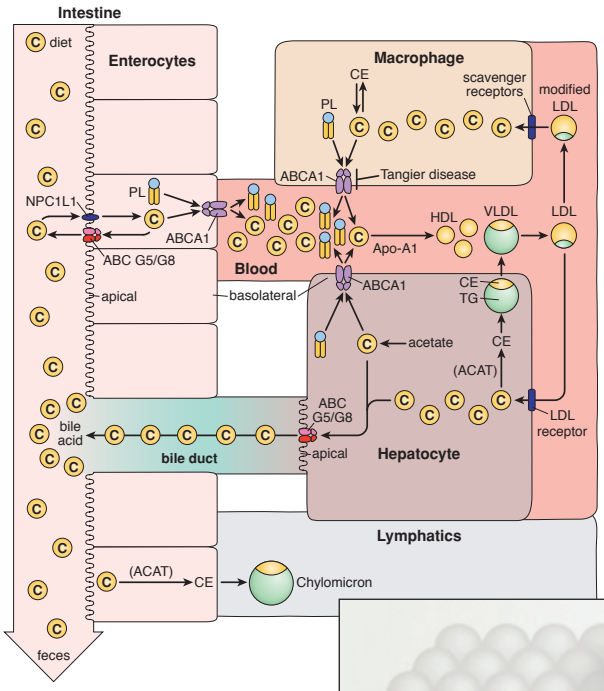
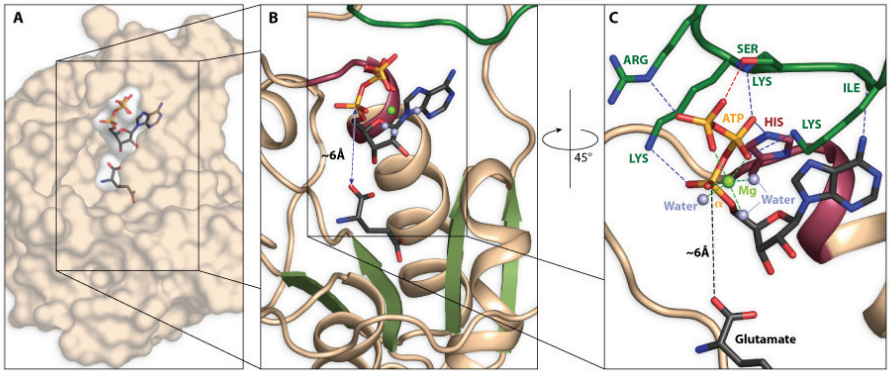
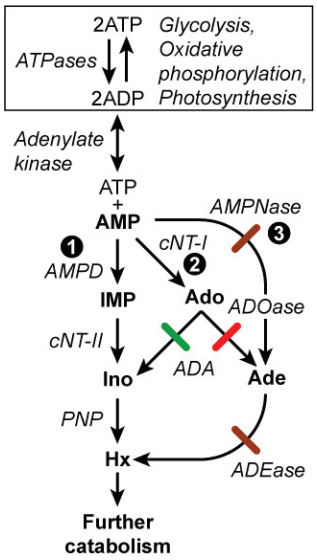
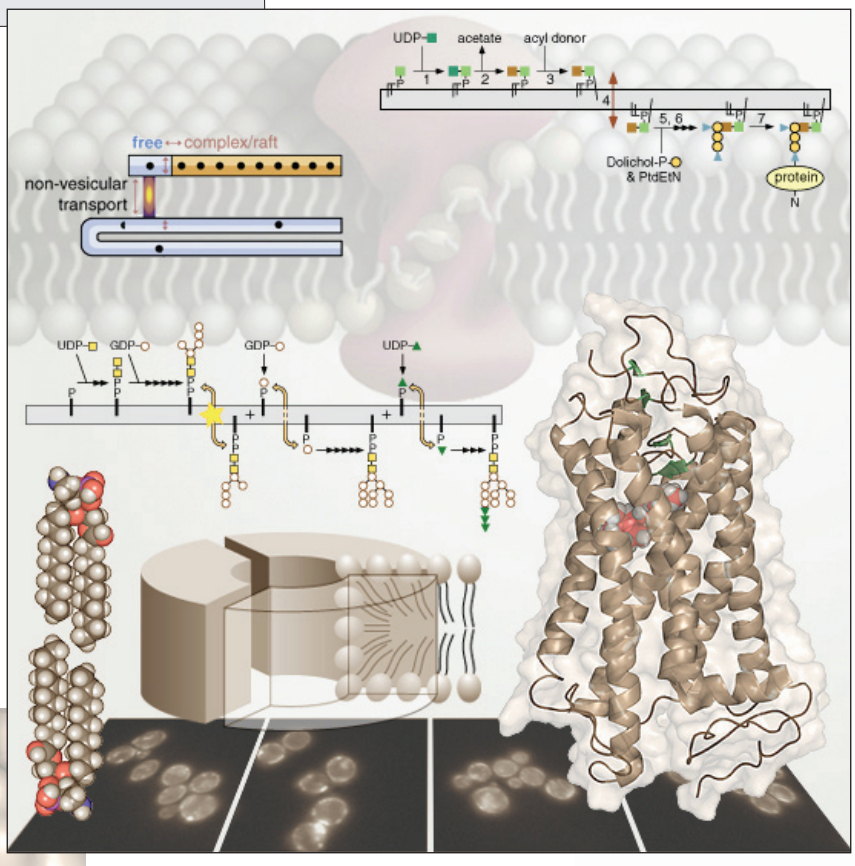
Scientific Illustrations 101

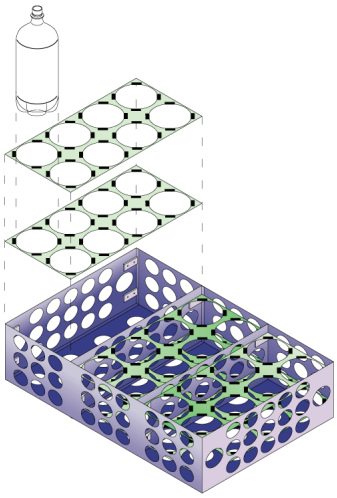
Journals – Talks – Posters

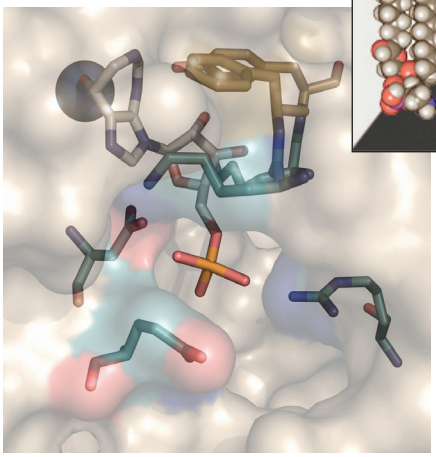


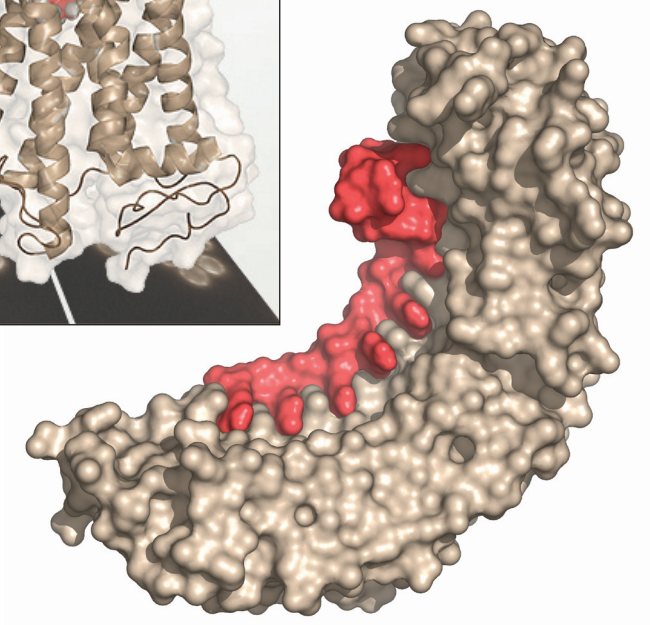












Ten tips for great scientific illustrations

1. **Know your audience.**
   Don't illustrate what they already know, **clarify** what they don't.
2. **Tell your story.** Started here (hunch), did this (experiments), and ended up somewhere (conclusions). Keep the components (colors, shapes, views, etc.) consistent from illustration to illustration.
3. **Create interest** and stimulate **imagination**.
4. **Control:** move the reader through the illustration
   Left to right, top to bottom.
5. **Color:** only when necessary, use it to direct focus.
6. **Humor:** but only if appropriate to the subject matter.
7. **Human:** add face, hand, body, etc. humans love to see humans.
8. **New ideas:** require simple illustrations.
   Let the idea take focus not the illustration.
9. **Technical text** = technical graphic, add parts or sections to clarify.
10. In general, **never use the defaults**, they are always WRONG!

Never hesitate to invest in good graphics. They pay for themselves by clarifying your research and data to those around you.

Convert your "My Molecule" talk into a poster

Poster size is:
43" Wide x 30" High.
Instructions begin on page 39, you can create your poster in Adobe Illustrator, Apple Pages or Microsoft PowerPoint

The "My Molecule" Poster should be submitted to the Media Center for printing:
http://jobboard.biochem.wisc.edu/ (or bring it on a USB Flash Drive) by 12/09/2008.

You must hang your poster in the main hallway of the 1998 Biochemistry Addition by 9:00 AM on 12/11/2008. Please pick any of the available boards and display. If you need thumbtacks you can get some from your lab or the Media Center.

Scientific Illustrations 101

Brought to you by the Information Technology & Media Center (ITMC)
Department of Biochemistry, University of Wisconsin, Madison, WI 53706

In this tutorial you will learn the following:

My Molecule poster due dates ..... Facing page
Ten tips for great scientific illustrations ..... Facing page and Handout
PyMOL default atom colors ..... Handout
Color basics – what, where and why? ..... Handout
Vector vs. Bitmap, two kinds of image file formats 2
Basic Adobe Photoshop 3
Basic Adobe Illustrator 7
Adobe Illustrator - Graphing 13
Google Image Searching 17
Google Scholar 18
NCBI (National Center for Biotechnology Information) searching 20
Images from Journals (using PubMed and HighWire) 22
Images from PDF files 29
Correctly inserting images into Microsoft PowerPoint 27
Creating poster in Adobe Illustrator 39
Five general rules for poster layout and presenting poster information 44
Printing your poster 46
Creating a poster in Microsoft PowerPoint 47
Converting a PowerPoint talk to a PowerPoint poster 53

You can also find these and other tutorials on our web site:
http://www.biochem.wisc.edu/medialab

Please call with any questions during the day,
7:30 AM to 5:30 PM – main phone number: 262-0622
Email all three of us
medialab@biochem.wisc.edu

H. Adam Steinberg
Senior Artist, Scientist
adam@steinbergs.us
265-4982

Laura Vanderploeg
Senior Media Specialist
vanderploeg@biochem.wisc.edu
262-5114

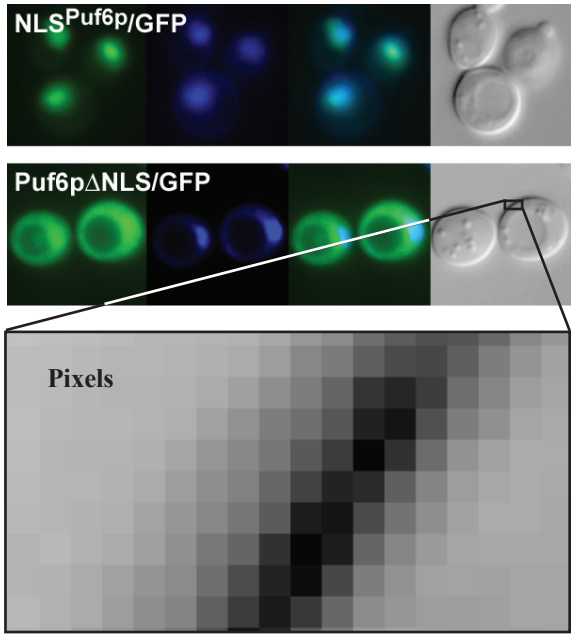
Robin Davies
Media Specialist
rodavies@wisc.edu
262-5116

ITMC
(The Information Technology & Media Center)
Room 401
433 Babcock Dr
Madison, WI 53706

There are two kinds of Images – Bitmap & Vector

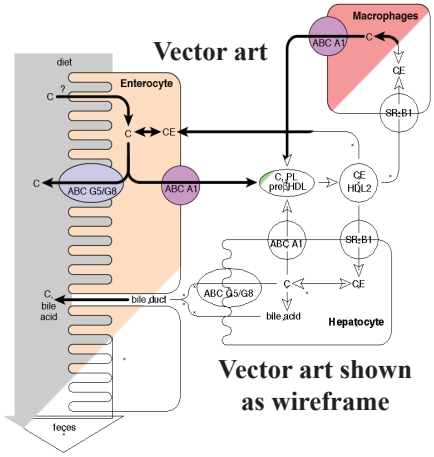
Adobe Photoshop - Bitmap

- Scanned images
- Files created in Adobe Photoshop, Adobe Elements, CorelDraw, etc.
- Made of pixels that represent an image
- Pixels are always shades of gray
- Color images are layered grayscale files
  - Three channel layers in a RGB file
  - Four channel layers in a CMYK file
- Bitmap files are resolution (dpi or ppi) specific
- Should not be scaled up, pixels may become visible
- Can be scaled down through interpolation and resampling
- Cannot contain vector information but may be saved as postscript files (PDS, Photoshop native files may contain vector information)
- Some bitmap images can be heavily compressed
- File formats are: PS, EPS, PDF, TXT, TIFF, BMP, PCX, and PICT
- Web file formats are: JPEG, JPEG2000, GIF, PNG



Adobe Illustrator - Vector (Postscript)

- Computer files created from lines, fills and text
- Written in postscript language
- Files created by Adobe Illustrator, Deneba Canvas, CorelDraw, ClarisWorks, etc.
- Can be scaled to any dimension and still look good
- Sometimes the files are large, poor compression
- May contain bitmap information
- PDF files are a form of Postscript.
- File formats: PS, EPS, PDF, and TXT (may be ASCII or binary)



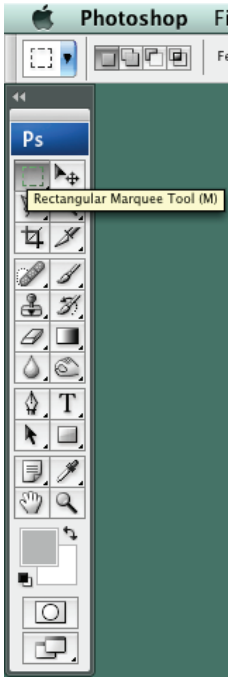
Basic Adobe Photoshop

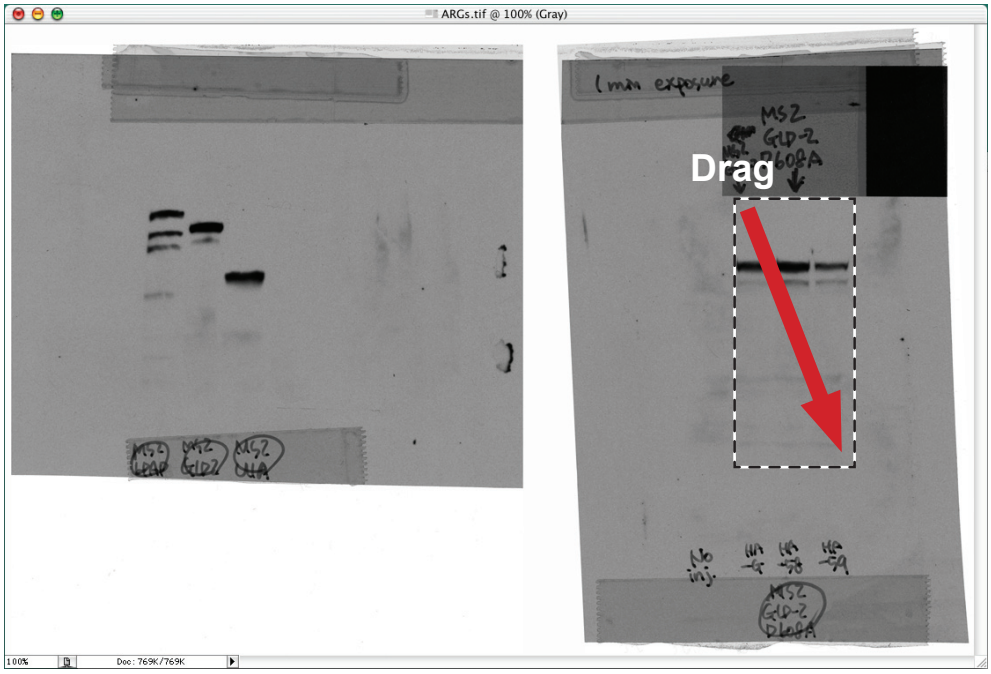
You will learn the following:

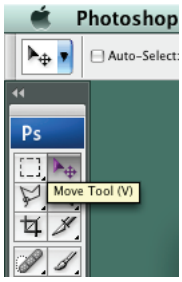
How to select areas with the Rectangular Marquee Tool
How to move areas with the Move tool
How to crop images
How to adjust an image histogram using Levels

Rectangular Marquee Tool

1. Open Adobe Photoshop. On the Macintosh move the mouse to the dock (at the bottom or left of the monitor) and click on the program.
2. Open the file ARGs.tif and we will combine the three lanes in the right ARG with the three lanes in the left ARG.
3. Click on the Rectangular Marquee tool. Notice if you hover over any tool in the toolbox (without clicking it) that a yellow highlight will appear with the name of the tool. This works in all Adobe and Microsoft programs.
4. Drag a box over the three lanes on the right ARG by clicking in the upper left and dragging down to lower right, just like it is shown in the example below. If you do not get the area you want with the first try, click on the image outside of the marquee area and it will deselect. Then redraw another more accurate marquee window.

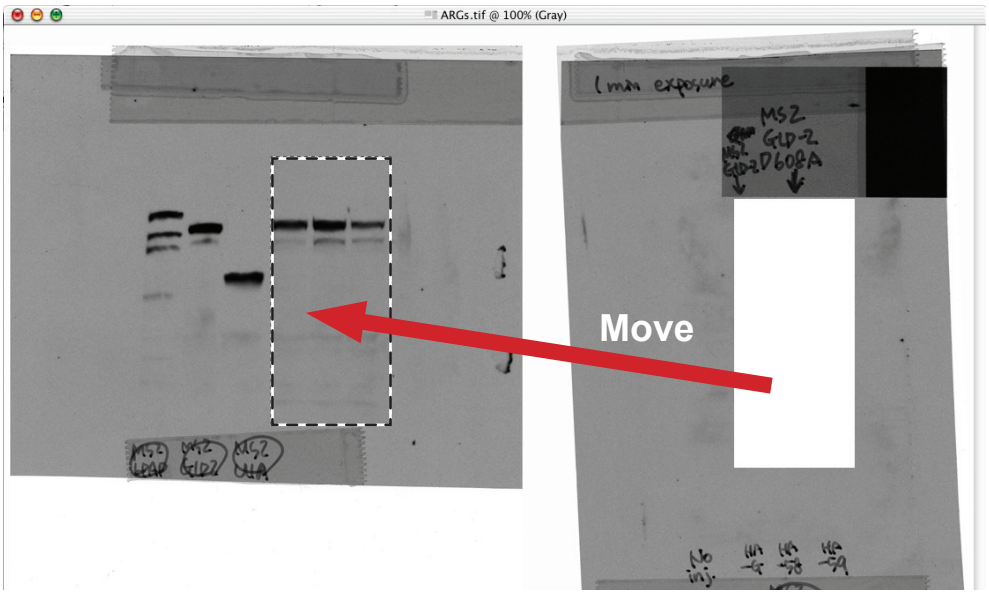


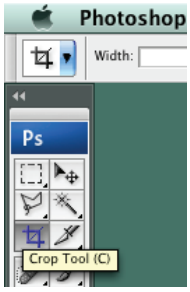




Move tool

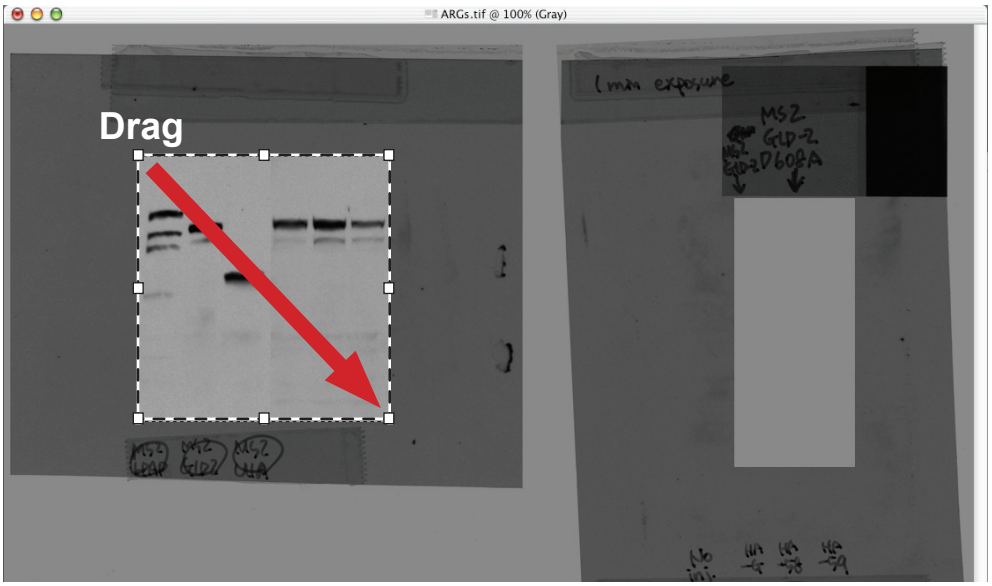
5. Click on the Move tool.
6. Click and drag on the marquee area with the Move tool to move the right lanes over to the left lanes, Align the dark top bands from the right ARG with top dark band in second lane on the left ARG (see image below). If you hold down the option or alt key while you drag the selection you will make a copy of the selection instead of cutting it out.





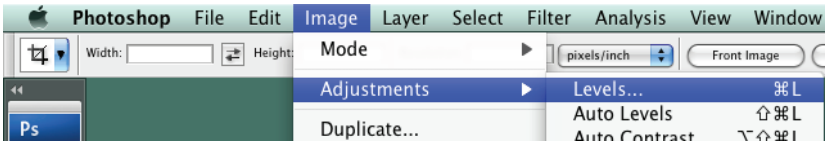
Crop tool

7. Click on the crop tool.
8. Click anywhere on the image to deselect the marquee selection.
9. Drag the Crop tool over all six lanes (the area you want to keep) from upper left to lower right. The non-selected image area will darken. Notice the little squares in the corners and the centers of the outside lines of the crop area? You can click and drag on those squares to reshape the crop area.
10. Hit the Return key or double-click the Crop tool inside the cropped area to crop the image.

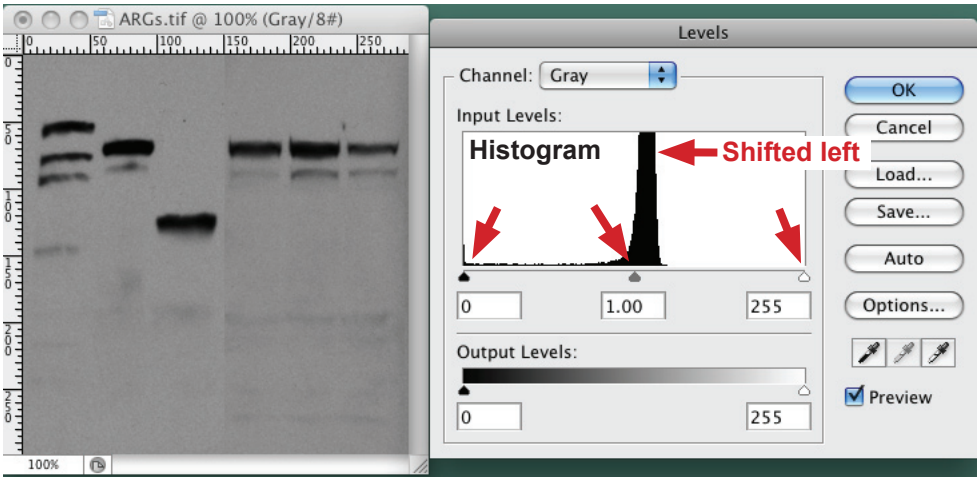


Levels adjustment

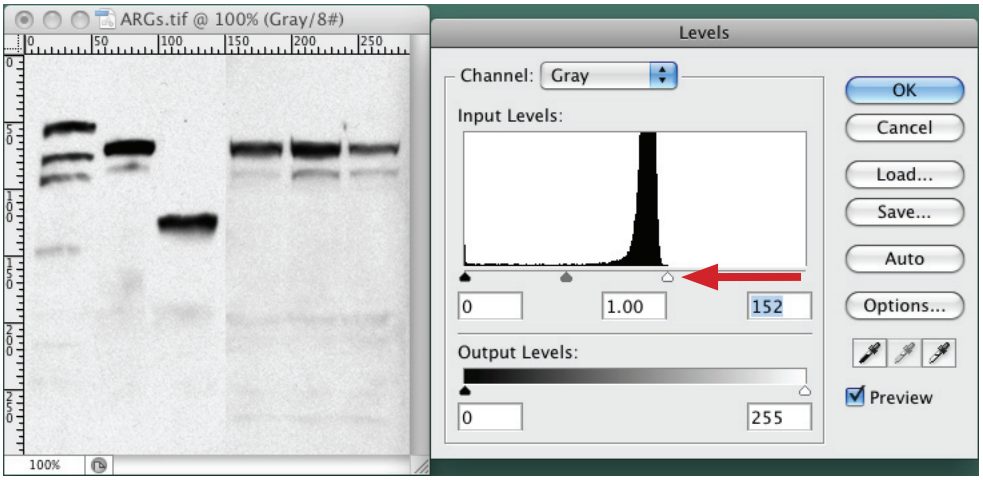
11. Open: Image–Adjustments–Levels.



12. Notice that the histogram representing all of the pixels in this image is shifted to the left.



13. Look at the three small triangles under the histogram.
    Left arrow - Black triangle: represents the number of pixels that are displaying at 100% black.
    Middle arrow - Gray triangle: represents all of the pixels that are displaying at 50% black.
    Right arrow - White triangle: represents all of the pixels that are displaying 0% black (these are the white pixels).
    The ARGs.tif file looks dark because all of the pixels that are supposed to be displayed at 0% black (white) are shifted to ~55% black. Slide the white triangle left (0% black) over to the right end of the histogram and then click OK (see example below). Notice how the image lightens and correctly displays the pixels at the their correct brightness level? If you open the Levels window again you will see that the histogram now correctly represents the pixels in the image. Most of the pixels of the image are light in shade and so the large "hump" in the histogram is in the 5 to 30% white (0% black) region.
11. You may save the file with new name to the desktop.



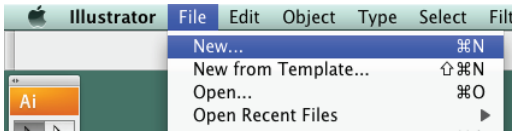
Basic Adobe Illustrator

You will learn the following:

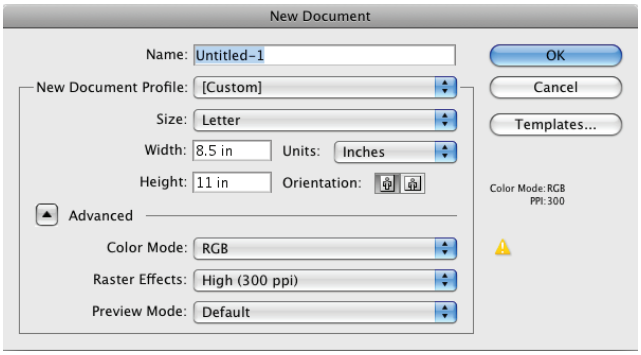
RGB vs. CMYK
Placing images or text
Zoom Tool and View menu
Character palette
Paragraph palette
Type Tool
Constrain and copy shortcuts
Transform and Duplication
Moving objects with the Arrow keys
Black vs White selection tools
Rectangle Tool
Fill and Stroke
Basic Graphing

RGB vs. CMYK

1. Open Adobe Illustrator.
2. Choose File–New.

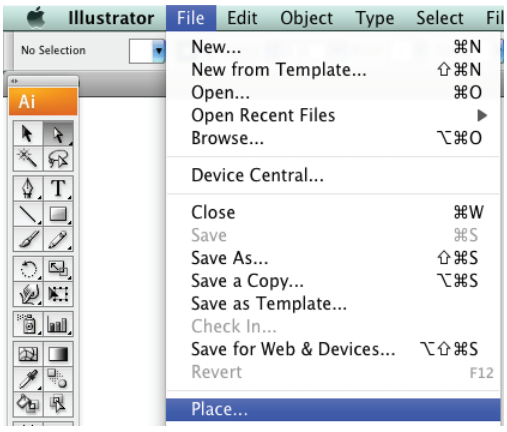


You will be presented with a New Document dialog box. Choose RGB for the Color Mode. Almost all of the files you create with Adobe Illustrator will be done as RGB files. RGB files are used in PowerPoint presentations, Posters and on the web, CMYK files are used for journal printing only.



Place command

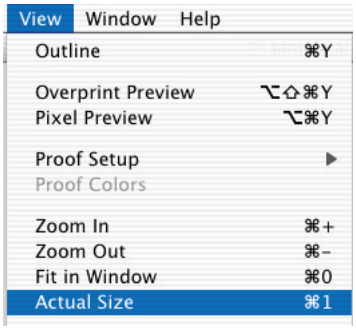
3. From the File menu choose Place. Use the Place command to insert text from Microsoft Word or bit-mapped image files such as PICT, TIF, JPEG, GIF, PSD, EPS, etc. into Adobe Illustrator. Do not use the Place to insert Vector image files such as PRN, PS, EPS, PDF, and TXT (ASCII & binary) from programs such as Adobe Illustrator, Macromedia Freehand, Deneba Canvas, CorelDraw, ClarisWorks, etc or from "Print to File" commands. Simply use File Open for Vector illustrations and images. For your convenience, Adobe Illustrator will open or place almost any file format!
4. In the directory window choose the file ARGs1.tif from the Photoshop exercise.

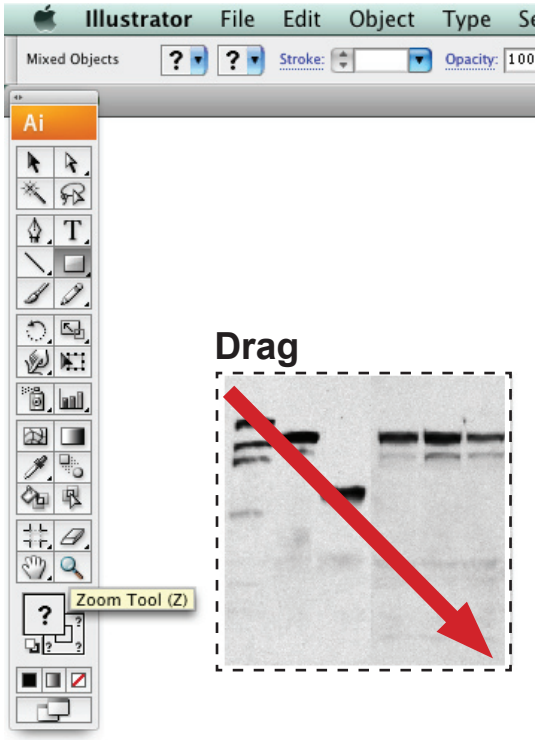


Zoom tool and View Menu

5. Click on the zoom tool. The zoom tool works in three different ways:
   1). You can click on an image and zoom in.
   2). You can hold down the option or alt key and click to zoom out. Notice when you do this the plus sign in the middle of the magnifying lens turns to a minus sign (to show you zoom out).
   3). You can click and drag a zoom window over a space and it will zoom into exactly that space.

Try all three. You can also Zoom in an out of an Illustrator window by using the options in the View menu (below left). Try Zoom In, Zoom Out, Fit in Window, and Actual Size from the View menu. When you are finished, choose Actual Size from the View Menu and drag a box over the ARG with the zoom tool (see example at right).

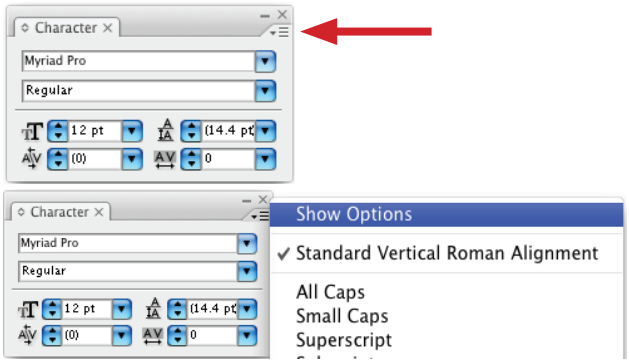


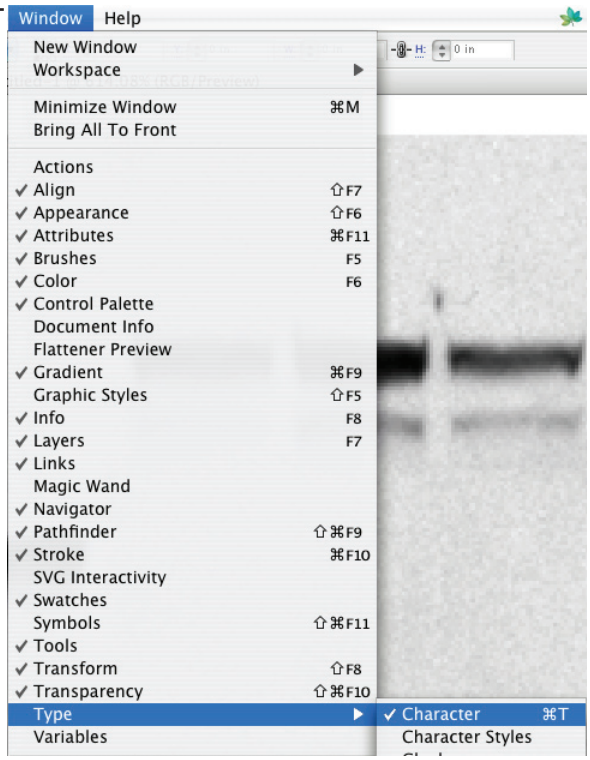


Basic labeling with Adobe Illustrator

Character palette

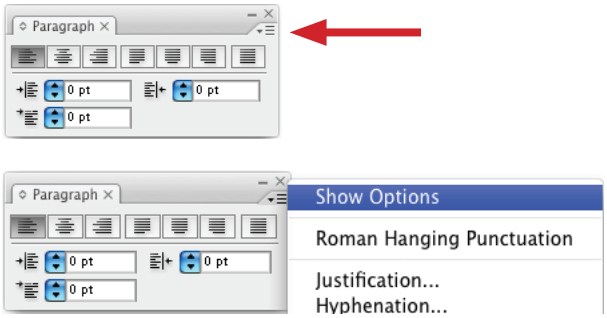
6. From the Window menu, choose Type, then Character (image right). The Character Palette will open. Note: If the Character palette is already open, the word Character will have a check mark next to its name in the window menu. If this is the case, you only need to find the palette on your screen. Click on three little gray lines next to the tiny triangle in the upper right corner of the palette and choose Show Options. Also notice the options for Superscript and Subscript hidden under this triangle.

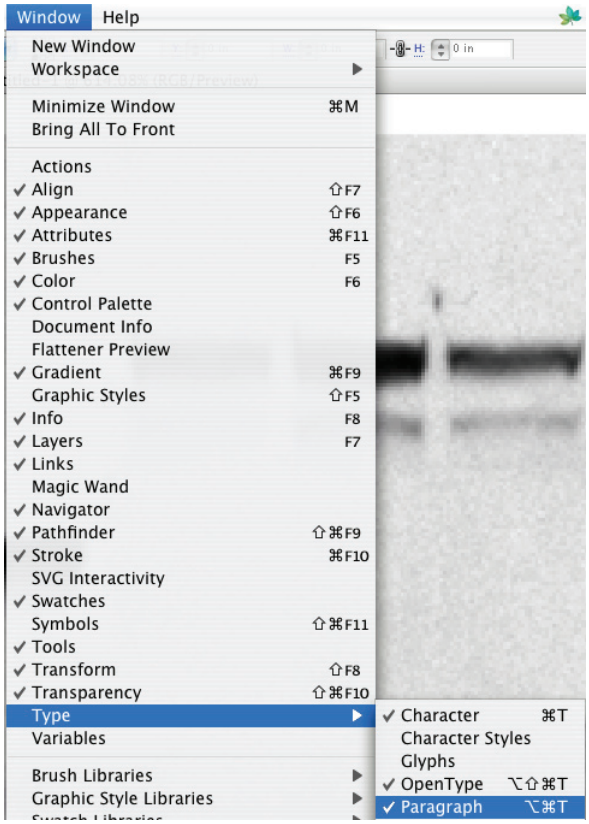




Paragraph palette

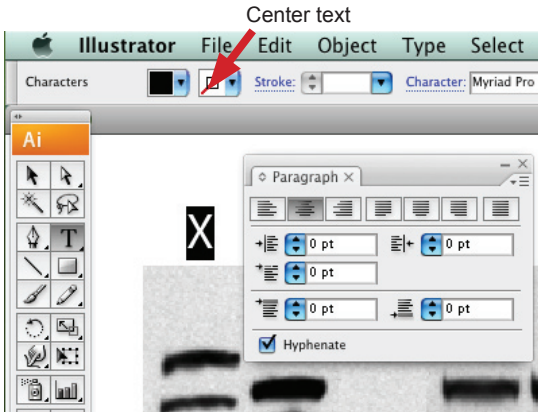
7. From the Window menu choose Type and then Paragraph. The Paragraph Palette will open. Click on three little gray lines next to the tiny triangle in the upper right corner of the palette and choose Show Options.





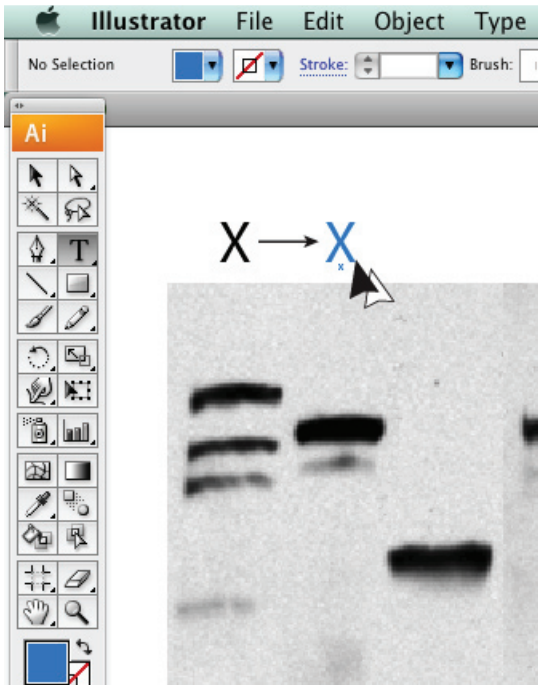
Type tool

8. Click on the Type tool
9. Click the Type tool right above the middle of the first lane of the ARG. Type the capital letter "X". Select (block off) the letter "X". Center the letter "X" by clicking on the center text image in the paragraph palette.



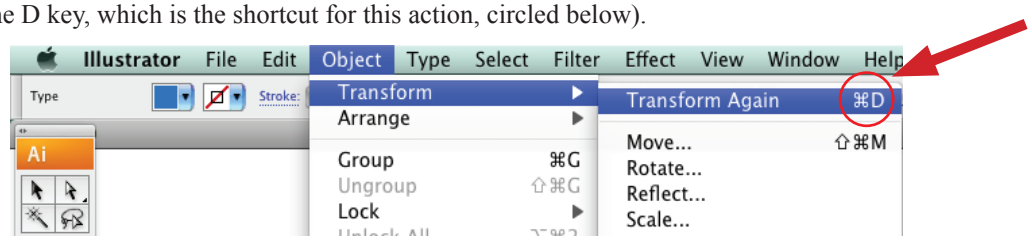
Constrain and copy shortcuts

10. Click on the Direct Selection tool (the white arrow tool).
11. Click on the letter "X", and then with your left thumb and fore finger, hold down the shift and the option or alt keys on the left side of the keyboard **while you drag the "X" to the right with the mouse**, placing it over the second lane of the ARG. You must let go of the mouse button first and then the shift and option or alt keys second. Notice that the cursor changes to two triangles, one black and one white whenever you hold down the option or alt key and drag an object with the white arrow tool. This is Illustrator's way of telling you that it is duplicating the object. You hold down the shift key to constrain the movement of the cursor to a perfectly horizontal line. Holding down the shift key will constrain the movement of the cursor up, down, left, right and also to 45 degrees in any direction. This "constraining" shortcut is adjustable in the preference panel and works in all Adobe and Microsoft programs since it is a function of the operating system.

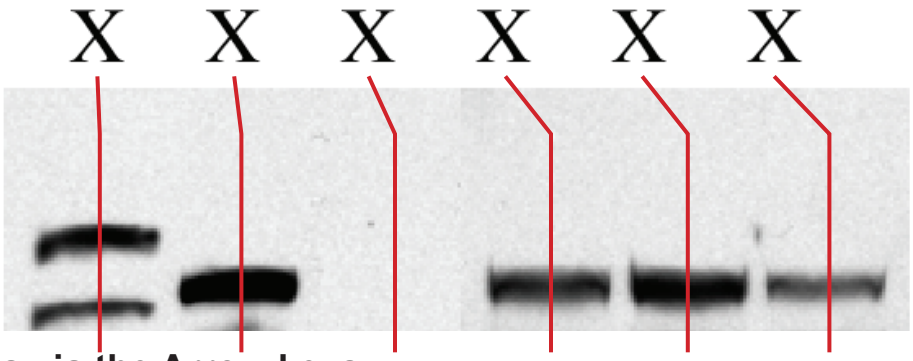


Transform and Duplication

12. Choose Object–Transform–Transform Again – four times (or you could hold down the Command key and hit the D key, which is the shortcut for this action, circled below).



The letter X will move to the right and duplicate itself four times! By duplicating your text this way you will get the same size and style font for all of your text. You may notice that you didn't exactly duplicate the text over the second lane of the ARG when you option or alt dragged it, so when you duplicated the text three more times it didn't exactly line up with the other lanes of the gel. We will now fix the alignment!



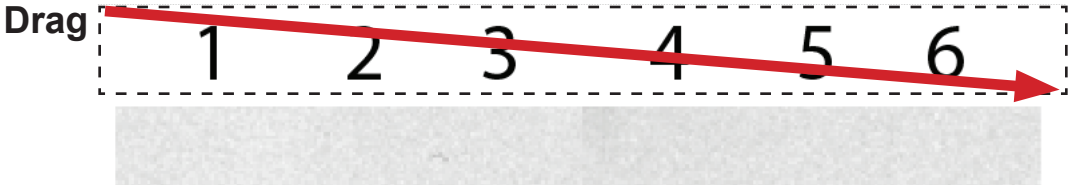
Move objects via the Arrow keys

13. Take the white arrow tool and click on one of the misaligned “X's”. Using the Arrow keys on the keyboard you can make the text move a small distance to the left or the right. If you hold down the shift key and then click on the arrow keys on the keyboard the text will move ten times as far. Do this to get your “X's” in visual alignment with the lanes of the ARG. This shortcut is adjustable in the preference panel and works in all Adobe and Microsoft programs.

14. With the type tool change the “X's” to "1", "2" , "3", etc.

Black vs. White selection tools

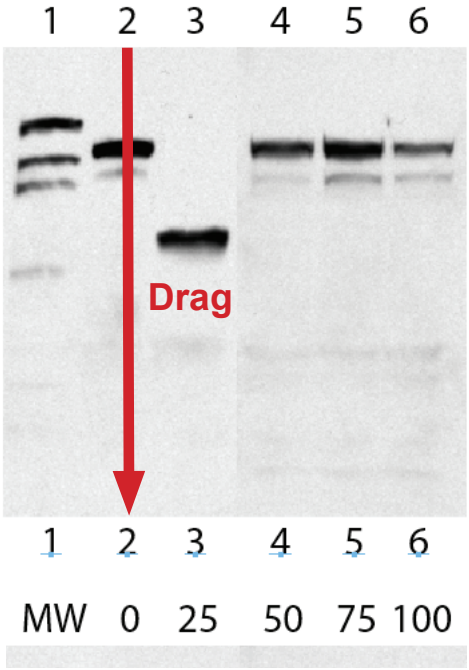
15. With the white arrow tool drag a box over all the lane numbers exactly as you see below. Note: Do not include any of the ARG image below the numbers.



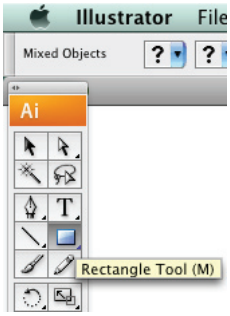
Notice that all of the numbers will be selected. The White arrow tool selects parts of objects in three different ways.

1). If you click on any part of an object, that part will be selected.
2). If you option or alt click on any part of an object the entire object will be selected.
3). If you drag a box over any part(s) of an object that/those part(s) will be selected. The Black arrow tool, the Selection tool, selects whole objects in the same way. The black arrow tool will also allow you to rotate and scale selections while the white arrow tool will not.

15. While you have all of the numbers selected, click and drag on one of them, dragging them to the bottom of the ARG lanes while you hold the option and the shift keys (duplicating and constraining them).

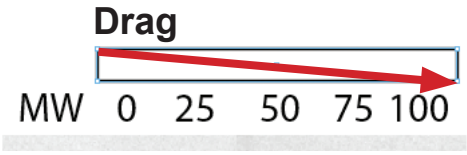


17. Label the top of the ARG with percentage points. Change the top "1" to "MW", the top "2" to "0", the "3" to "25", the "4" to "50", the "5" to "75" and the "6" to "100"

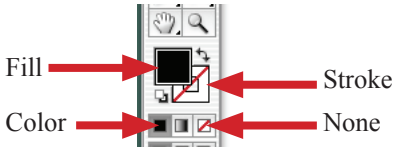


Rectangle tool

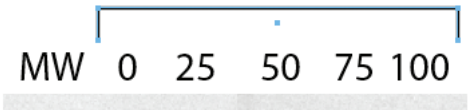
18. Click on the Rectangle tool
19. Draw a box from between the "MW" lane and the "0" lane to the right of the "100" lane.



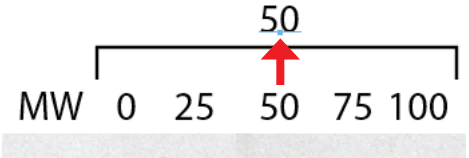
Fill and Stroke



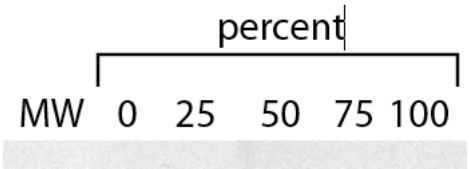
20. Change the black fill to none by clicking on the Fill box, then by clicking on the small box with the red slash through it located below the Fill and Stroke boxes. Change the stroke to black by clicking on the Stroke box and then by clicking on the small Color box below it (see example at right).
21. Click the White Arrow tool and then click on a blank area of the desktop to deselect the box you just drew.
22. Click once on the bottom line of the box (this will select just the bottom part of the line) and hit delete.



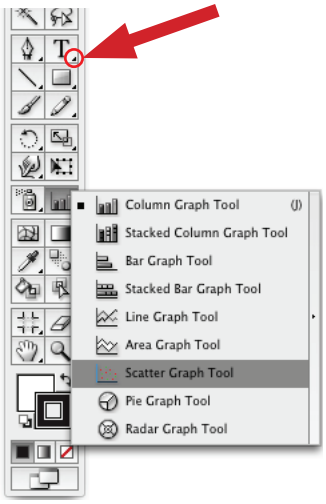
23. With the White Arrow tool click on the "50".
24. Move the "50" up above the box while holding down the shift and option key to constrain and duplicate it.



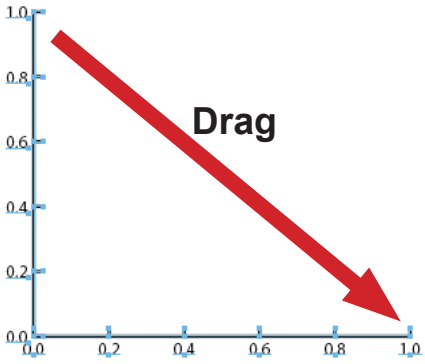
25. Change the "50" to the word "percent".
26. In the View menu, choose Fit in Window.



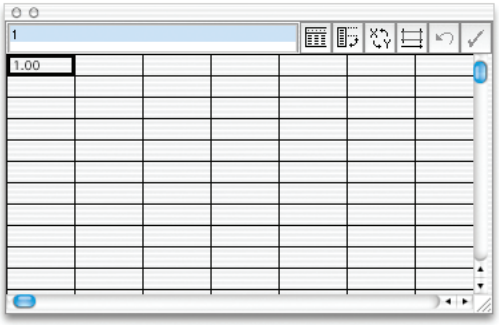
27. Click on the Graph tool in the toolbox. Notice that some of the tools in the toolbox have a tiny black triangle in the lower right corner. Tools with this triangle are called nested tools. If you click and hold down on one of these tools it will expand out and show you all of the options for that tool. Expand out the Graph tool and choose the Scatter Graph tool.

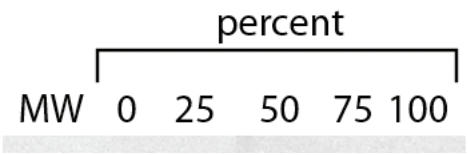


28. Drag a big square box (like the example below) with the Graph tool above the labeled ARG from "0" to "100" percent. Notice that a data entry window will automatically open.

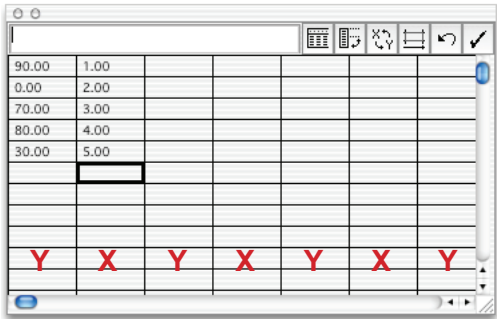


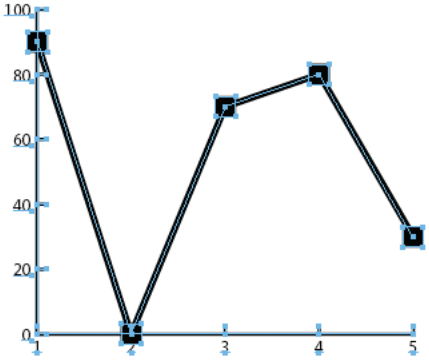
Data entry window



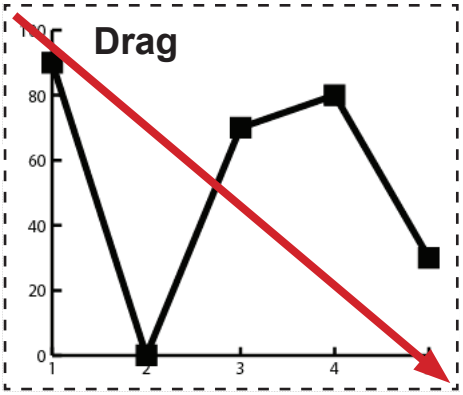


29. Adobe Illustrator requires you enter data with the Y values in the first column and the X values in the second column, etc. Enter the following data in column 1: 90, 0, 70, 80, 30 and the following data in column 2: 1, 2, 3, 4, 5. Then click on the Check mark in the upper right of the data window to apply the data.

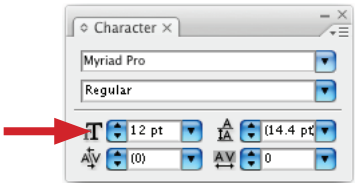


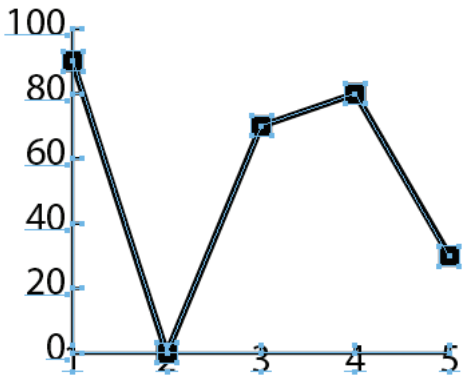


30. Notice that the fonts on the graph are too small and the X and Y tick marks are inside the graph area.
Click on the White Arrow tool and drag a selection box over the entire graph.

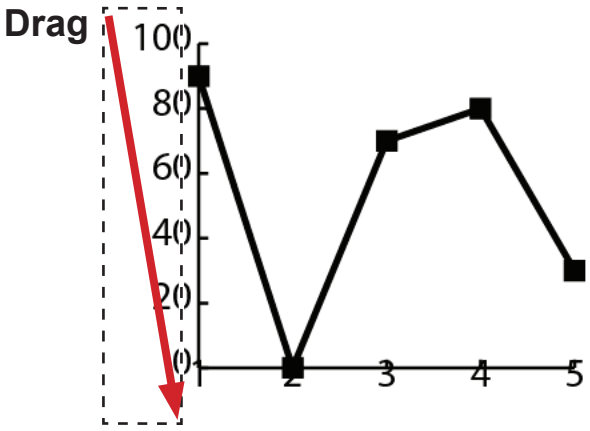


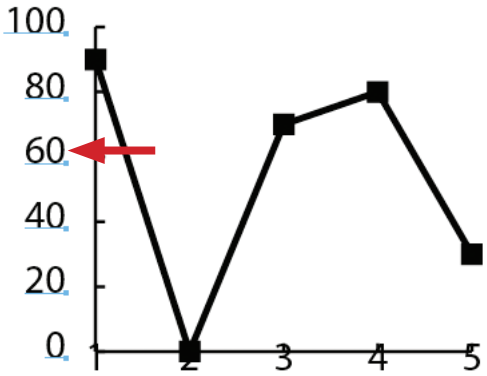
31. In the Character palette change the type to 12 points. Notice that if you click on the TT in the Character palette that Illustrator will select the information in the TT box for you, making it easier to enter text. All Adobe palettes work this way.



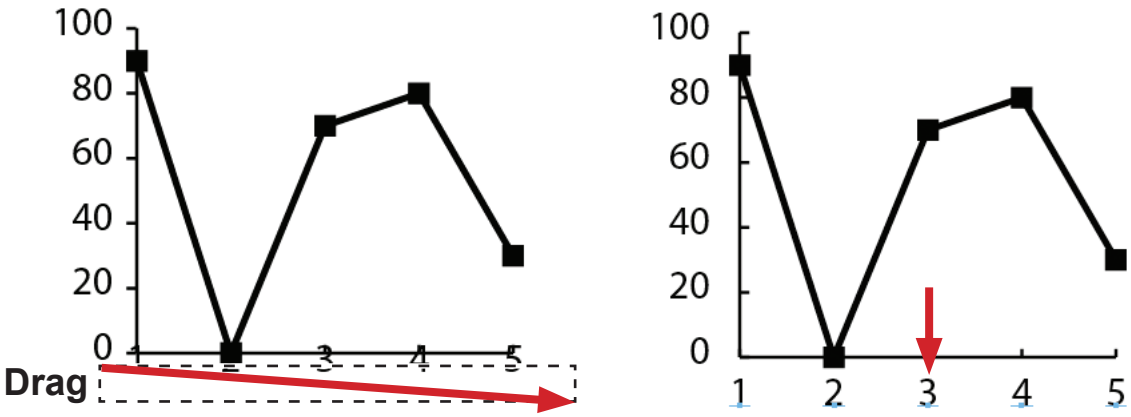


32. Select the White Arrow tool and click on a blank part of the illustration to deselect everything. Drag a selection box over the Y axis numbers, just as it is pictured below. Do not allow any of the dotted selection box to touch any part of the graph. Arrow the Y axis values left with the keyboard arrows or the Shift + Arrows.

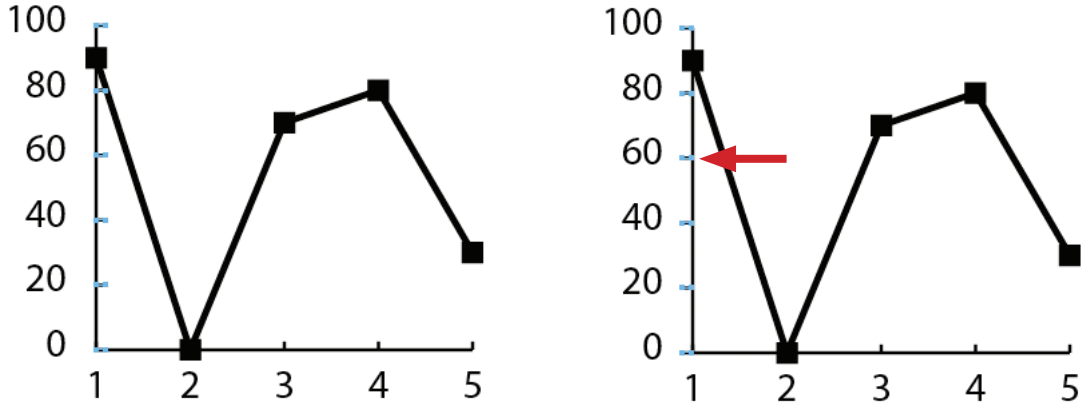




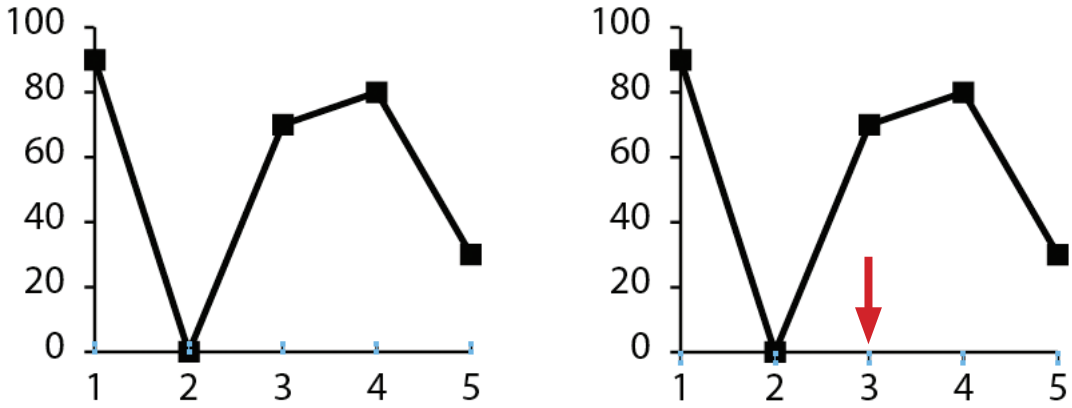
33. Do the same thing for the X axis. Notice that the selection box does not touch any part of the graph.



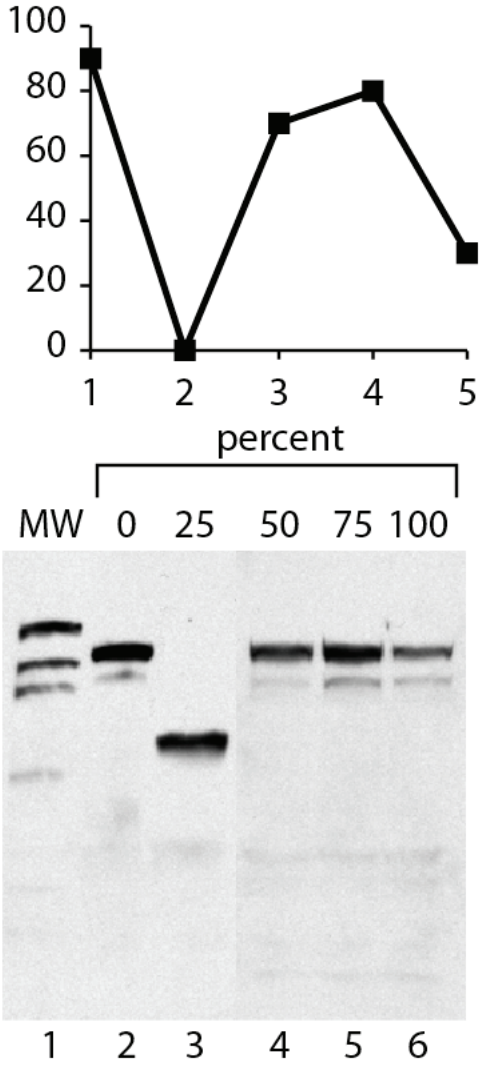
34. Using the White Arrow tool, option double-click on the Y axis tick marks, this will select all of them as a group. Arrow them left with the keyboard arrows or the Shift + Arrows.



35. Do the same for the X value tick marks.



You are finished, your labeled ARG should look similar to the image on the next page.

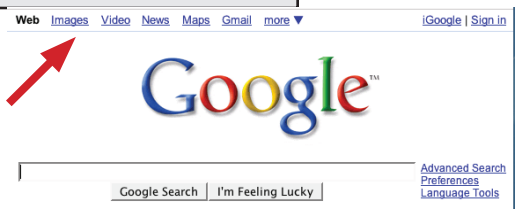

100
80
60
40
20
0
1
2
3
4
5
percent
MW
0
25
50
75
100
1
2
3
4
5
6

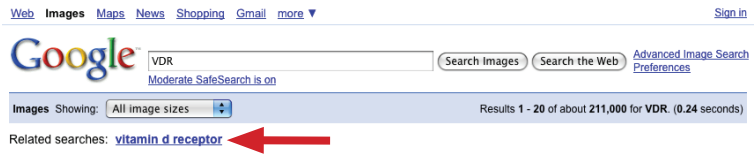
Google image searching

You will learn the following:

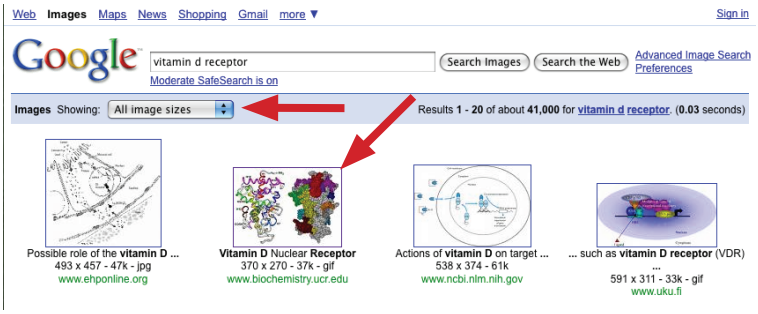
How to use Google to find illustrations for Posters and Talks

1. In a web browser go to: http://www.google.com.
2. Click on Images, type VDR, the common reference for Vitamin D receptor, and then on Search. There are 211,000 hits & none of them seem to be what we want!





3. Type vitamin d receptor or click on the Google supplied suggestion. There are 41,000 hits & the second one is what we want!



Notice that you can filter your results by size (Large/Medium/Small) from the drop down box in the upper left of the window, allowing you to find the largest image size quickly.

4. You can get a more accurate search if you enclose what you are searching for in quotation marks. Searching for [“Vitamin D receptor”] will only find images that match all three of these words. Searching for [Vitamin D receptor] (no quotes) will find all images that match [Vitamin], all images that will match [D], all images that match [receptor], but the search engine will show you results which are weighted to matching all three words. This is an important distinction because the two searches will bring you different results.
5. Narrow your search by file type:
   .jpg, .jpeg, .gif, .tiff, .pdf, .bmp, .png and on and on. In the google search box simply type what you are looking for, followed by a space, a colon, a period, and then the three letter file format or extension code: e.g. "vitamin d receptor" :.gif. This will only bring you back results that match the search term and are gif files. Add an additional search parameter for location: e.g. "vitamin d receptor" :.gif :.ucr.edu. Now you only get results that occur on the ucr.edu server.
6. Click on the image and load largest version available into the browser.
   Then right mouse click on the image and download it to your hard drive.

Google Scholar

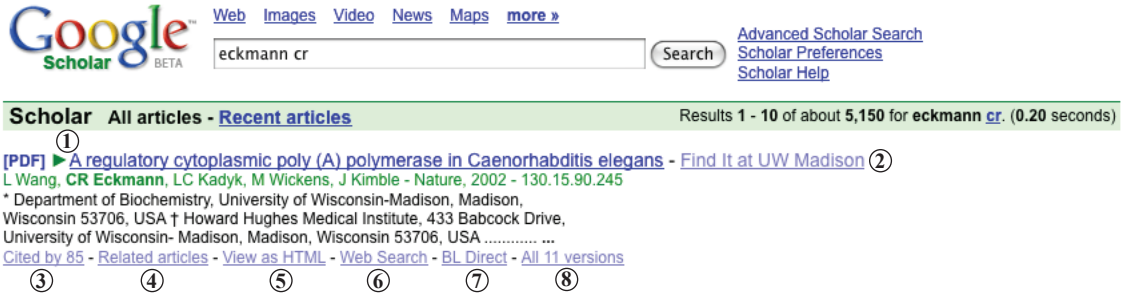
You will learn the following:

How to use Google Scholar to find publications

Google Scholar gives you results that represent a body of scholarly work. This may include one or more related articles, or even multiple versions of one article. For example, a search result may consist of a group of articles including a preprint, a conference article, a journal article, and an anthology article, all of which are associated with a single research effort.

Each search result contains bibliographic information, such as the title, author names, and source of publication. One set of bibliographic data is associated with the entire group of related articles and is Google's best estimate at the representative article for the group. This bibliographic data is based on information from the articles in the group, as well as on citations to these articles from other scholarly works.

In a web browser go to: http://scholar.google.com/.
Type "eckmann cr", an author's name, in the search field and hit Search.



Click on the following links so you can see how they work:

1. **Title** – Links to the abstract of the article, or when available, the complete article. This link will download the pdf file, or take you directly to the journal web page that has the pdf and/or html version of the paper.
2. **Library Links (online)** – Locates an electronic version of the work through your affiliated library's resources; appears automatically if you're on campus. Our campus and many others use a program called Find it.
3. **Cited By** – Identifies other papers that have cited articles in the group. Clicking this link will take you to a list of all 68 publications that cite this article.
4. **Related Articles** – Finds other papers that are similar to articles in this group. Clicking on this link will take you to 101 articles that are similar to this one.
5. **View as HTML** – Clicking on this link will open the pdf file in the browser window.
6. **Web Search** – Searches for information about this work on Google. For this publication Google will search for the following: "Wang" "regulatory cytoplasmic poly".
7. **BL Direct** – Purchase the full text of the article through the British Library. Google receives no compensation from this service.
8. **All Versions** – This link will give you a list of all locations where you can download this pdf file.

Now try it on your own. **Enter your name**, or any author, or search term related to your MyMolecule project and see what you get!

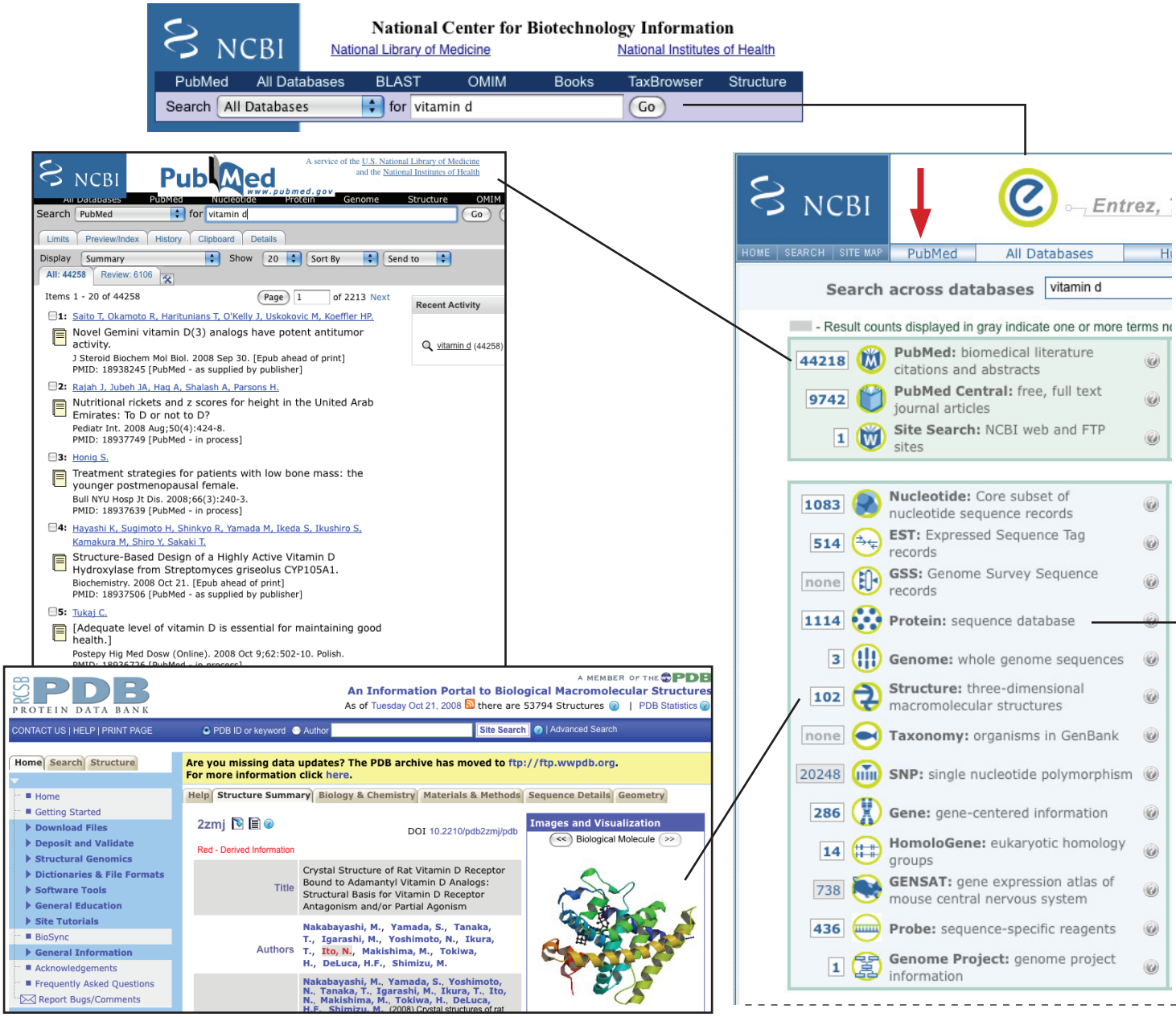
NCBI searching

You will learn the following:

How to all NCBI databases at once!

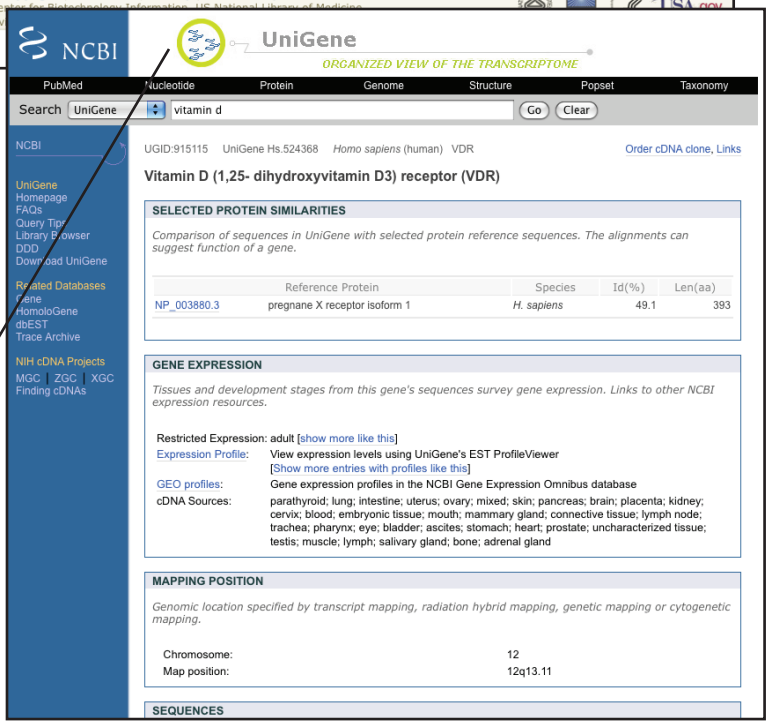
NCBI (National Center for Biotechnology Information) is a national resource for molecular biology information. NCBI creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information.

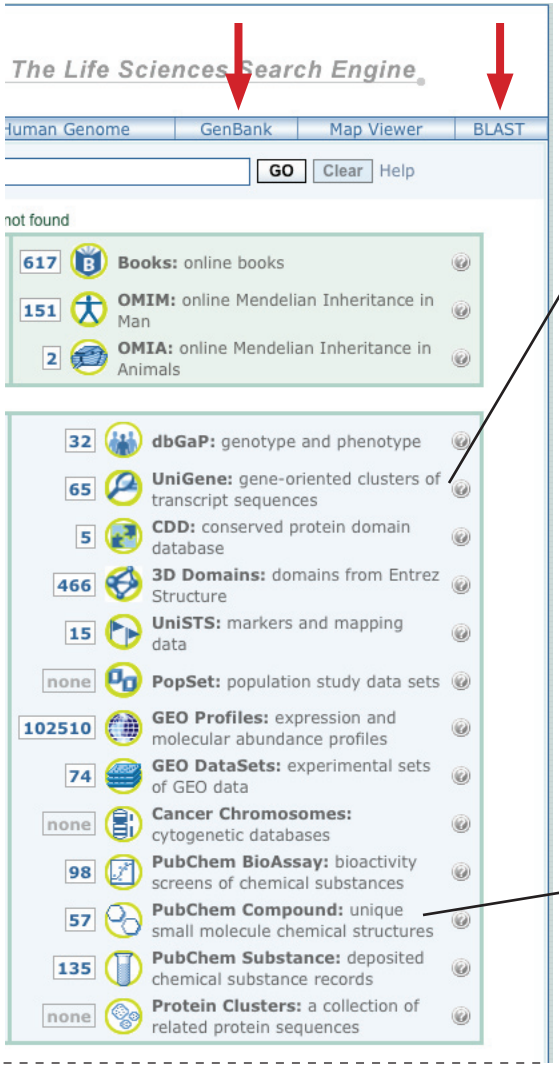
In a web browser go to: http://www.ncbi.nlm.nih.gov/.
Type "vitamin receptor" in the search field and click Go, or better yet, enter the topic of your "My Molecule" project!.

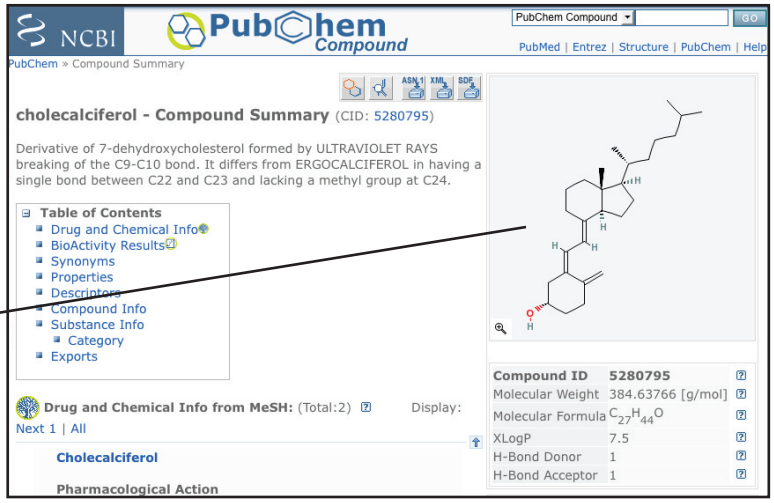


Notice all of the wonderful things you can quickly get with this one search!

The entire group of individual Entrez databases is organized on this page with literature databases at the top including PubMed, PubMed Central, Journals, Books, OMIM and OMIA. The NCBI Site Search is also listed. The sequence databases include Nucleotide, Protein, Genome, Structure, and SNPs. The remaining databases are Taxonomy, Gene, UniGene, HomoloGene, Conserved Domains, 3D Domains, UniSTS, PopSet, GEO Profiles, GEO Datasets, PubChem Bio-Assay, PubChem Compound, PubChem Substance, Cancer Chromosomes, Probe, MeSH, Journals and NLM Catalog. Links to popular NCBI Web pages, such as PubMed, Human Genome, Map Viewer, and BLAST, are on the toolbar. There is also a link to the "GenBank" database, leading to the Nucleotide database.







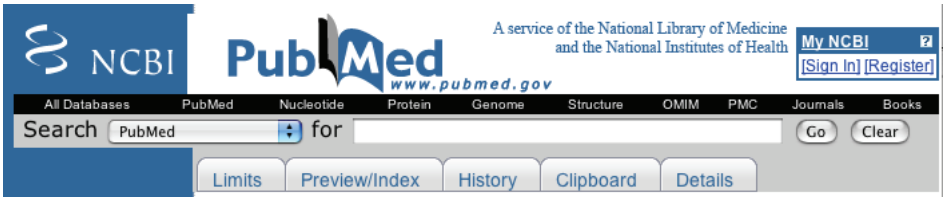
PubMed Image Search

You will learn the following:

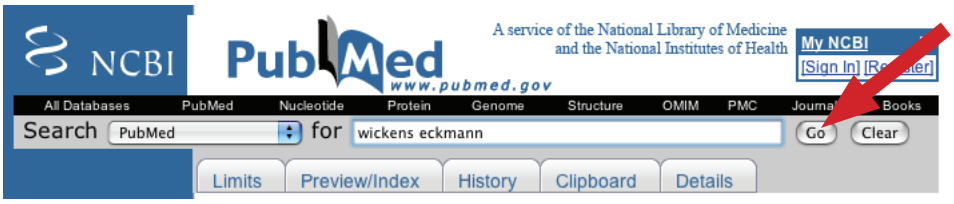
How to use PubMed to find illustrations for Posters and Talks

Find the research article, then the image

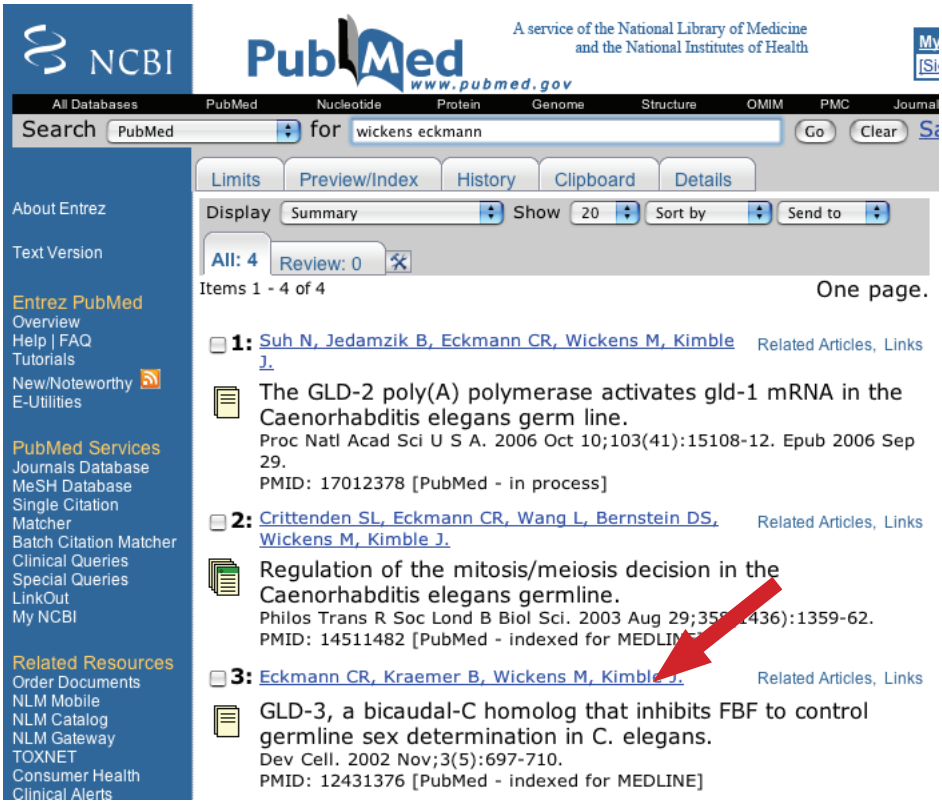
1. In a web browser type "pubmed" and hit enter (http://www.pubmed.org).



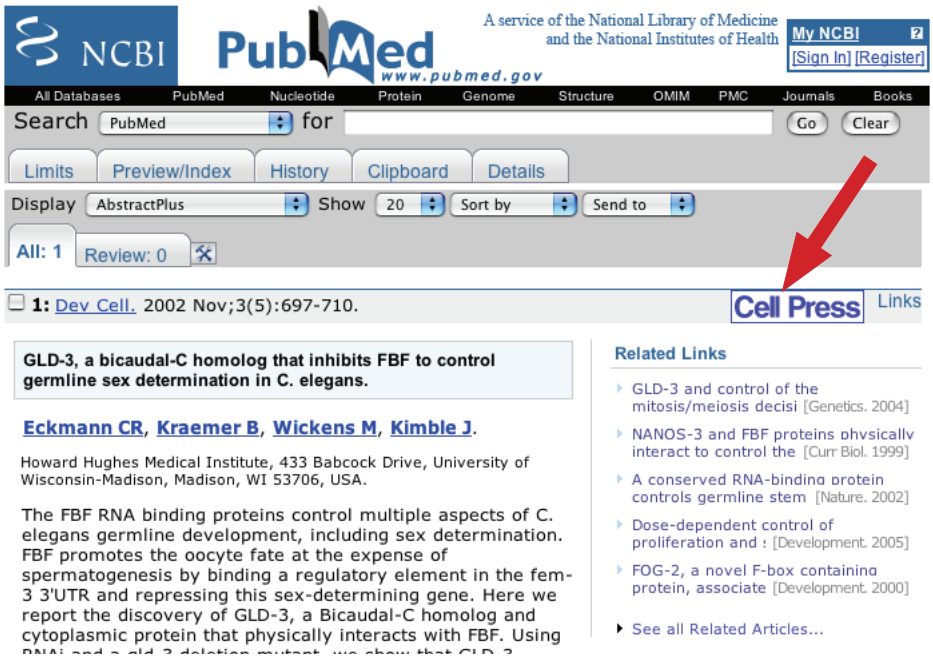
2. Type “wickens eckmann” (these are two author names) in the search field at the top of the page and Click Go.



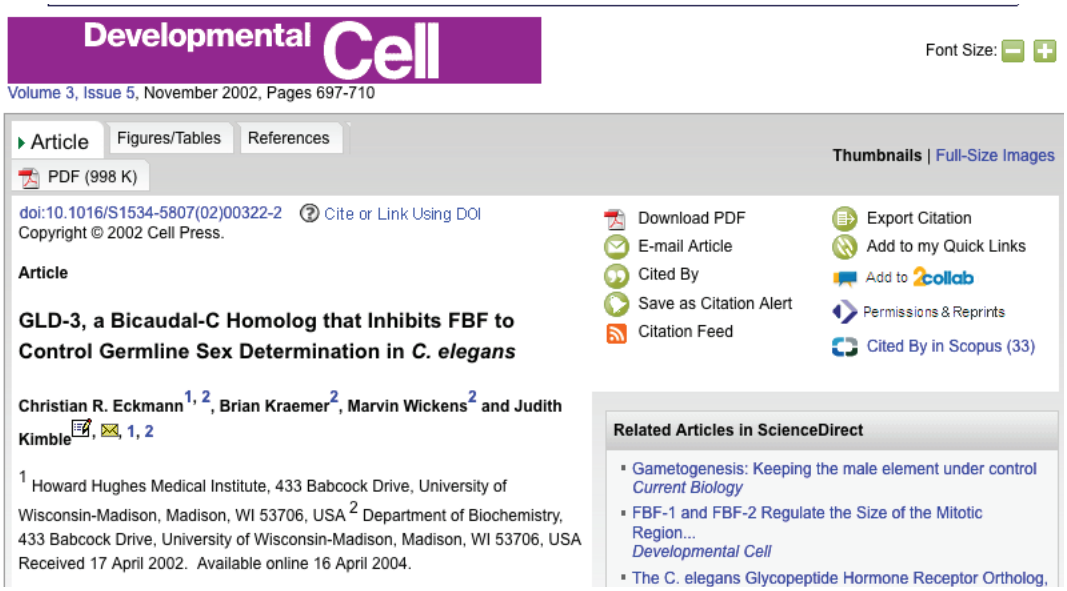
4. Click on entry 3: Eckmann CR, Kraemer B, Wickens M, Kimble J.



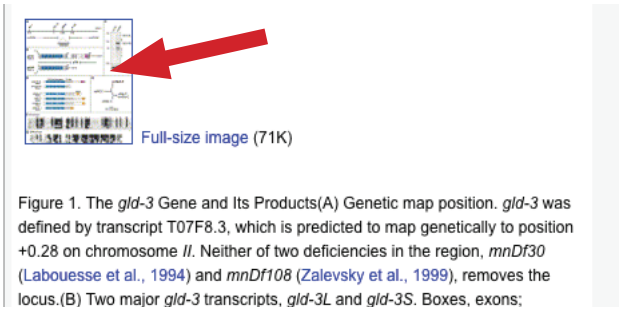
5. PubMed takes you to the Abstract for the article. Click on the Cell Press link.



6. Another Browser window will open and take you to Elsevier.
Click on the ScienceDirect link to see the journal article.



7. Scroll down to figure 1. Click on the small image of Figure 1 to get the large image.



8. Right mouse click and download the large image to the desktop so you can use it in your poster or talk.

Note: Some journals allow viewing of full text articles and the downloading of PDF articles. Always use the largest image from the full text article if you can, otherwise download the PDF version of the article and open it in Adobe Illustrator or Adobe Photoshop (see, **Getting Images from PDF files in the next section**).

HighWire image search

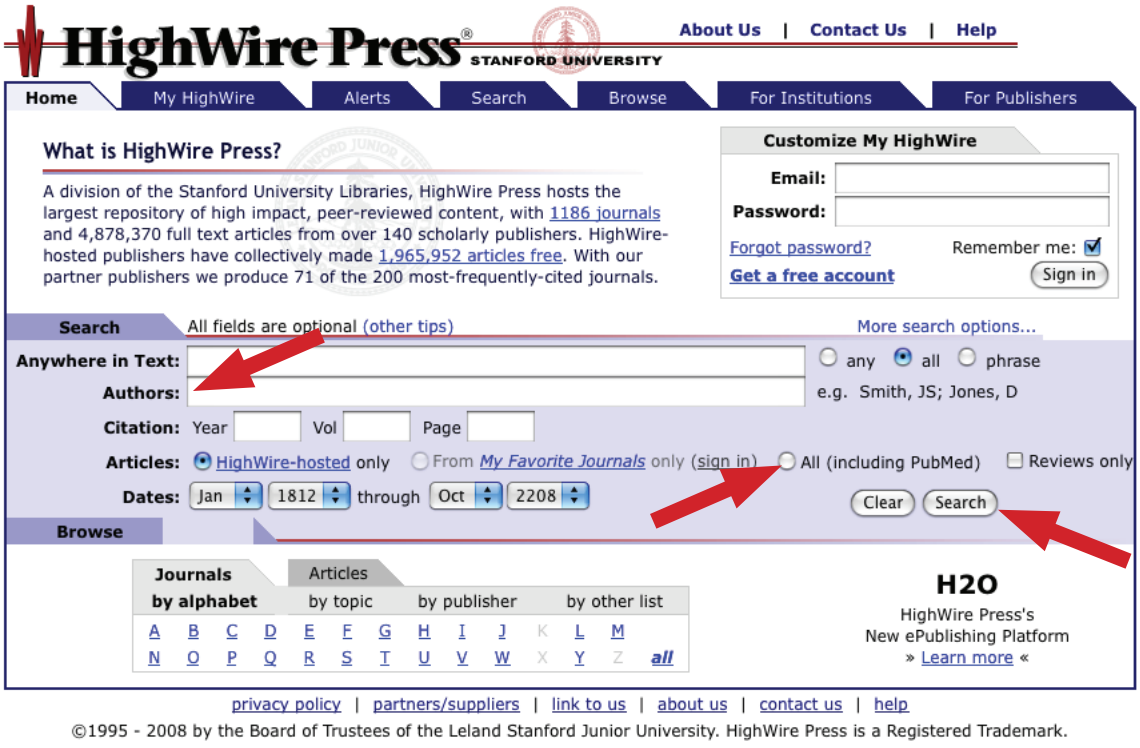
You will learn the following:

How to use HighWire.org to find illustrations for Posters and Talks

Find the research article, then the image

1. HighWire is another way to find research articles online. HighWire performs a much wider search than PubMed. In a browser go to: http://www.highwire.org
2. Type “eckmann cr” in the Author box, check the "All (including PubMed)" radio button, and then click the "Search" button.

Note: Just looking for a Review article? Check the box next to “Reviews only” near the middle-right of the page.



3. HighWire will return a list of matching articles. Click the “condensed” format link. If you have more then 5 or 6 matches, click on the appropriate number of links per page (10, 20, 30 etc/page).

4. Notice how HighWire provides a nice, neat, clean list of the matching articles. It lists which ones are available to you as ABS (abstracts), FULL (full text article) and PDF (PDF file).
5. On the fourth entry click "Full" and the rest is the same as the PubMed exercise.

Getting Images from PDF files

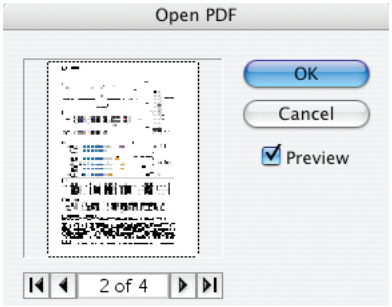
You will learn the following:

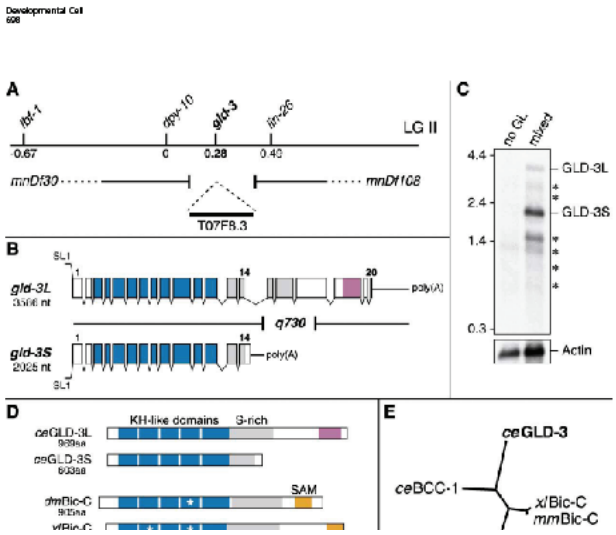
How to extract images from PDF files as vector illustrations or bitmaps

PDF files

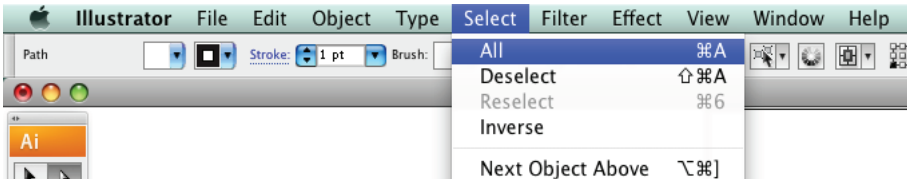
Are a universal text and image file format that works on any computer platform: Windows, Macintosh, UNIX, Linux, etc. In general they are small files and may contain vector or bitmap images or both. They can be opened in Adobe Acrobat (the full version), Adobe Acrobat reader (limited FREE version), and all Adobe programs including Illustrator and Photoshop. PDF files can be created from any program on any computer platform with the full version of Adobe Acrobat installed.

1. Open Adobe Illustrator. Choose File Open and choose sample 1.pdf from the directory window.
2. When you open a PDF in an Adobe program it will only allow you to edit one page at a time.
   Pick page 2 in the Acrobat page dialog box.





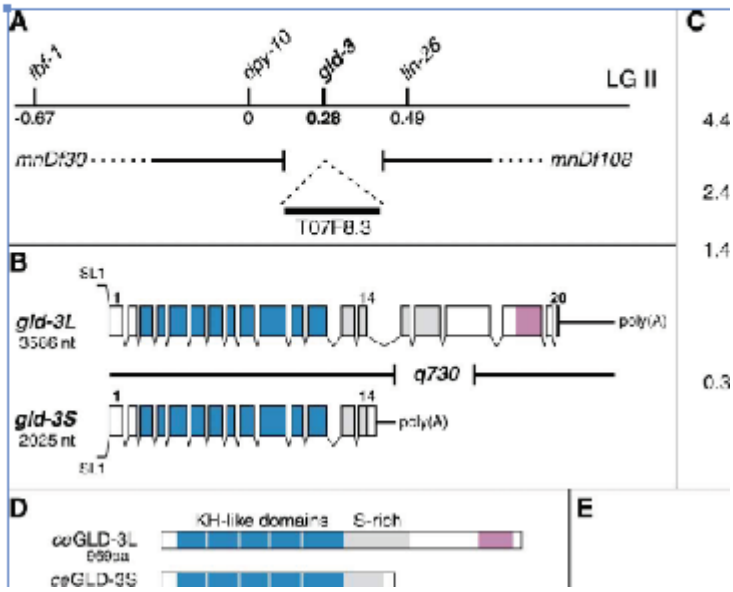
3. Once the file opens, choose Select–All.



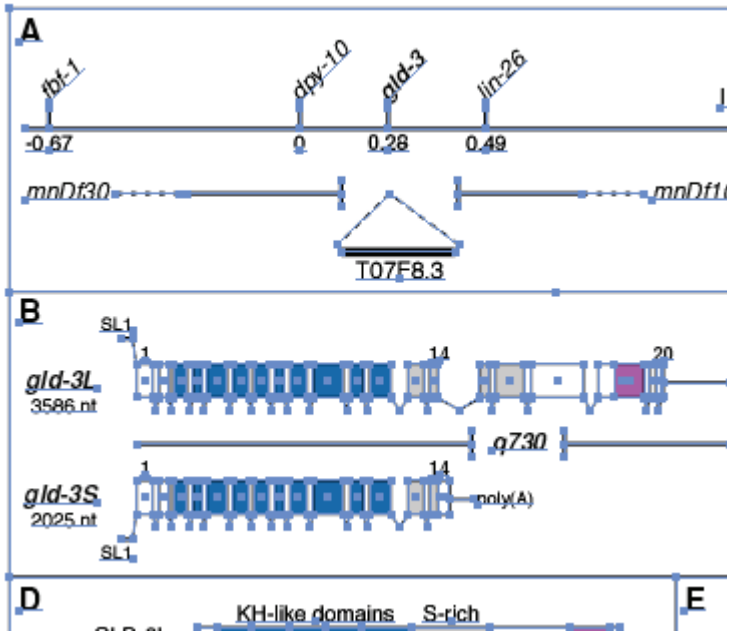
There are two ways that one can save vector images into a PDF file. Notice that the image parts are all in one box in this PDF file (below left), therefore this vector image was saved as a bitmap image in the PDF file. You could open this PDF file in Adobe Photoshop and crop the bitmap image out to use it in a poster or PPT talk, however the image will be low in resolution and of poor quality.

4. Choose File Open and choose sample 2.pdf from the directory window. Pick page 2 in the Acrobat page dialog box. Choose Select All. Notice that the vector image parts are highlighted and can be edited in this PDF file (below right), therefore this vector image was saved as vector information in the PDF file. You can resize and resave this image to use in a Poster or PPT talk with any resolution (see the next section, "Images into PowerPoint", for instructions on how to do this).

Bitmap image



Vector image



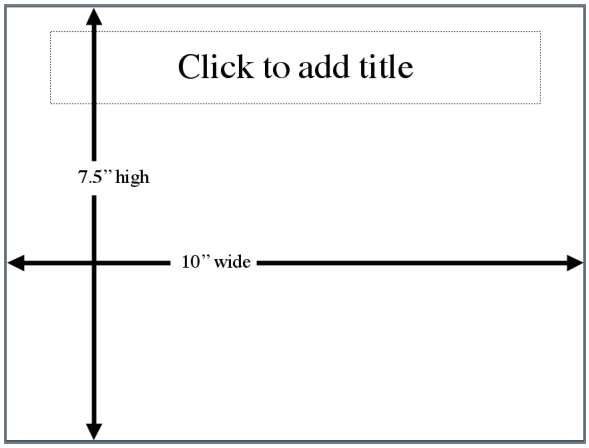
Images into PowerPoint

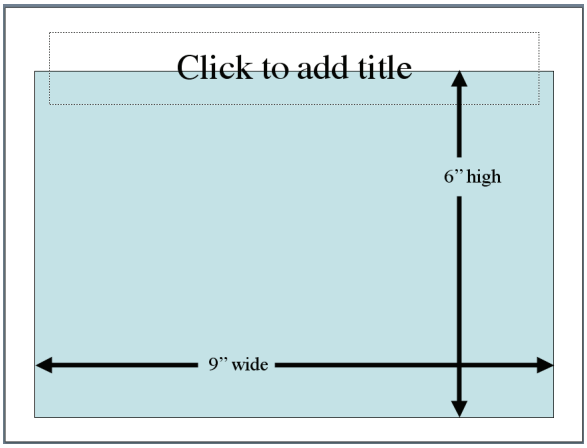
You will learn the following:

Correct image file formats for PowerPoint talks
How to create PNG files from adobe Illustrator files

Notes

- All portable and fixed projection units are based on a screen resolution of 72 dpi, therefore all image files inserted into a PowerPoint slide should be 72 dpi, or double that amount (150 dpi). They should not be 300 or 600 dpi!
- The PNG file format works best.
- PNG files should be 200% the final size you want, and then scaled to 50% in PowerPoint.
- All sides in a PowerPoint Presentation are 7.5" high and 10" wide.
- When making a slide one should leave space for a title and a comfortable margin for the eye to rest in on all four sides. Therefore, 6" x 9", or less, is generally the maximum area for images on PowerPoint slides.





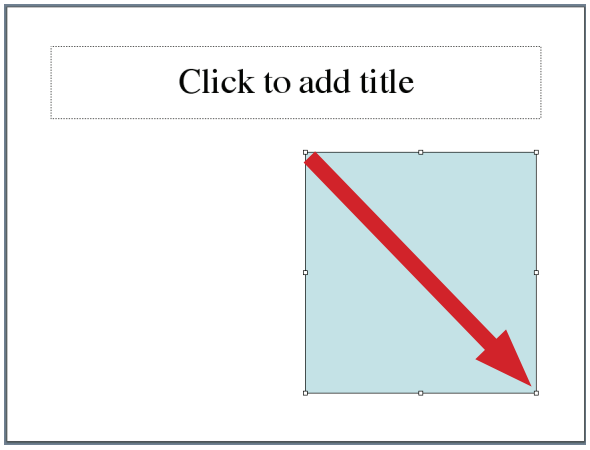
PNG files

PNG-8
Use PNG-8 files for grayscale images, gels, immunofluorescence, tissue samples and EMs. In general, images with limited amounts of color and gradients.

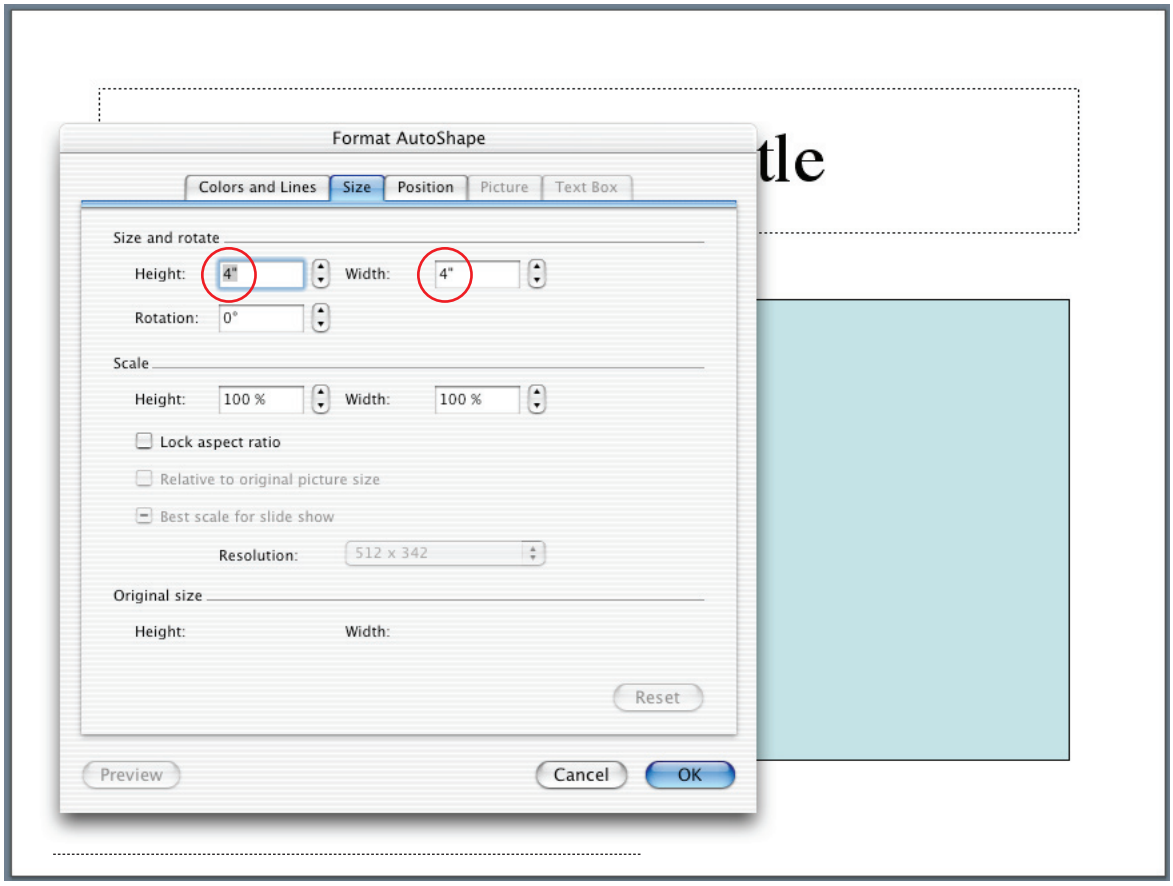
PNG-24
Use PNG-24 files for complex colored images, files with large color ranges, color photographs, a person's face, etc.

Creating PNG files

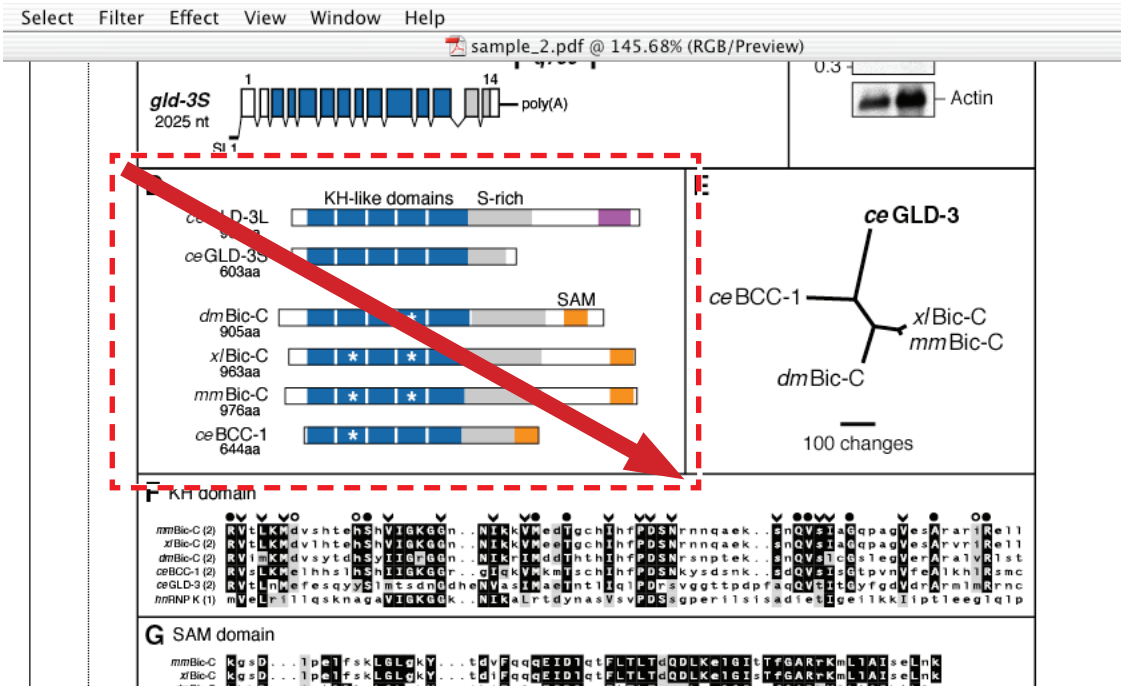
1. Open a PowerPoint presentation and create a new slide. Draw a box to the approximate size and shape you want your inserted image to be.



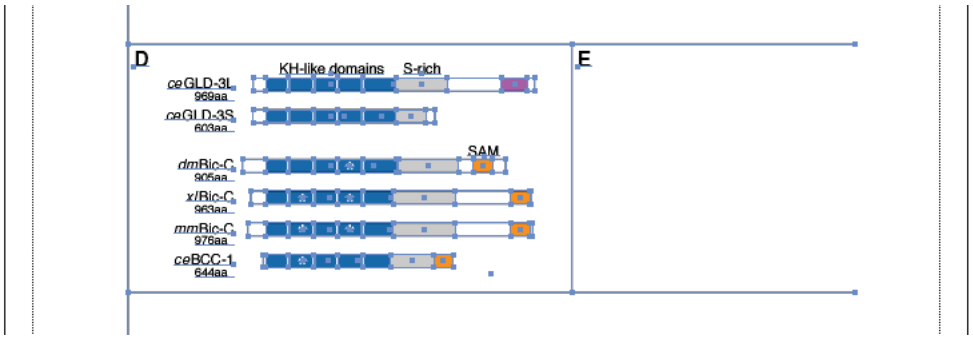
2. Double click on the box and the Format Shape dialog box will open. Click on the size tab. Note the size of the box: Height and Width (if your box is not 4" x 4" please change it now...).



3. Open an image in Illustrator. Use sample 2.pdf - page 2 from the previous PDF exercise.
4. Using the white arrow tool click and drag a selection box over “section D”.
   NOTE: Exactly as it is shown in the example below!!!

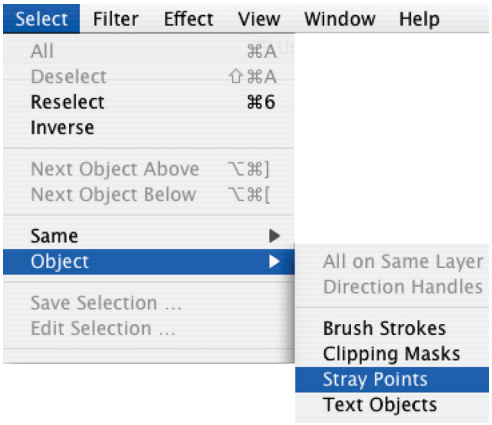


5. Copy and paste the image into a new file by choosing Edit Copy. File New. Edit Paste.

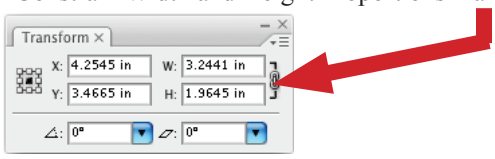


6. Your image should look something like the example above. Delete the extra lines around the figure and also the letter D and E by clicking on them with the white arrow tool. First click on the white space around the figure to deselect everything, then click on a line or a letter and hit the delete key. **If you are deleting a line you need to hit the delete key twice**, once to delete the line and once to delete the endpoints of the line.

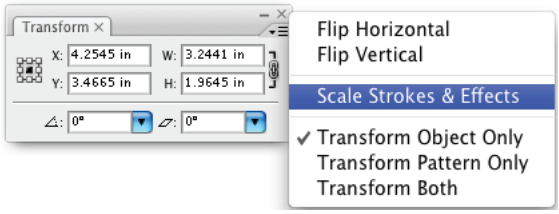
   You may have created stray points making the above deletions. Stray points are the endpoints of lines or text anchors that do not contain text. Zoom out to full screen by choosing View Actual Size. Choose Select–All. Notice if there are any blue highlighted dots around the figure. If there are you must choose Select–Object–Stray Points and then hit the delete key.



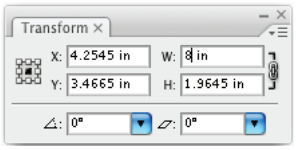
7. From the Select menu choose All.
8. From the Window menu choose Transform and the Transform palette will open (remember, if the transform palette is already open it will have a check mark next to it's name in the menu). Make sure the "Constrain Width and Height Proportions marker" is on.



9. Click on the little black triangle in the upper right of the transform palette and from the fly out menu choose "Scale Strokes and Effects".

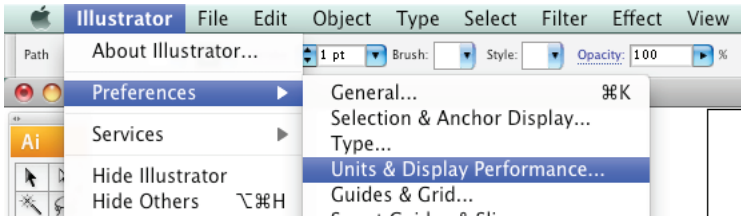


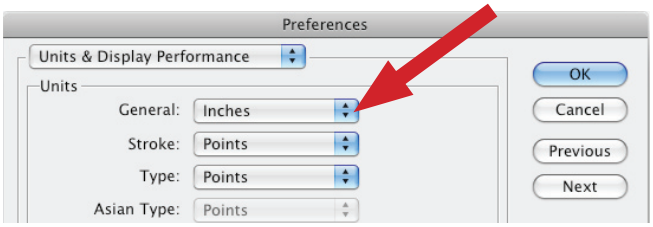
10. The Transform palette allows one to move and resize images in Adobe Illustrator. In the "W:" box type twice the width, or in the "H:" box type twice the height you noted for the size of the box you drew in PowerPoint and then hit the return or enter key.



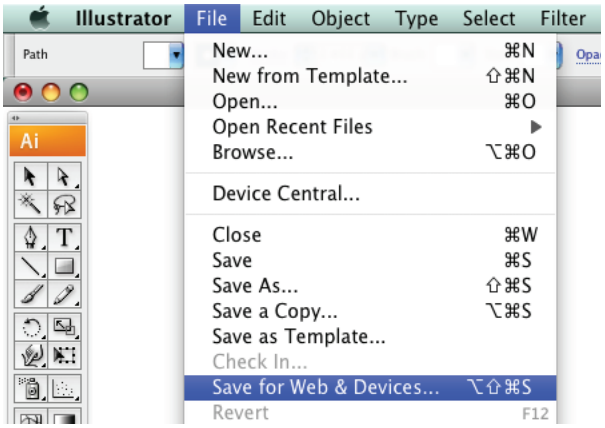
The box I drew in PowerPoint was 4" x 4" so I entered 8" in the W: field.

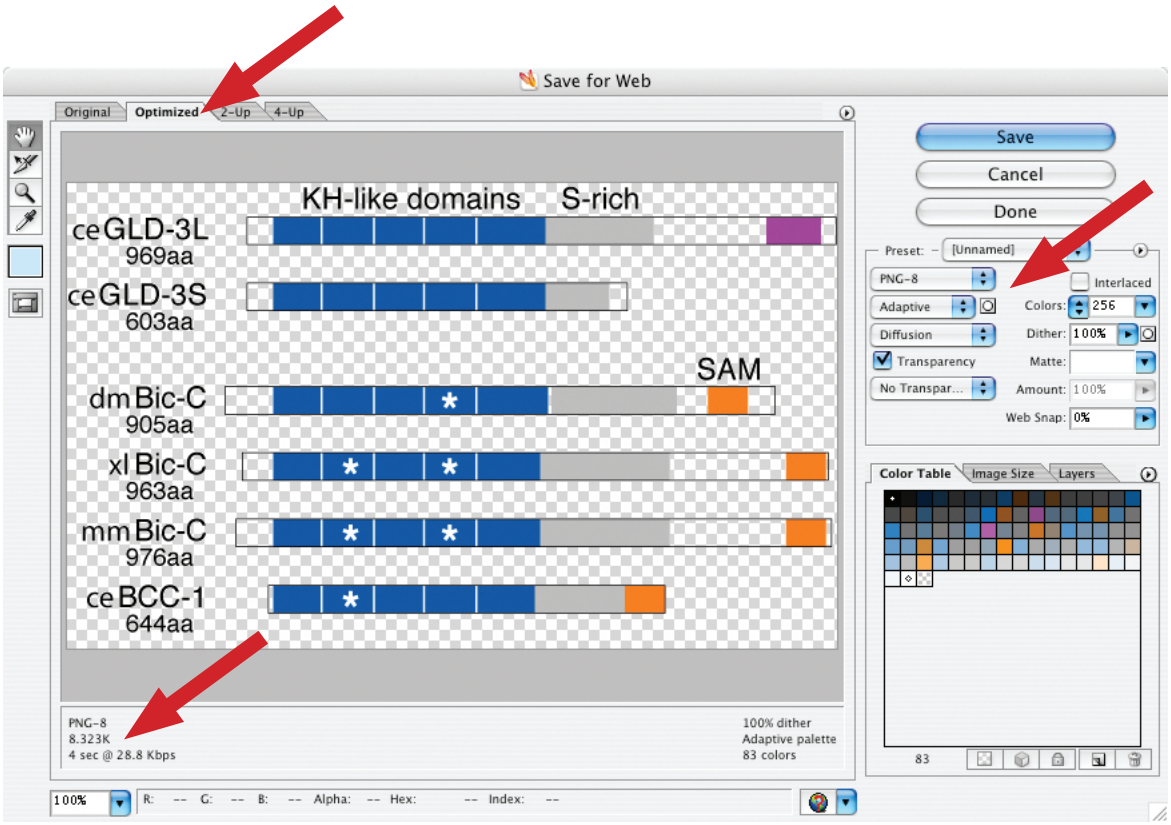
The default ruler units for Adobe Illustrator is Picas (p) and Points (pt), a standard unit of measure in the publishing world... You can change the ruler units to a more familiar standard (inches) or metric (centimeters) in the Preferences, Units & Display Performance. Or... you can just leave them as pts. and type the unit symbol in any of the dialog boxes, "in" for inches, "cm" for centimeters, "mm" for millimeters, "px" for pixels, etc. Illustrator is programmed to figure out what you mean!





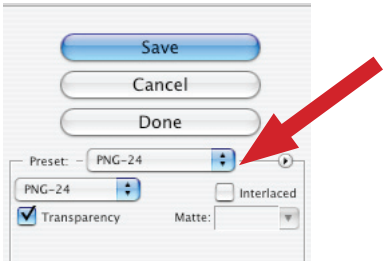
11. Now that we have properly sized the image we need to get it into PowerPoint.
From the File menu choose Save for Web. The Save for Web dialog box will open.





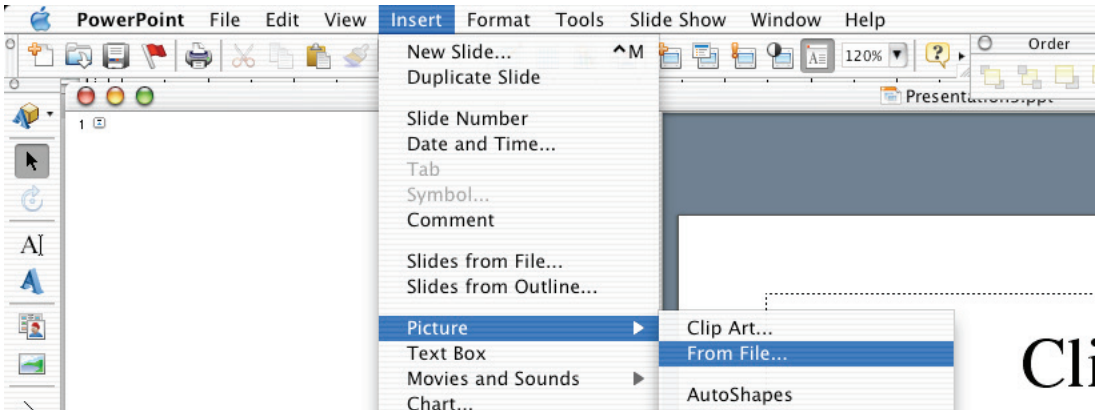
12. Choose the Optimized tab in the upper left. Then configure the settings on the right to match this screenshot.
    PNG-8 – Adaptive – Diffusion – Transparency (yes or no) – No Transparency Dither,
    Interlaced box unchecked – Colors: 256 – Dither 100% – Matte: if transparency is checked then choose a matte color that is similar or identical to the background in your PowerPoint slide, if transparency is not checked choose white from the pull down menu – Amount is grayed out... Web Snap: 0%.

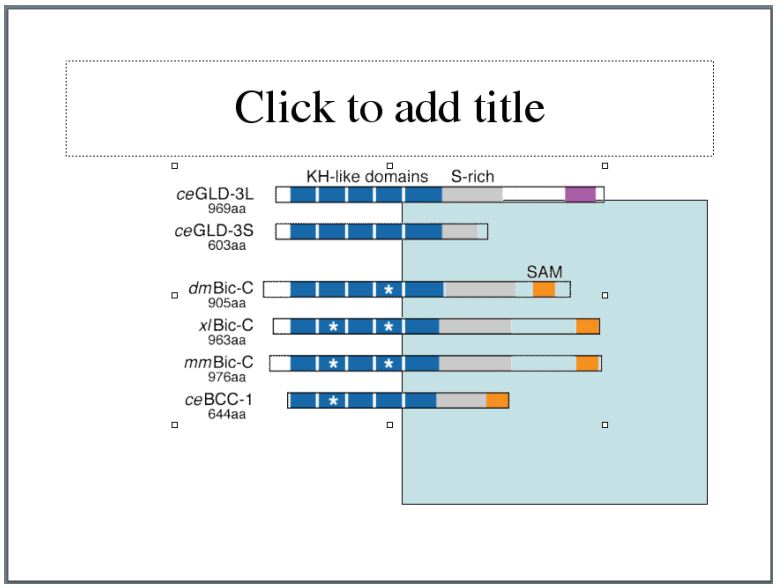
Note that Illustrator tells you how big your file is going to be before you save it, this allows you to choose different format options and see how the files size changes. For PowerPoint talks try to keep file sizes under 800K. Then click the save button and save the file to your desktop.



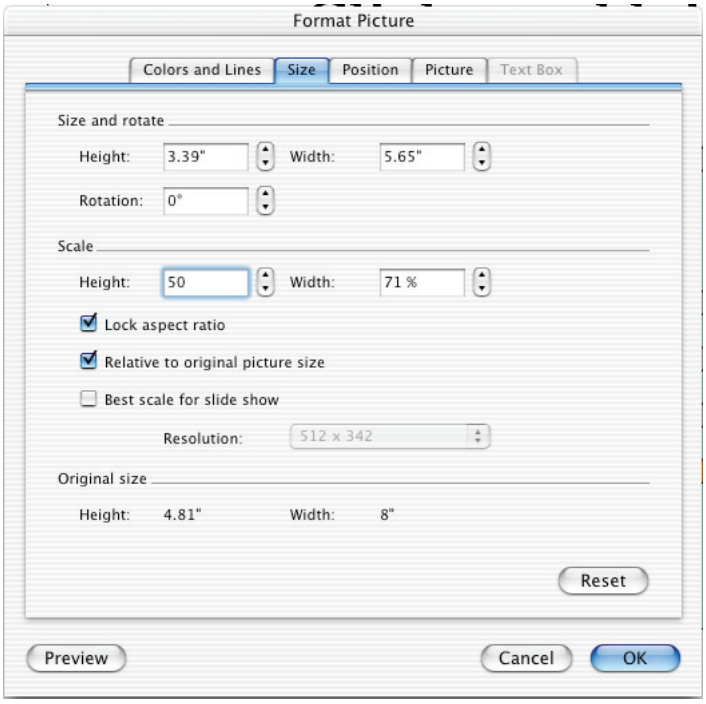
PNG-24 only has a transparency option and a Matte: option since you can have millions of colors with PNG-24 therefore you do not need color and dither settings.

13. Switch to PowerPoint. From the Insert menu choose Picture From file. Choose the file you just saved from Illustrator in the directory window that comes up.
14. Double click on the inserted image (not the blue box you drew) and the Format picture dialog box will open.



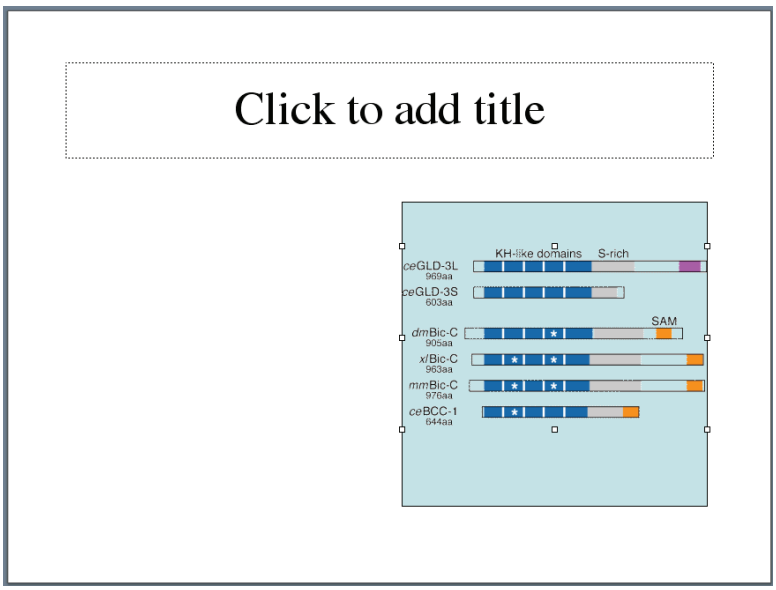


15. Click on the Size tab at the top. Under the Scale section make sure the Lock aspect ratio box is checked and then type 50 in the Height or Width box. Then click OK or hit the return or enter key.



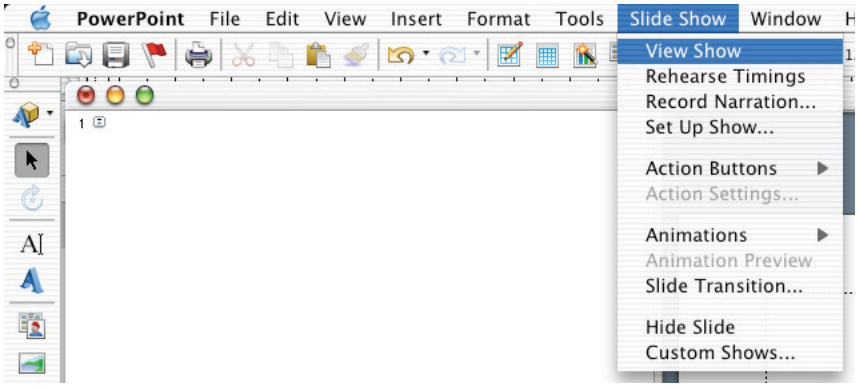
NOTE: We always want to pick 50%... not 48%, not 53% or any other percent!!! The reason we pick EXACTLY 50% is because the screen is 72 ppi (pixels/inch) and the file we just exported from Adobe Illustrator is 150 ppi. By choosing exactly 50% we are perfectly aligning the image pixels with the screen pixels. In a pinch it is fine to choose a percent slightly to one side or the other of 50% but the image quality will be slightly degraded. The further you deviate from 50% the more the image quality will degrade.

16. Move the inserted picture over the blue box we drew earlier.



17. Click on the blue box and then hit the Delete key.

You now have a perfectly sized image on your slide. Add a title and choose Slide Show–View Show and look at your image on screen.



Creating a poster using Adobe Illustrator

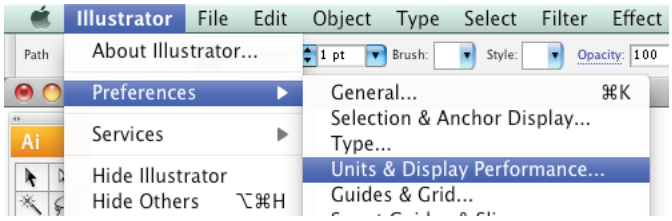
You will learn the following:

Setting up a poster file
Changing the Unit preferences
Formatting and layout of a poster
Titles, identity and location
The abstract
Text boxes and leading
Switching between open files
Placing images
Five general rules for posters
Examples
Printing

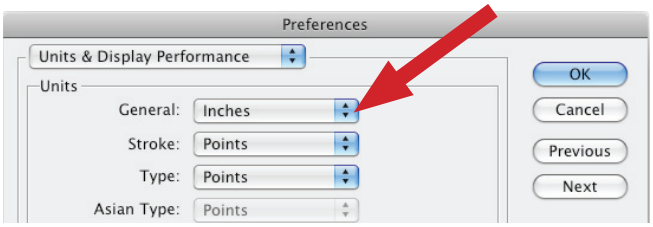
Setting up the poster file

Note: Before you try to create a poster, please complete the basic Adobe Illustrator tutorial starting on page 7.

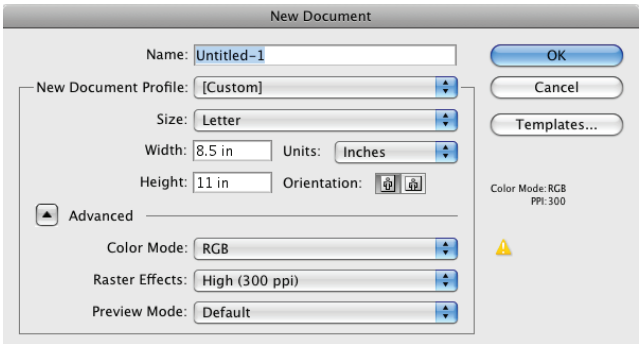
1. Open Adobe Illustrator.
2. Choose Illustrator, then Preferences, then Units & Display Performance...



3. Change Units, General, to Inches (if you haven't already done this in a previous tutorial).



4. Choose File, New. You will be presented with a New Document dialog box. Choose RGB for the Color Mode. Almost all of the files you create with Adobe Illustrator will be done as RGB files. RGB files are used in PowerPoint presentations, Posters and on the web, CMYK files are used for journal illustrations only.



5. Type the size of your poster into the Width and Height fields. Since the maximum paper size the poster printer can print is 44", keep either the width OR the height to a maximum of 43.5", the other dimension can be up to 227.54" (19'). Click OK.

Note: All meetings specify what size your poster should be, please check the web site of your particular meeting. Common sizes are 24" x 36", 48" x 48", 48" x 60" and 48" x 72". For the "My Molecule" presentation in this class we will be using 43" Wide x 30" High.

6. Choose View, then Fit in window.
7. Save and name the file with your last name, the title of the meeting and the year, on your desktop. This will help everyone keep track of your poster when it comes time for reviewing, sharing and printing. E.g., lastname_mymolecule_08.ai.

Formatting and layout of your Poster

Where does one start !?!

Posters are used to communicate information, therefore you should be thinking about what information you want to communicate. A good poster is one that presents information clearly and succinctly. Your poster should be ONE thought, ONE process, or ONE idea – NOT MANY!!! It should be as simple as possible, with supporting images and short blocks of text that describe those images, most importantly... all images must relate to your message!

Title, identity and location

8. The title should sum up the entire poster in as few a words as possible. The title is generally centered and usually in a 100 point, sans-serif, bold, font (**Arial**, **Verdana**, etc.).
9. On the next line add your first and last name and the name(s) of any other **major** contributors to the work represented in the poster. The presenting author's name is always first and the major professor's name is always last. This line is also centered and is usually 75 pts.
10. Add the location of the presented work, including department, university affiliation, state, zip and country. This line is also centered and is usually 55 pts.

Note: All of these fonts and sizes are adjustable, as is the vertical space (leading) between the lines of text. We are giving you what we have found to work best over the years. Use whatever you feel is appropriate!

The abstract

All posters should start with an abstract. The abstract should be used as the outline of the poster. The abstract should state the following:

- Why is the presented information important?
- How does the presented information further the current body of knowledge.
- A brief explanation of the methods.
- A succinct statement of the results, conclusions and/or recommendations.
- References

Some people break up their abstract into sections (introduction, methods, conclusions, references, etc.) and then place each of those sections in a different part of the poster.

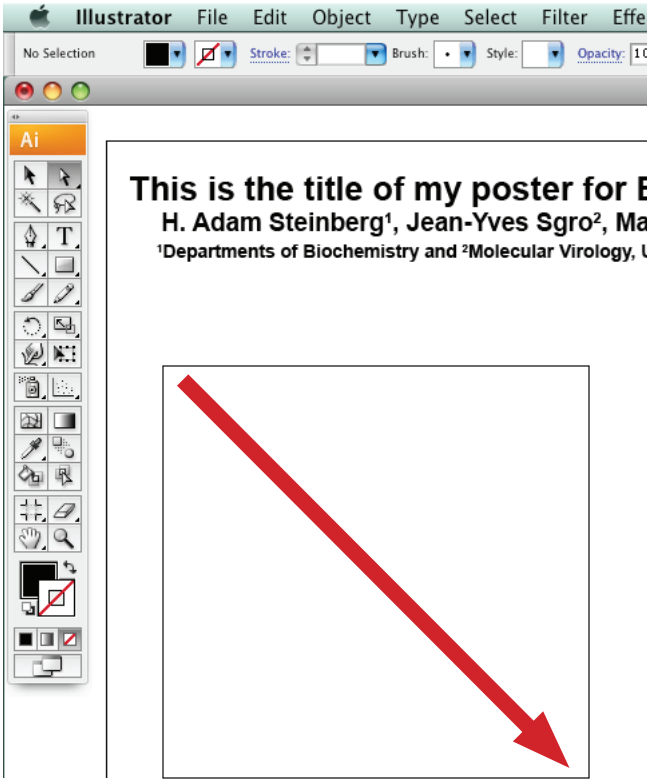
Note: If you think about it, your entire poster **IS** an abstract, therefore you don't need a written out abstract. This however is not the convention and most people will be looking for a written abstract to follow.

Remember: Posters should help you engage your colleagues in dialog. They should help you get your point across to as many people as possible.

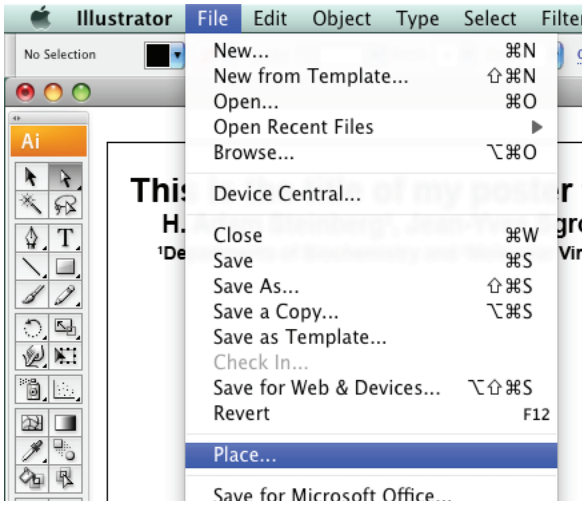
Creating a text box

Note: Adobe Illustrator allows you to import text from any word processing program.

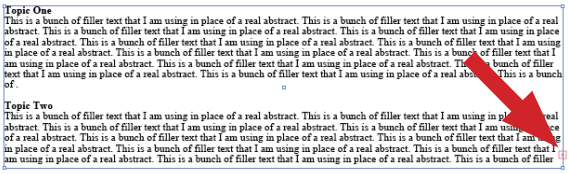
11. Take the type tool and click and drag out a text box to the size you think your abstract will be. Don't worry if you do not know how big to make this box, you can resize it at anytime! By dragging out a text box you are telling the program that you want contain all of the imported text in this box.



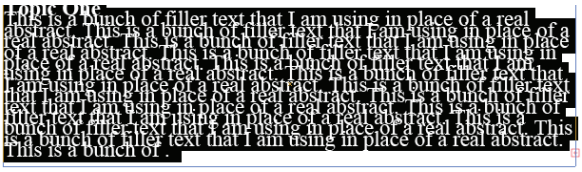
12. Choose File, Place, then locate your written Abstract in the directory structure and click OK.

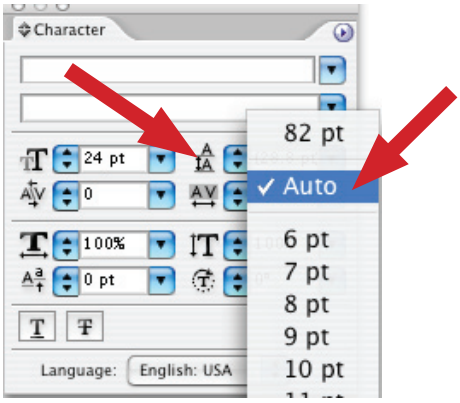


Note: When you import more text then your text box can hold, Illustrator will display a small, red, boxed, plus sign in the lower right of your text box. Do not worry about this just yet!

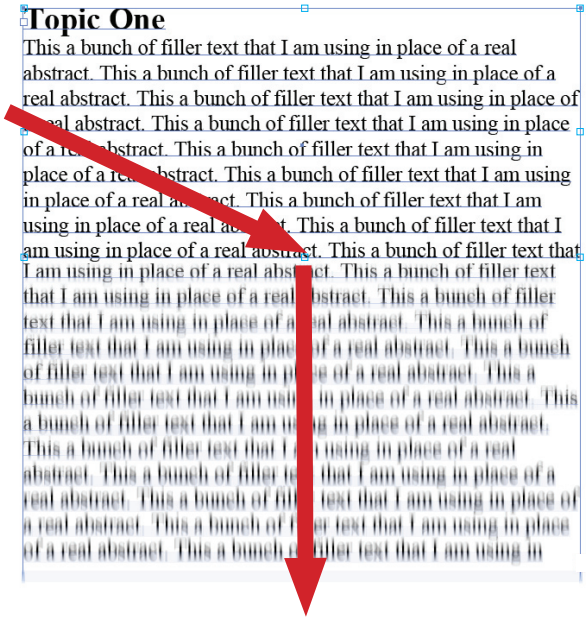


13. While the text tool is still active in the text box choose Select All from the menu. This will select all of the text in your text box for you.
14. In the Character palette change the font size to 24 pts. This is the best presentation size for general text on a poster. Your text should now look like the example shown right. The reason that this text is all crammed together is because the leading (the space between the lines of text) is set incorrectly for 24 point type. In the Character Palette change the leading to "Auto" from the leading pop-up menu.

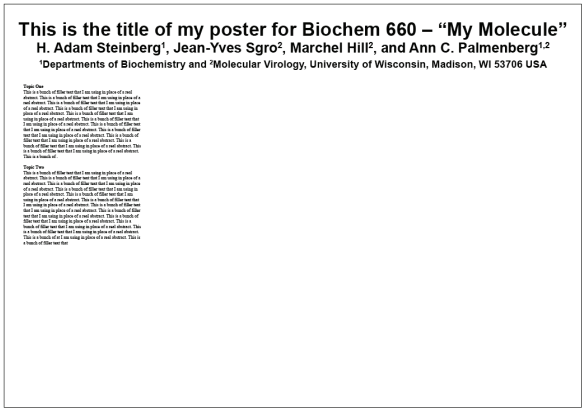




15. Highlight just the first line of the text "Topic One" and change it to 36 pts. This the best size to use for headline text.
16. Remember the little red, boxed, plus sign telling you that there was more text to display? Let's fix that now. Take the black arrow tool (Selection tool) and click on the text box. You will see little blue squares in the corners and in the middle along the edges of the text box. Clicking and dragging any one of these little blue squares will re-size your text box. Click and drag down the little blue square that you see along the middle of the bottom edge of your text box, until you can see all of the text in your text box.

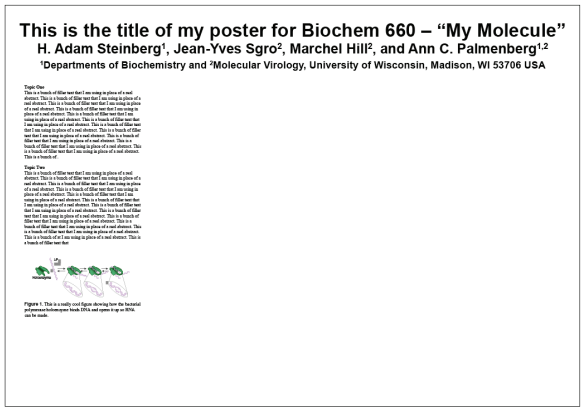


Your poster should now look something like the example, right.



Placing images

17. From Adobe Illustrator open the sample file, figure 1.ai. Select all and Copy.
18. Go to the Window menu and choose your poster file from the list of open files at the bottom of the window menu.
19. Paste in figure 1 and move it below your abstract with the black arrow tool.
20. Again take the text tool and drag out a text box under the figure, so you can add a caption. Use 24 pt. font. Write a "dummy" caption of your own. Your poster should now look something like the example below.



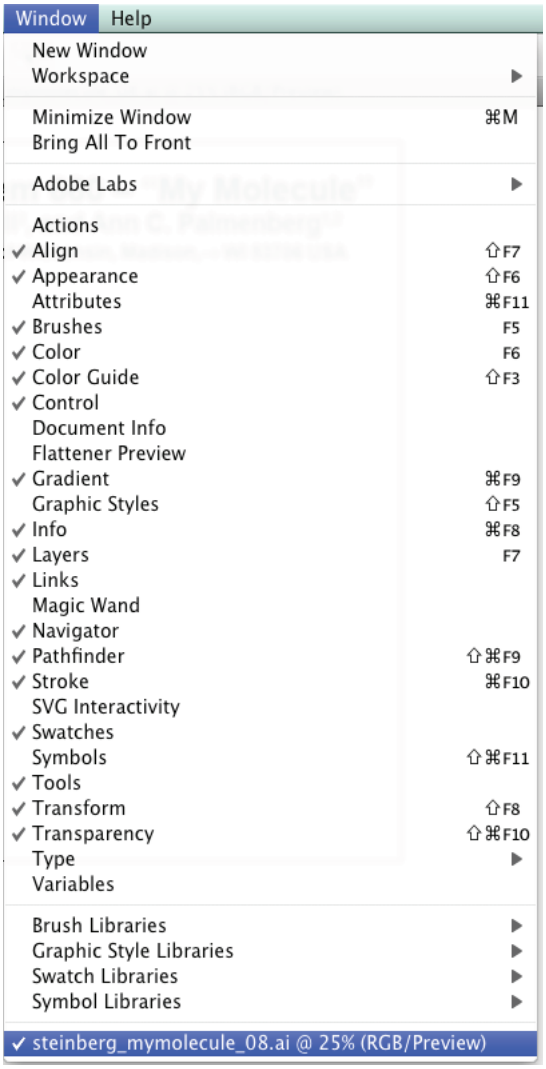
21. Choose File and then Place. Open the sample file called Rhodopsin.jpg. Drag this image so it is to the right of the abstract. It will be the start of our second column.

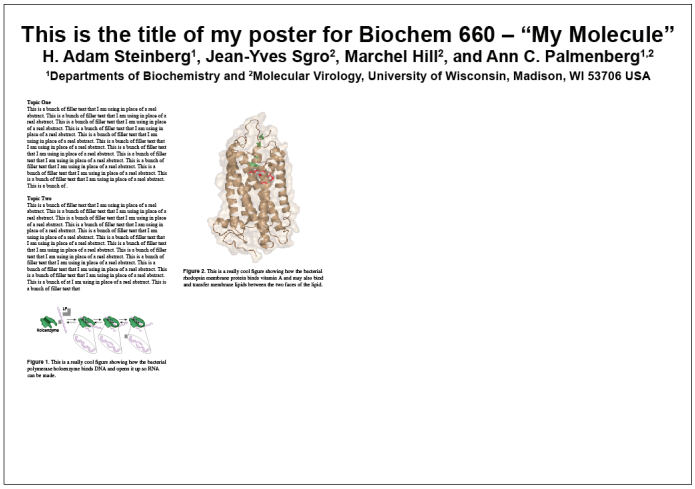
Note: Bitmap images placed into Illustrator need to only be 180 dpi if they are going to be used without any scaling. Just like in the Illustrator to PowerPoint tutorial on page 31, all images you create for your poster should be created at the size you are going to use them in the poster. You may use files with higher dpi but the extra dpi will not be used by the poster printer and will only slow it down. If you already have files scanned at higher dpi for use in other documents don't bother resizing them down to 150 dpi unless they are at dpi's higher than 600.

22. Create a figure caption for the rhodopsin molecule by Shift - Option - Dragging the figure 1 caption, just like we did in step number 11 on page 41. See example, right.

You can now finish your poster by adding more images, captions and text boxes for conclusions, references, etc.

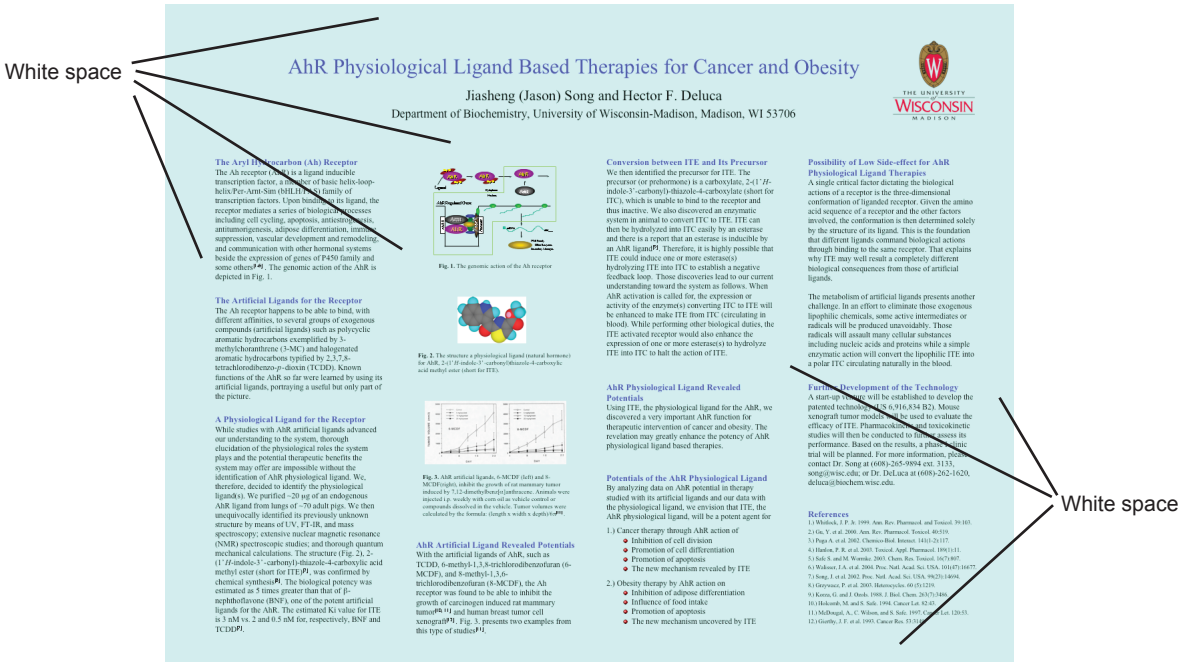
Note: You will need to embed all of your image files before you print your poster on the poster printer. See page 46 for instructions.





Five general rules for poster layout and presenting information

1. **Author Identification –** Make sure you use your first and last name. This allows colleges at the meeting to converse with you on a first name basis. It is also a good idea to include your complete address, email and phone number somewhere on the poster incase someone at the meeting would like to contact you.
2. **Make your research objectives clear –** Use large bold headings (36 pts.) that state the following: Introduction, Background, Objective, Main point, Aims, Summary, Results, Conclusions, References, Contact, etc.
3. **Traffic flow –** When laying out your poster remember that you are trying facilitate the movement of people past your poster. In general, present your poster in columns from left to right. This allows participants to read your poster and move out of the way when the next participant starts to read your poster. Columns do not need to all be the same size (see examples) but in general, equally sized columns have a familiar symmetry.
4. **Appearance –** Make your poster pleasant to look at! There should be a pleasing use of text and graphics. It should not be cluttered or sloppy! Make it easy for the participants to follow the information in your poster by using large figure numbers. Make your poster text easy to read (24 pts.). Leave white space on all four sides and in between the columns and title of your poster. This allows the reader to rest as they proceed through your poster.

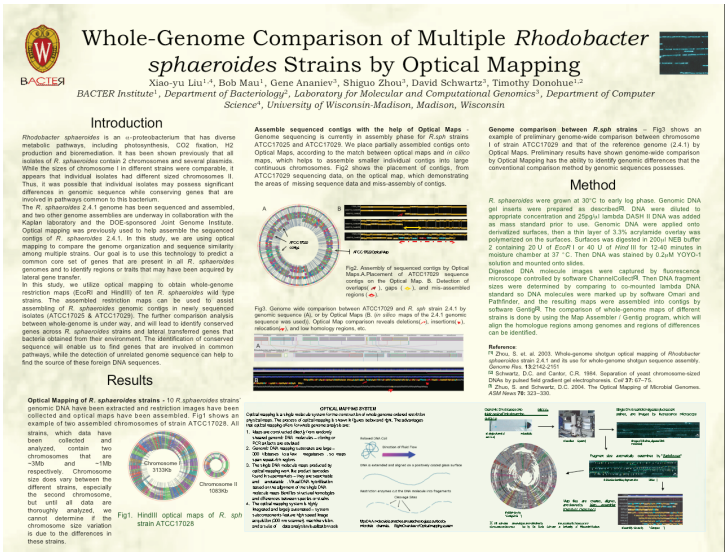


5. **Balance between graphics and text –** DO NOT BE WORDY!!! Cut your text and title to the bare minimum. Repeat this mantra over and over in your head, "SHORT AND SUCCINCT"! There should be enough text to explain the graphics, and enough graphics to clarify the text! You are not writing a journal article!

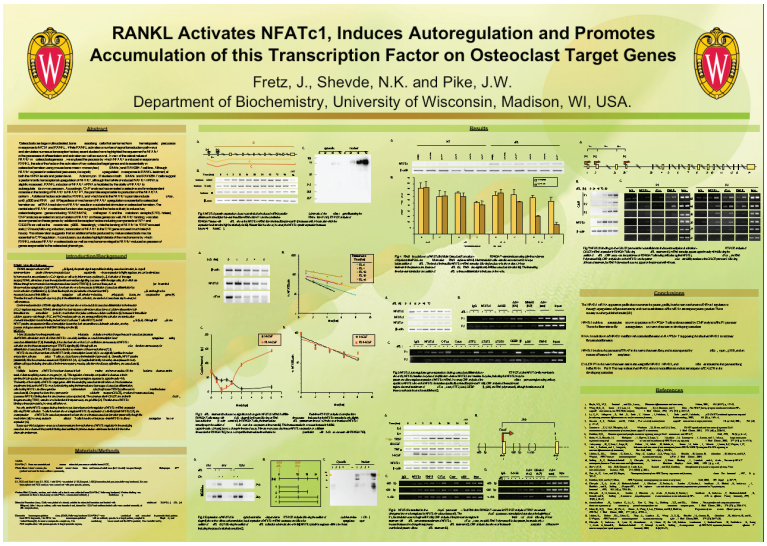
Some examples:

The (light blue) AhR therapies poster on the previous page is an example of a simple, straight-forward poster. The information is presented in regular columns though it is very heavy on the text side and very lean on the graphic side.

The (beige) Whole-genome comparison, poster at the top of this page, is an example of a methods poster. There are no conclusions. The information is presented in three even columns but you can see they added a two column figure to the bottom of the second and third columns.

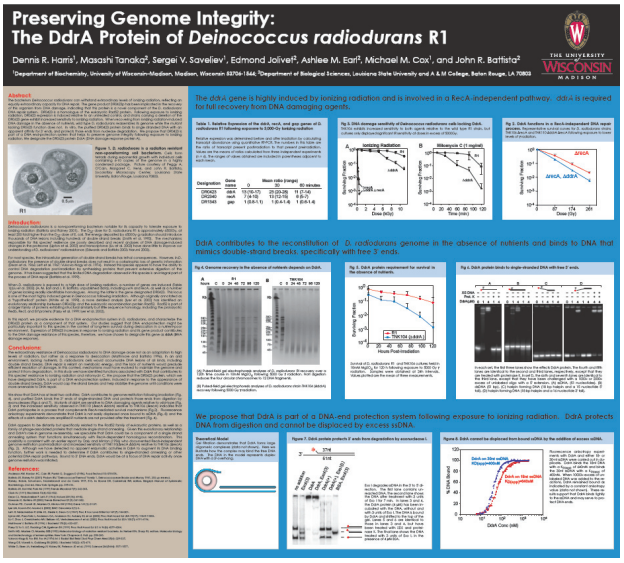


The next example on RANKL, is presented with all the text on the left and the right and all the figures in the middle. Though this is a visually striking poster, it is lacking white space around the edges and in between the columns.



The last example, DdrA protein, uses a three frame approach to present the information. Color is used to separate the title (black background), text (beige background) and figures (light blue background). All of the text is together, as are all of the figures.

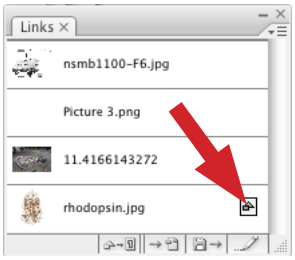
Remember, it's your poster! It should reflect your style and opinions so don't be afraid to adapt these lessons to your taste.



Printing

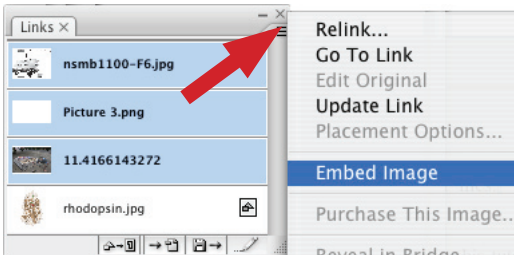
Once you have finished your poster you should print out a proof, show it to the following people, and weigh their advice carefully:

Yourself (your poster will look different when you see it on paper!), your PI, your lab mates, someone who doesn't understand the topic



Embed your images before you submit your poster to the Media Center for printing.

1. From the Window menu in Adobe Illustrator choose Links to open the Link Palette. Notice that the first three images in this example do not have the little embedded image icon.



2. Highlight the images that are not embedded and from little black triangle in the upper right corner of the palette choose Embed Image.

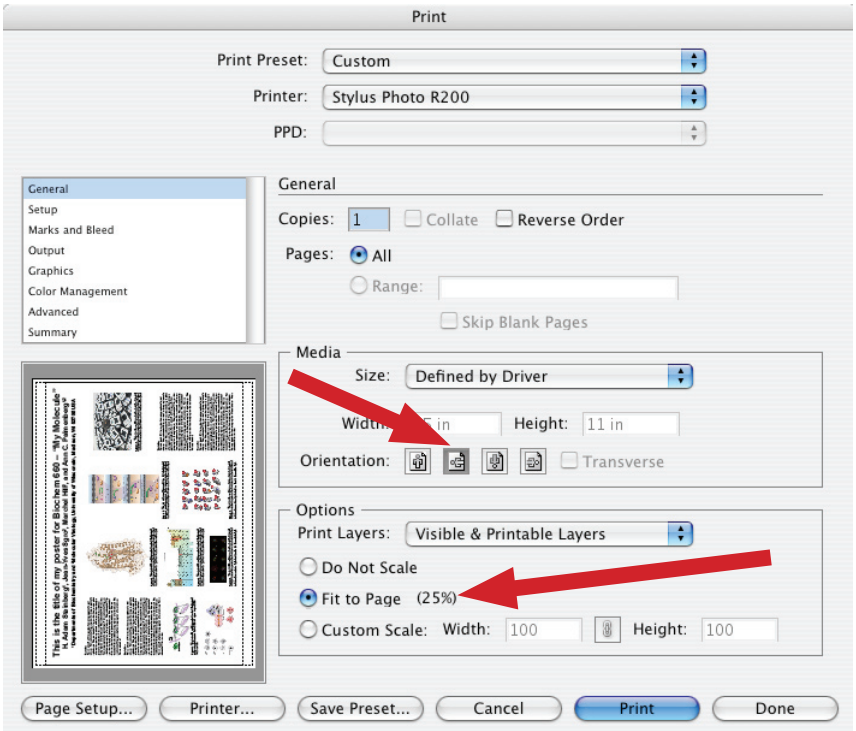
Print an 8 1/2" x 11" proof on any printer:

Choose File, Print and then click on Fit to Page, then Print. If the preview in the lower left doesn't fit the page, click on the Orientation and choose Landscape under Media in the middle of the print dialog box.

Print a 13" x 19" proof in the ITMC.

In a web browser type: http://medialabcolor2.biochem.wisc.edu.

Click on the "Install Print Drivers" and follow the directions for your computer on how to set up the printer. Then follow the directions above on how to make your poster fit the page. You may pick up your proof in room 401 of Biochemistry between the hours of 7:30 am and 5:30 pm.



Print out the final poster simply place a job on the job board, http://www.biochem.wisc.edu/medialab or bring it to the ITMC on a USB Flash Drive. In general it takes about 45 minutes to print a 43" x 48" poster if you did everything correctly. Remember this when there are 5 or 6 posters in line ahead of yours!

Creating a poster in Microsoft PowerPoint

Note:

PowerPoint **IS NOT** a program for creating posters.
Posters created in PowerPoint:

- Are limited to 56" in width by default.
- Are not widely accepted at printshops that print posters. Many places require PDF files.
- Have longer processing and printing times.
- Tend to have problems when creating, editing and printing.

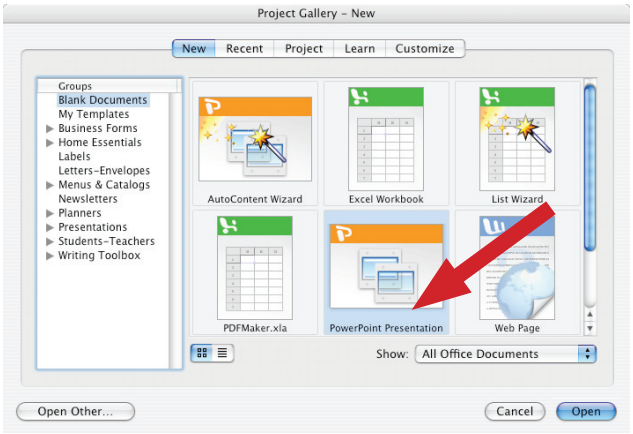
You MUST read through the Adobe Illustrator poster tutorial first (see page 39), as this tutorial builds on the knowledge learned there.

You will learn the following:

Setting up a poster file
Slide layout
Formatting palette
Drawing toolbar
Adding and formatting text
Inserting Microsoft Word files
Inserting pictures
Printing your poster

Setting up the poster file

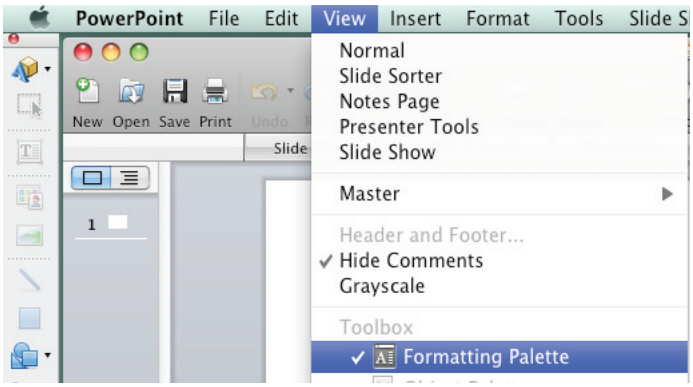
1. Open Microsoft PowerPoint.
2. When you first open PowerPoint you may be presented with the following window. Choose PowerPoint presentation.



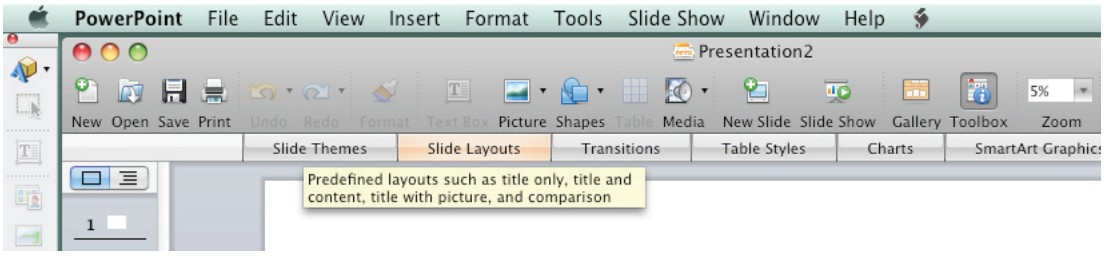
3. PowerPoint will open a new presentation and present you with a title slide.

Formatting Palette

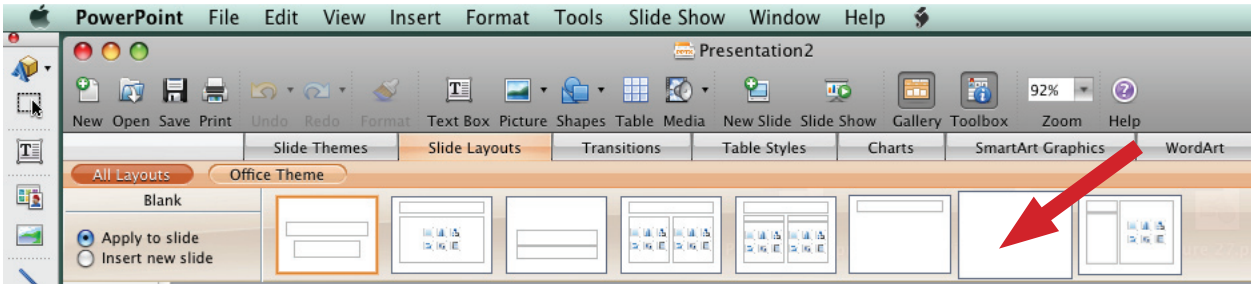
4. If the Formatting palette is not open on your screen then choose View, Formatting palette.



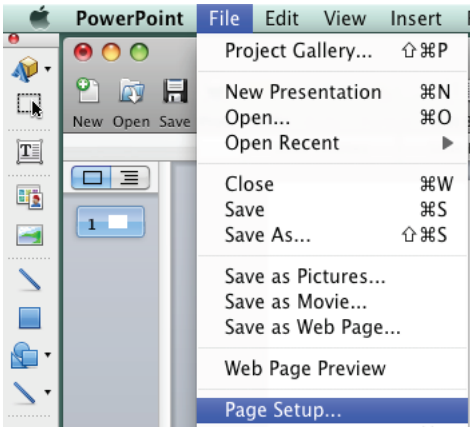
5. Click on the Slide Layout tab at the top of the slide.



6. Choose the plain blank slide.



7. Choose File, then Page Setup...

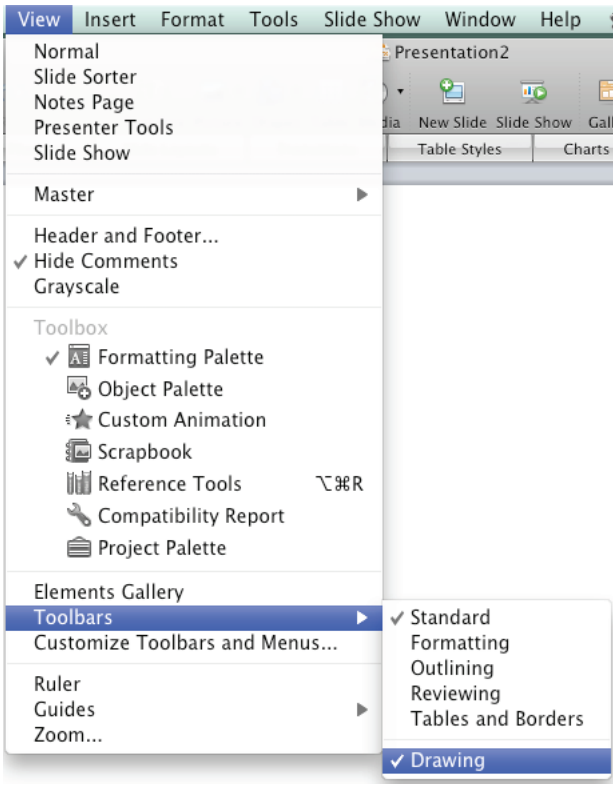


8. In the page setup change the Width to 43" and the height to 30", this is the size we are using for this example. Remember though one dimension must be 43" (see page 39).

9. When you click OK PowerPoint will ask you if you want to format your poster (which is just an oversized slide) to your current printer's printable area. Click Fix.

Drawing toolbar

11. If the Drawing toolbar is not visible along the left side of the screen choose View, then Toolbars, then Drawing.

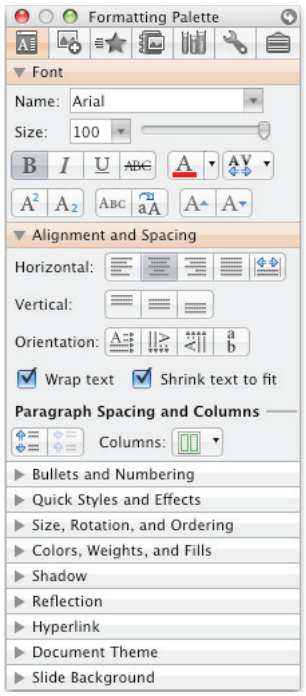


Text tool

12. In the Drawing toolbar choose the Text tool and then click in the middle top of the poster so you can add a title.

13. Type the title into the text box following the guidelines on page 40.

14. To format the text use the Formatting palette:



Font
Size
Bold
(super and subscript)

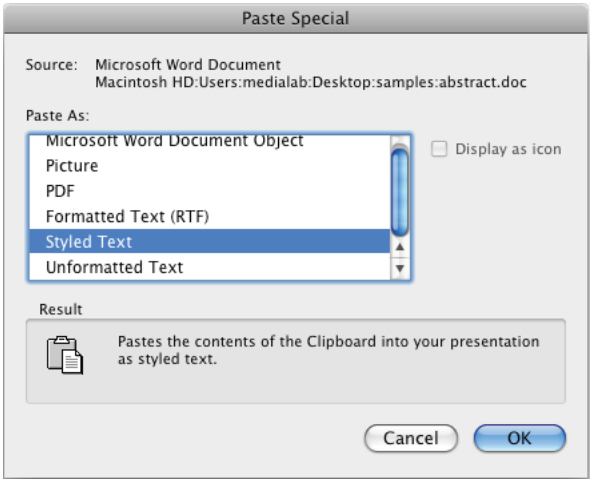
Align Center

15. Save the file with your last name and the title of the meeting and the year. This will help everyone keep track of your poster when it comes time for reviewing, sharing and printing. E.g., lastname_ mymolecule_08.ppt.

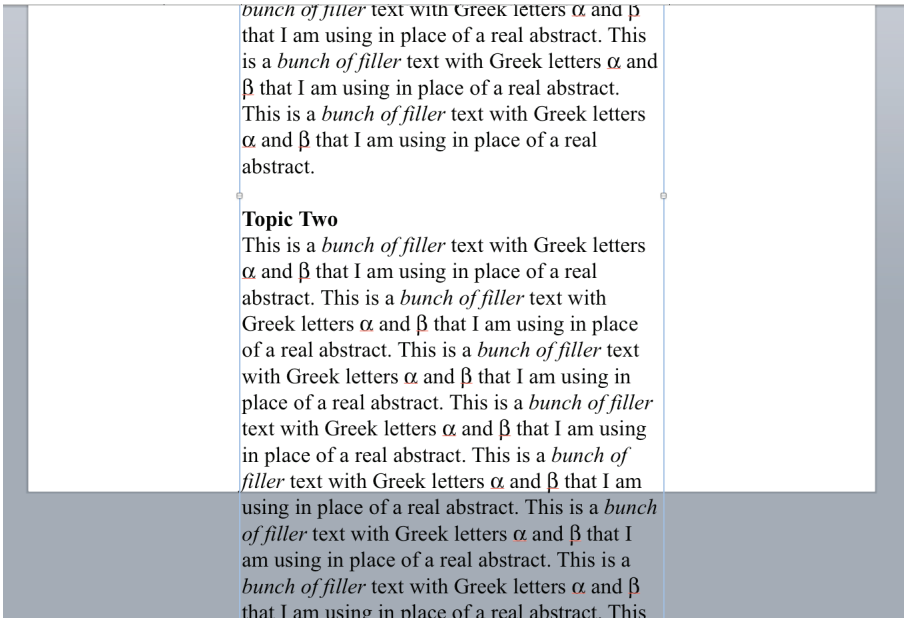
Inserting Word files

16. Open Microsoft Word.
17. Open the file abstract.doc
18. Select All and Copy the text.
19. Switch back to PowerPoint.
20. Choose Edit, Paste Special.
    Click on Styled text.

Note: DO NOT just copy and paste. You will loose the bold, italic and greek formatting!

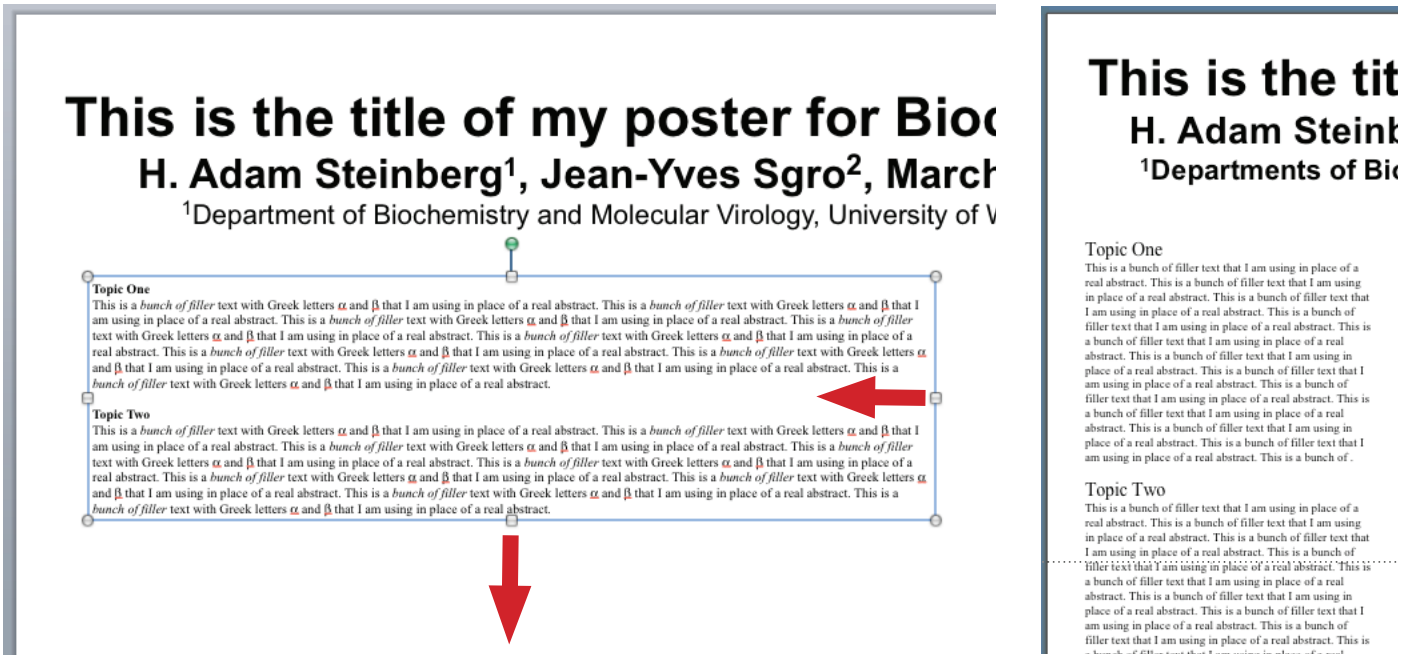


Your poster should look something like the example, right.

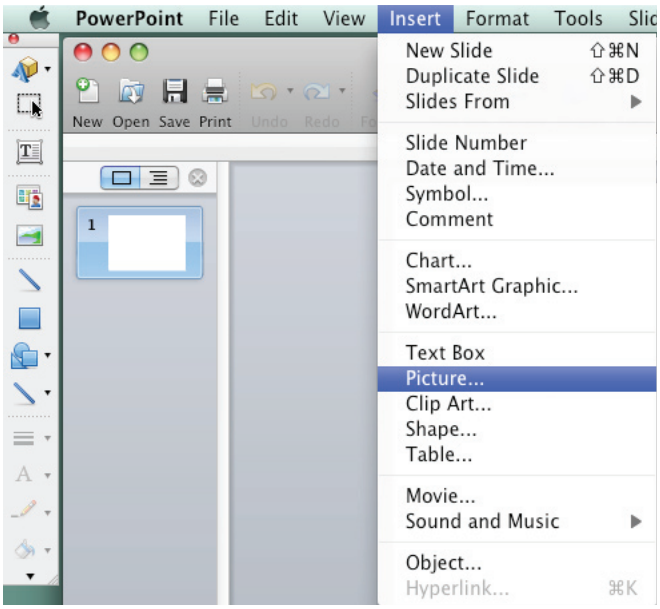


21. Select all of the text you just imported and change the font to 24 pts. The textbox will jump off the poster and you will have to scroll around to find it. Try looking above the poster.
22. Drag the textbox to the poster area and click on the textbox editing handles. Drag them to make the textbox longer and thinner, formatting the text.

From this: **To this:**



23. Choose Insert, Picture, From File... and choose the sample file rhodopsin.jpg.
24. Click on the text tool and create a figure legend for the rhodopsin figure.

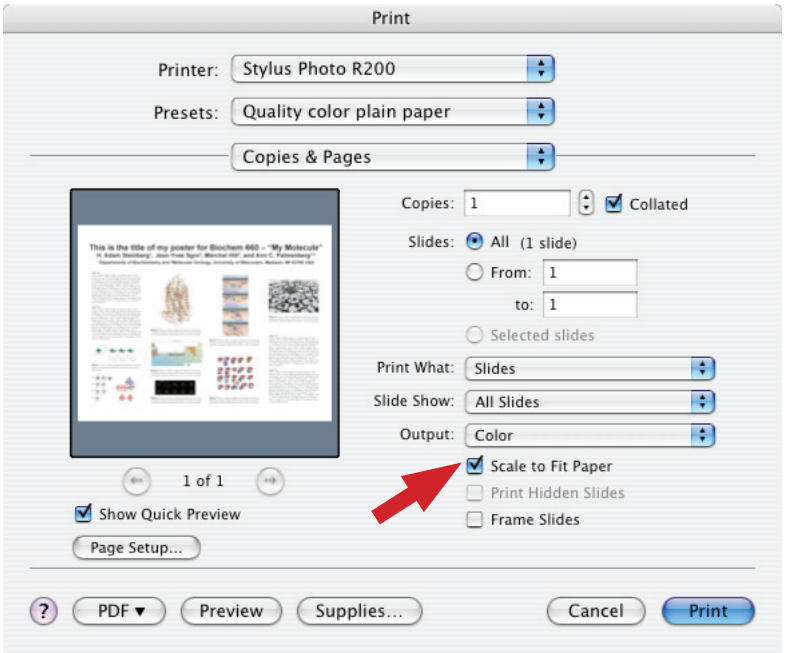


You can now finish your poster by adding more images, captions and text boxes for conclusions, references, etc.

Printing

Once you have finished your poster you should print out a proof, show it to the following people, and weigh their advice carefully:
Yourself (your poster will look different when you see it on paper!), your PI, your lab mates, someone who doesn't understand the topic

Print an 8 1/2" x 11" proof on any printer:
Choose File, Print and then click on Scale to Fit Page, then Print. If the preview on the left doesn't fit the page, click Page Setup and choose your printer from the printer list.



Print a 13" x 19" proof in the ITMC.
In a web browser type: http://medialabcolor2.biochem.wisc.edu.
Click on the "Install Print Drivers" and follow the directions for your computer on how to set up the printer. Then follow the directions above on how to make your poster fit the page. You may pick up your proof in room 401 of Biochemistry between the hours of 7:30 am and 5:30 pm.

Print out the final poster simply place a job on the job board, http://www.biochem.wisc.edu/medialab or bring it to the ITMC on a USB Flash Drive. In general it takes about 45 minutes to print a 43" x 48" poster if you did everything correctly. Remember this when there are 5 or 6 posters in line ahead of yours!

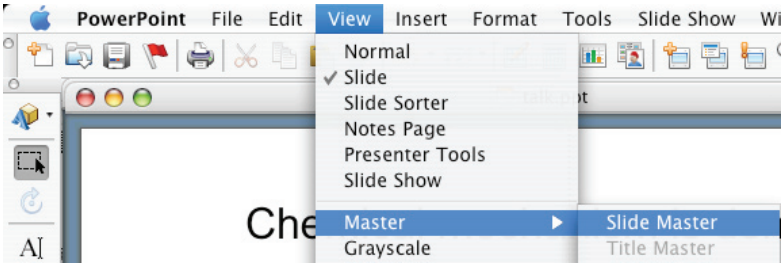
Converting a PowerPoint talk to a PowerPoint poster

You will learn the following:

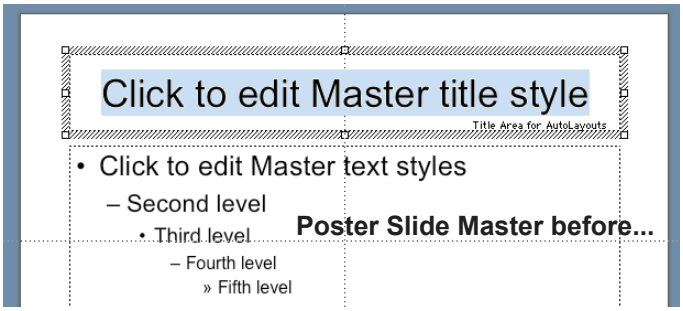
Setting the Slide masters
Viewing two PowerPoint files at the same time
Copying and pasting between a talk and a poster

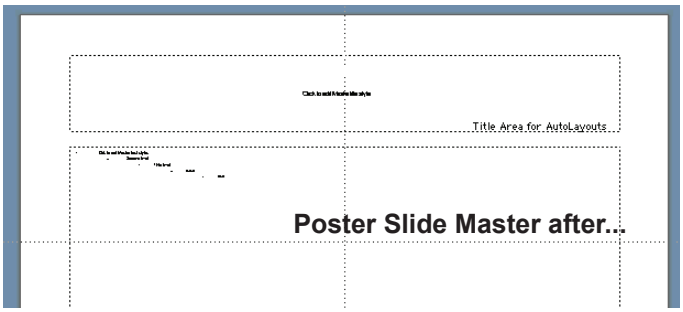
Create the poster file

1. First make sure you read and understand pages 39-45. Second, follow steps 1-11 on pages 47-49.
2. Save the file with your last name and the title of the meeting and the year. This will help everyone keep track of your poster when it comes time for reviewing, sharing and printing. E.g., lastname_mymolecule_08.ppt
3. Open the sample file talk.ppt.
4. In the talk.ppt file choose View, Master, Slide Master.



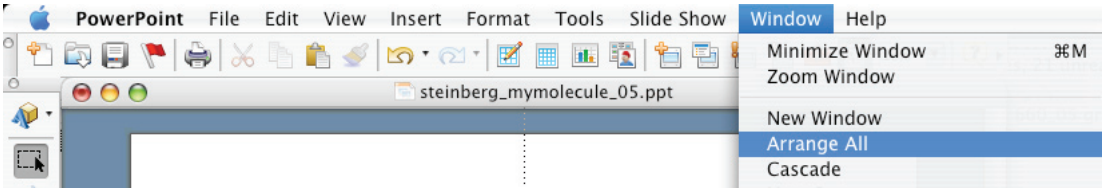
5. Click on the title box and note the font, font size and font style (bold, italic, etc.). In our example it's Arial and 32 pts. Then click on the 1st bullet line of text and do the same (Arial 22 pts.). Continue this with each line of bullet text.
6. Choose Window from the menus at the top of the screen and then pick your poster file from the list of open files you'll see there.
7. In the poster file choose View, Master, Slide Master.
8. Select all of the text in the title box and change it to whatever it was in the talk.ppt file. In our example that was Arial 32 pts. Select the text of the first bullet text and do the same. Proceed through each of the other bullet text strings in the slide master until the Slide master of the talk and the Slide master of the poster are the same.



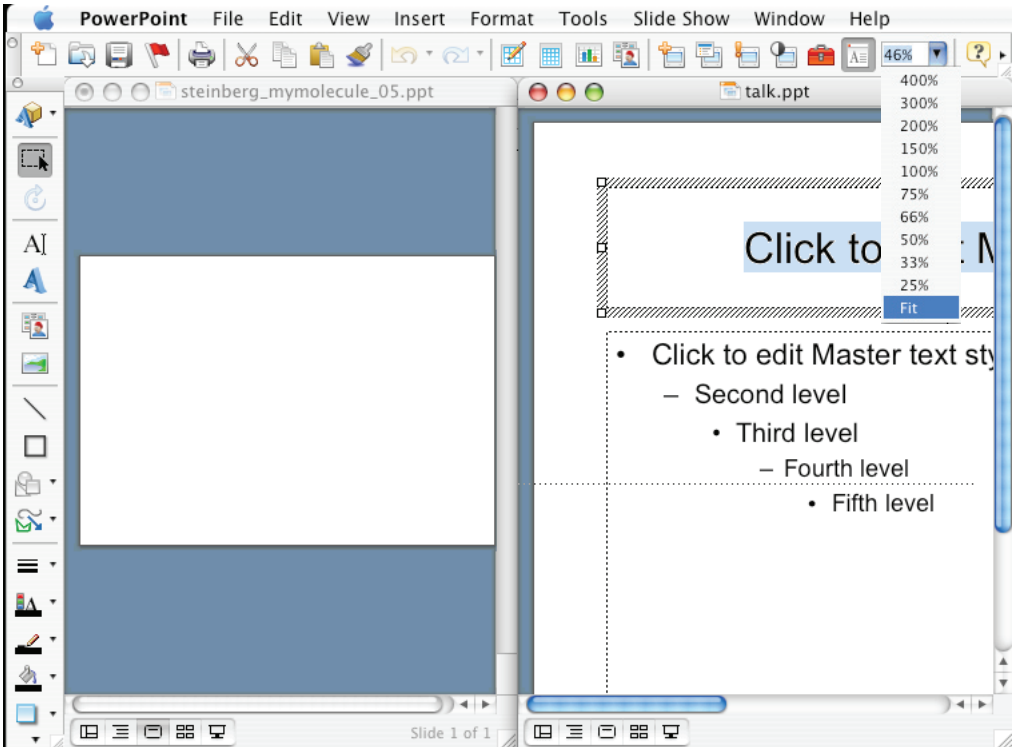


9. While still in the poster file choose View Slide.

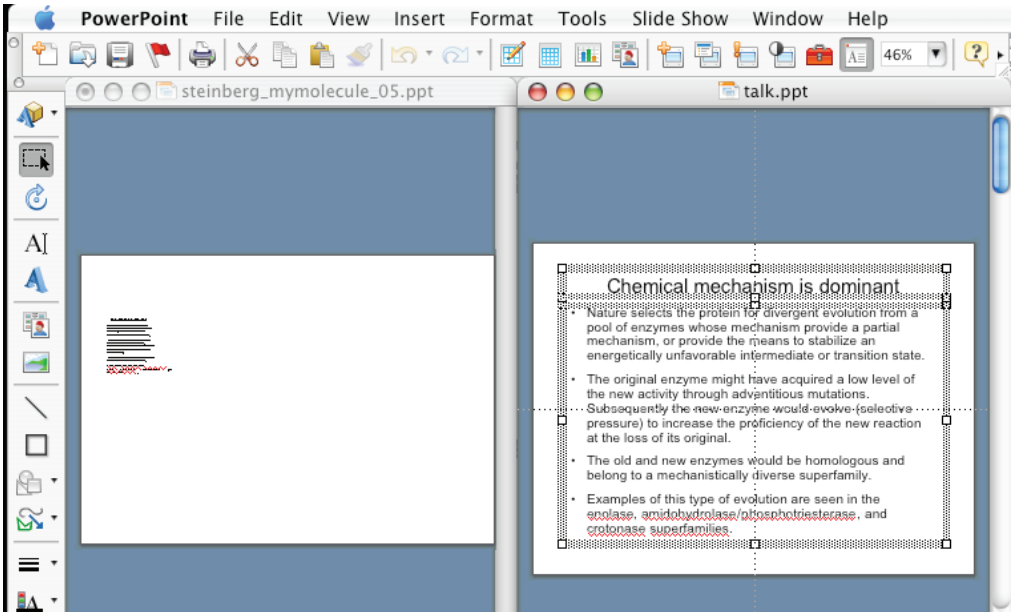
10. Choose Window, Arrange All.



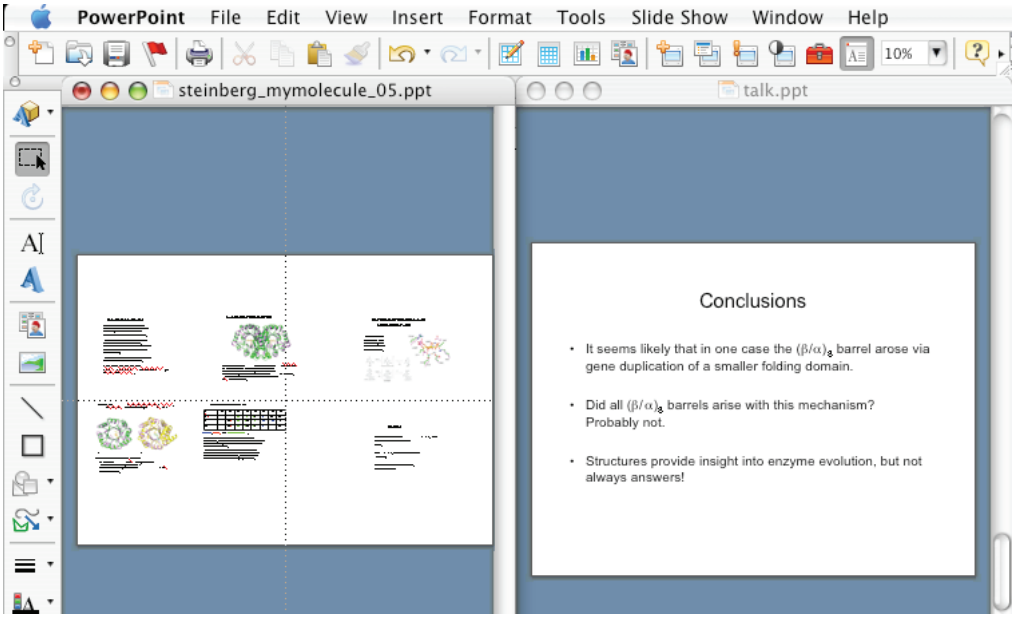
11. Click on the talk file window (right side) and choose View Slide. If your slide is too big change the size to Fit in the scale window.



12. In the talk file, Slide one, Select All and Copy. Click on the poster file and Paste.



13. Switch back to the talk file and go to slide two. Select All and Copy. Click on to the poster file and Paste. Repeat for all slides in the talk (six in our example).



14. Once you have moved all of your slides over to the poster file, close the talk file. Make the poster file full screen and complete your poster using the information on pages 47-52.

Note: Little things may change when you copy from one file to the other. Remember to go in and check all the details!

Notes:

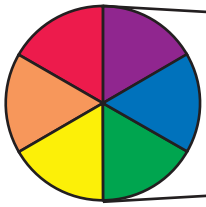
Color basics – *What is color?* Terms and definitions

H. Adam Steinberg - hsteinbe@wisc.edu

1. Pigment color wheel:

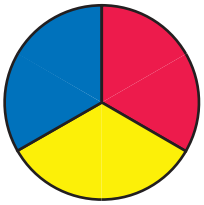
Red - Orange - Yellow - Green - Blue - Violet

This is the best representation of the real spectrum that we can achieve with ink/toner on paper.



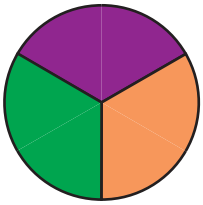
The spectrum of light:

Red - Orange - Yellow - Green - Blue - Violet



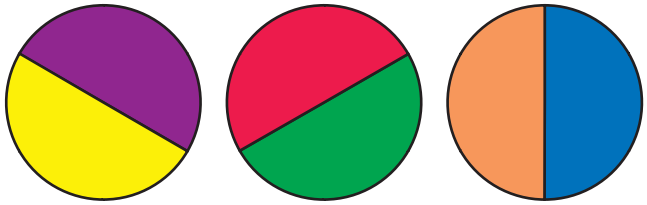
Primary colors:

Red - Yellow - Blue



Secondary colors:

Orange - Green - Violet



Opposite colors:

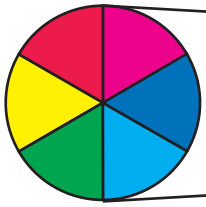
Violet - Yellow *Red - Green* *Blue - Orange*

Primary, secondary and opposite colors work very well together but only in printed materials, think sports logos. They do not work well together on computer monitors e.g., do not use red text on a green background or orange text on a blue background, etc. as the text will look like it is vibrating on the screen!

2. Spectral color wheel:

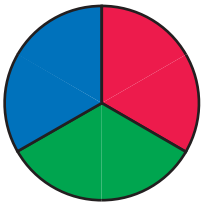
Red - Yellow - Green - Cyan - Blue - Magenta

These are the actual physical colors of the light spectrum. These are the colors you see on computer monitors.



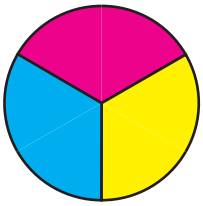
The spectrum of light:

Red - Orange - Yellow - Green - Blue - Violet



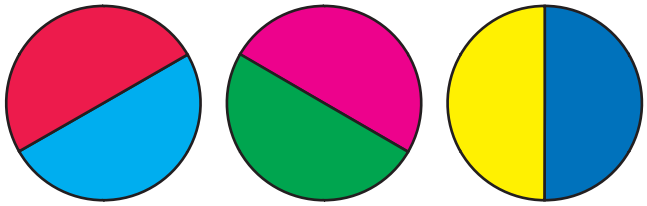
Primary colors:

Red - Green - Blue (RGB)



Secondary colors:

Cyan - Magenta - Yellow (CMY)

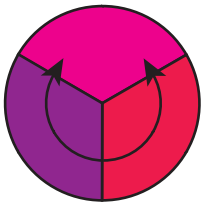


Opposite colors:

Red - Cyan *Green - Magenta* *Blue - Yellow*

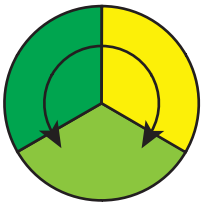
Primary, secondary and opposite colors work very well together but only in printed materials, think sports logos. They do not work well together on computer monitors e.g., do not use red text on a cyan background or magenta text on a green background as the text will look like it is vibrating on the screen! However, yellow text does work well on a blue background.

3. Special colors: Only use these colors with specific intent, use them sparingly.



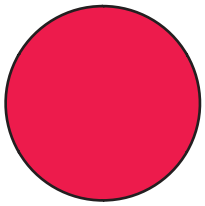
Magenta:

This is not a natural color. It is made by combining the two ends of the spectrum: many people find it “shocking”.



Yellow-green:

Chartreuse (Fluorescent green) is the exact middle of the spectrum: many people find it “alarming”.



Red:

Is a very attention getting color for humans, probably because it is the color of blood. Use it only to call attention to a special point or idea.

What colors do I use?

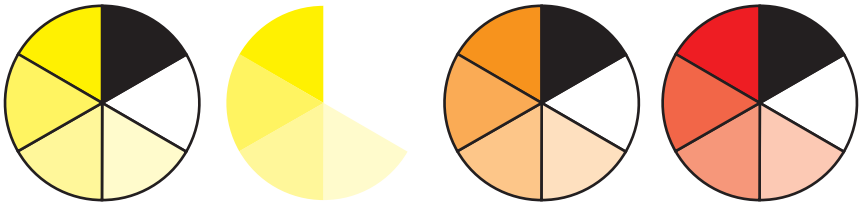
Follow these simple guidelines for color combinations that work!

Neutral colors:

Work well as a set, work well with any primary or secondary color.
Brown: any two opposite pigment colors will make brown e.g., red + green.
Beige: is light brown.
Gray: mix the three primary colors or the three secondary colors to get gray.
Black: made from a mix of all pigment colors or a subtraction of all spectral primary colors.
White: is the absence of all pigmented colors or the addition of all spectral primary or secondary colors.

Warm colors:

Red - Orange - Yellow - Brown - Beige
Generally favored psychologically by women, work well together as a set.

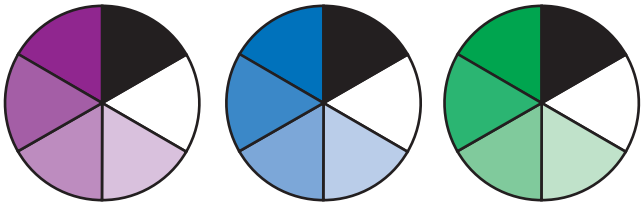


Monochromatic warm colors:

Three or four shades of the same color work well together as a set. However yellow on white does not have enough contrast unless it is stroked with a darker color. This is especially true when displayed on a computer screen.

Cool colors:

Violet- Blue - Green - Gray
Generally favored psychologically by men,
Work well together as a set.

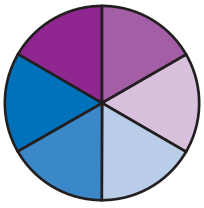


Monochromatic cool colors:

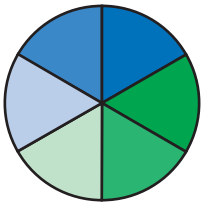
Three or four shades of the same color work well together as a set.

Any pair of Pigment colors:

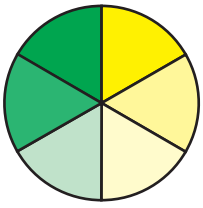
Work well together as a set, the exception is *Red - Orange*.



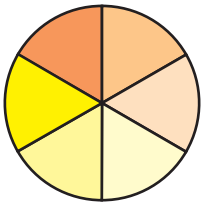
Blue - Violet



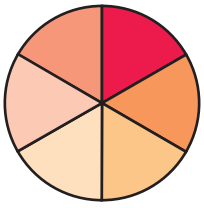
Blue - Green



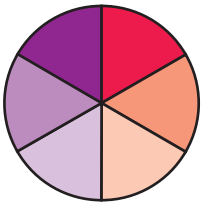
Green - Yellow



Yellow - Orange



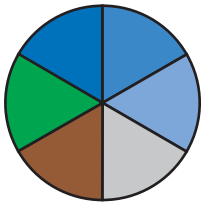
Red - Orange

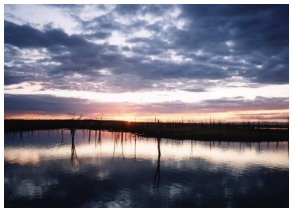


Red - Violet

Look to nature

Whenever you need inspiration on what colors to use just look to nature. It is always correct!

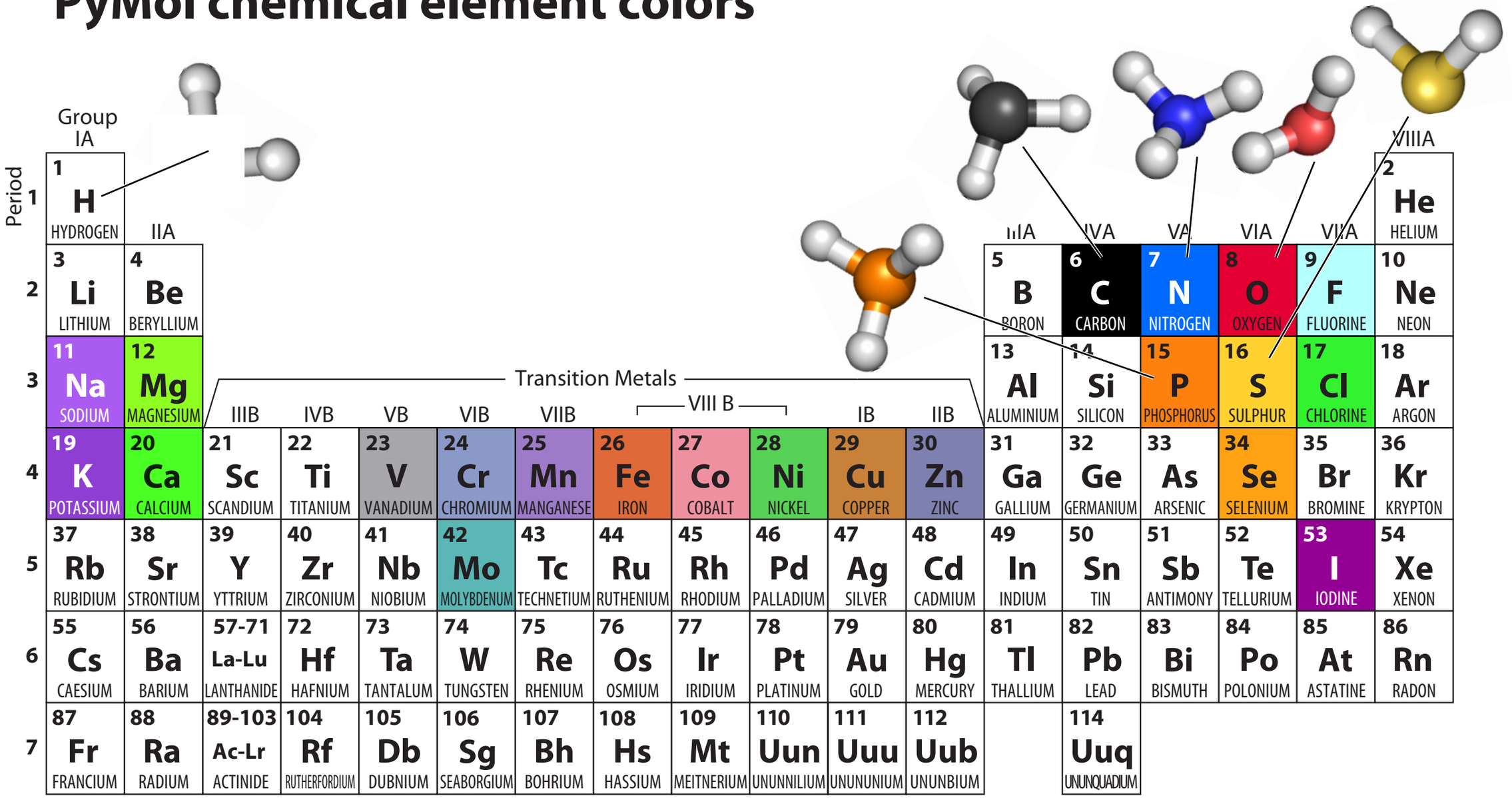




10 Tips for Great Scientific Illustrations

1. **Know your audience.**
   Don't illustrate what they already know, **clarify** what they don't.
2. **Tell your story.** Started here (hunch), did this (experiments), and ended up somewhere (conclusions). Keep the components (colors, shapes, views, etc.) consistent from illustration to illustration.
3. **Create interest** and stimulate **imagination.**
4. **Control:** move the reader through the illustration
   Left to right, top to bottom.
5. **Color:** only when necessary, use it to direct focus.
6. **Humor:** but only if appropriate to the subject matter.
7. **Human:** add face, hand, body, etc. humans love to see humans.
8. **New ideas:** require simple illustrations.
   Let the idea take focus not the illustration.
9. **Technical text** = technical graphic, add parts or sections to clarify.
10. In general, **never use the defaults,** they are always WRONG!

Never hesitate to invest in good graphics. They pay for themselves by clarifying your research and data to those around you.

H. Adam Steinberg - hsteinbe@wisc.edu

PyMol chemical element colors