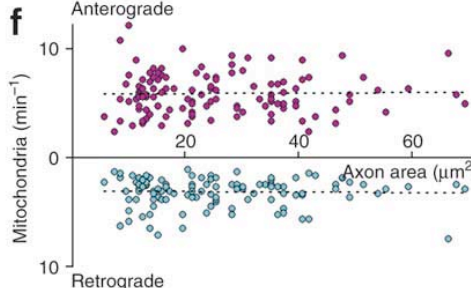
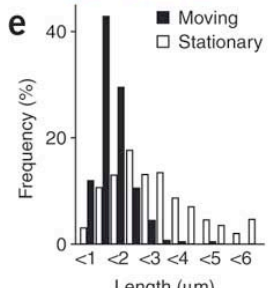
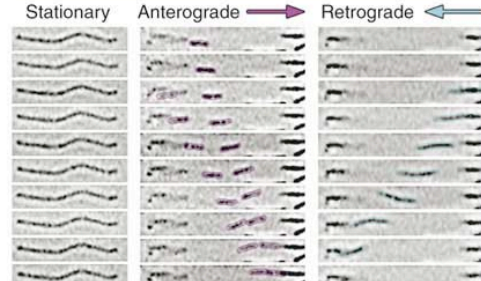
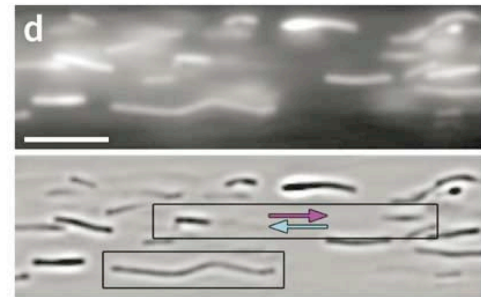
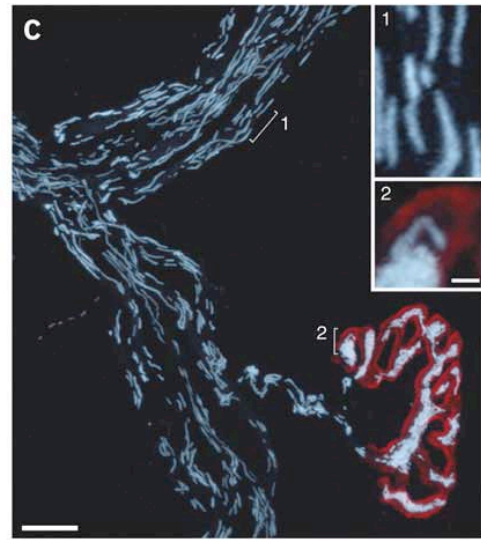
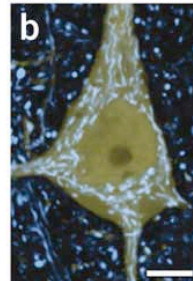
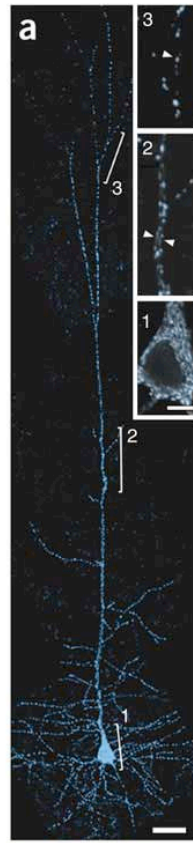
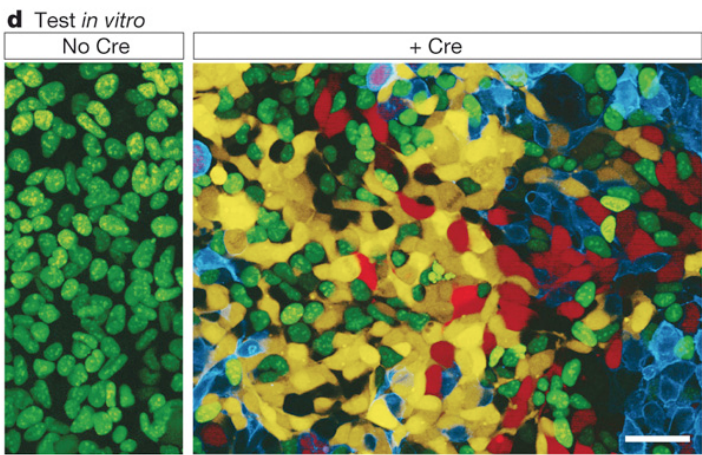
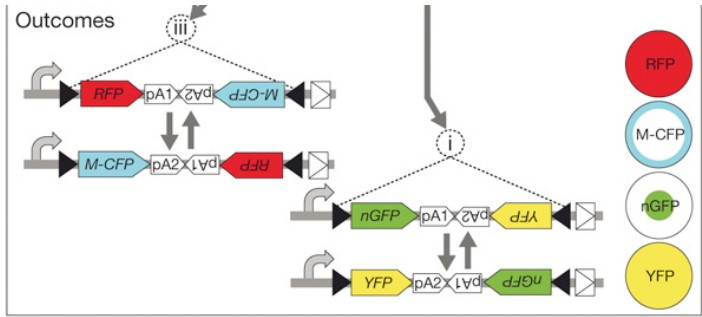


Making Professional Quality Scientific Figures: Part 1 – The Essentials

RESOURCES:

<http://www.people.fas.harvard.edu/~draft/thesisworkshop/>

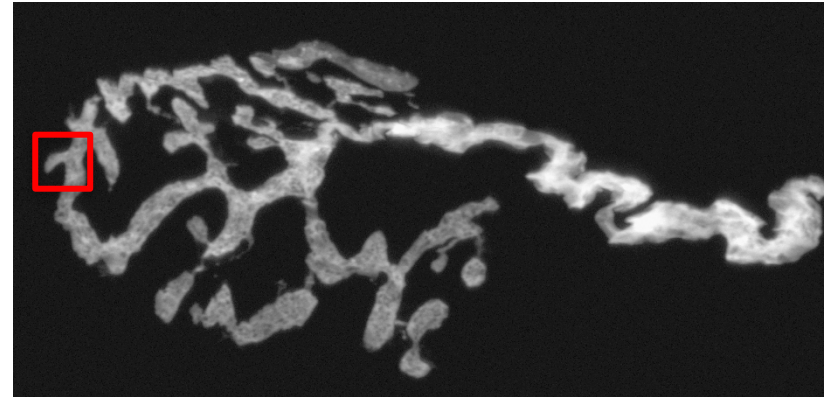
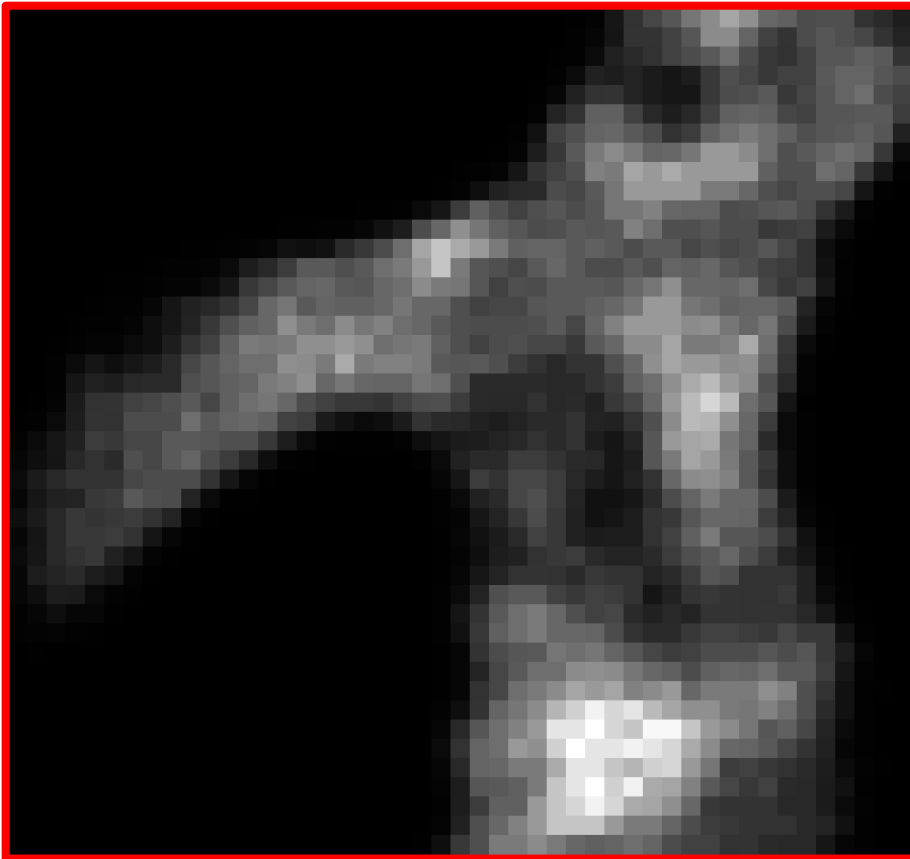
- PDF of this presentation
- PDF of instructions for image manipulation
- Sample images used in the demos



Figures are a mix of raster objects and vector objects

Raster objects: scans, microscope pictures, photos, screen-captures

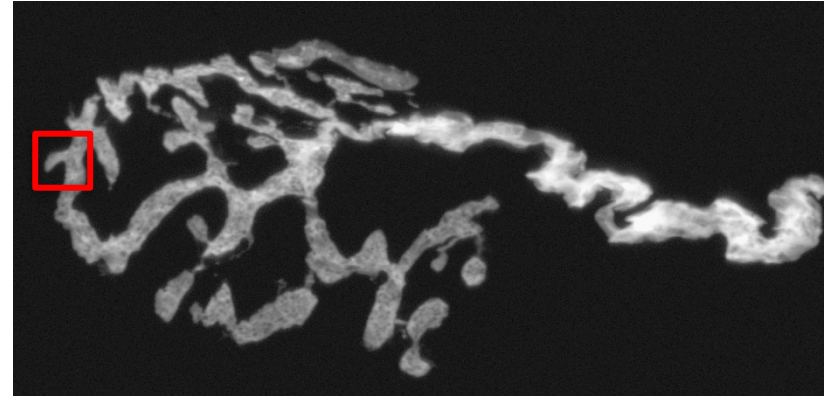
- **Pixel based** (set number of pixels)
 - Zoom in and see pixels
- Edit in **Photoshop** or **GIMP**
- File types: TIFF, PNG, JPG, BMP



Figures are a mix of raster objects and vector objects

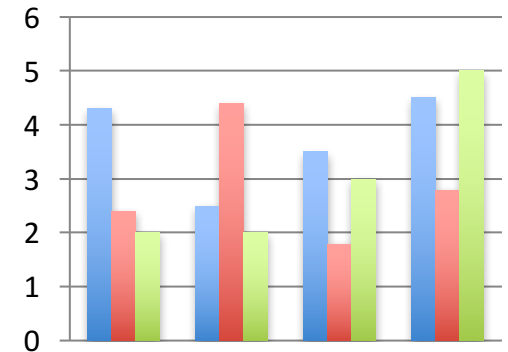
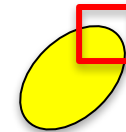
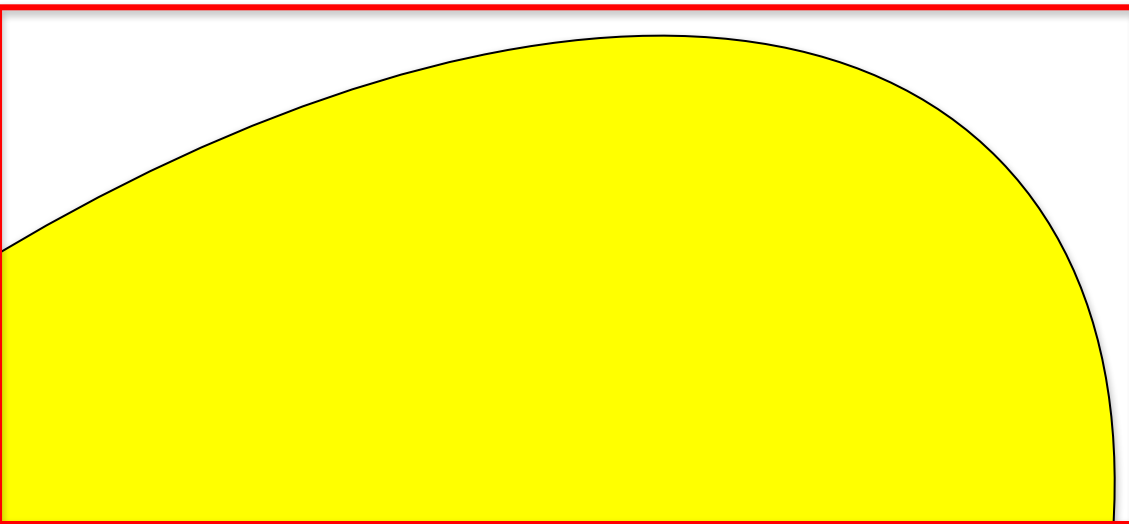
Raster objects: scans, microscope pictures, photos

- **Pixel based** (set number of pixels)
 - Zoom in and see pixels
- Edit in **Photoshop** or **GIMP**
- File types: TIFF, PNG, JPG



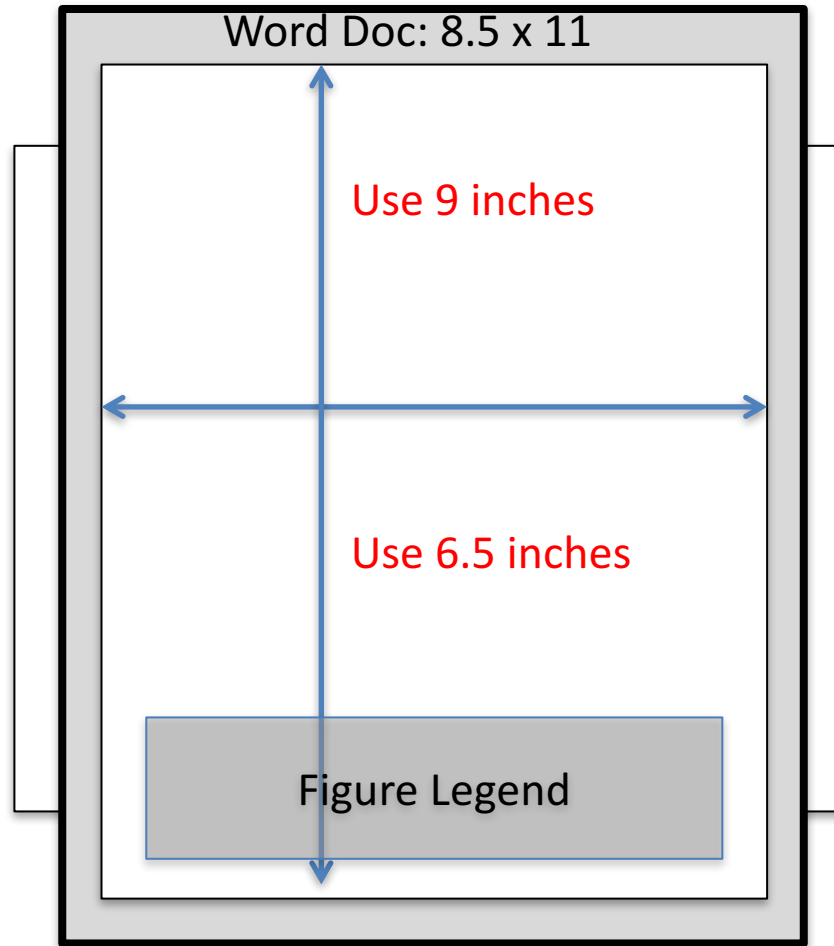
Vector objects: shapes, text, excel/matlab graphs

- **Not pixel based** (mathematical expressions)
- Zoom in without blurring
- Create and edit in **Powerpoint** (or Illustrator)
- **PPT, PDF can handle vector and raster objects**



Using PowerPoint to Build Your Figures

'File' >
'Page Setup' >
6.5 x 9 (Portrait)



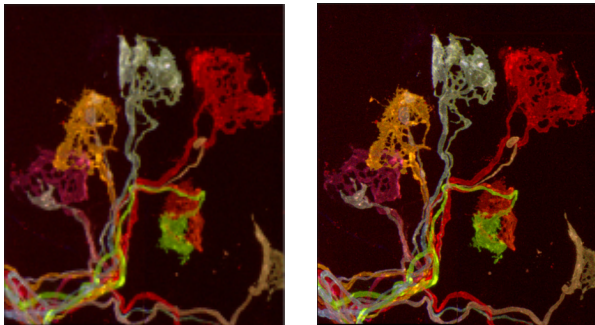
That will give you
a 1 inch border in
final document

- Set the page size so your figures can be easily integrated into your word document.
- Use Arial font for the figure legend. That is what most professional journals now request.

Inserting Raster Images: Resolution

How do we know if we have sufficient resolution for clear printed images?

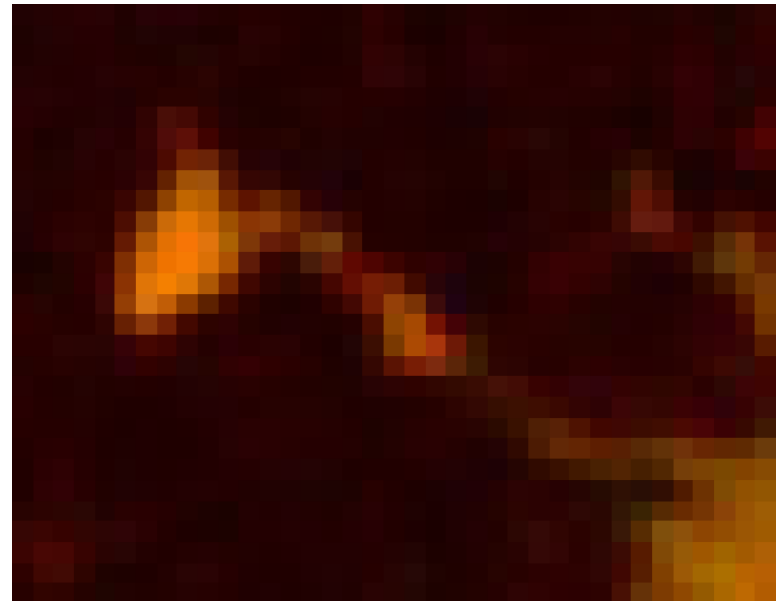
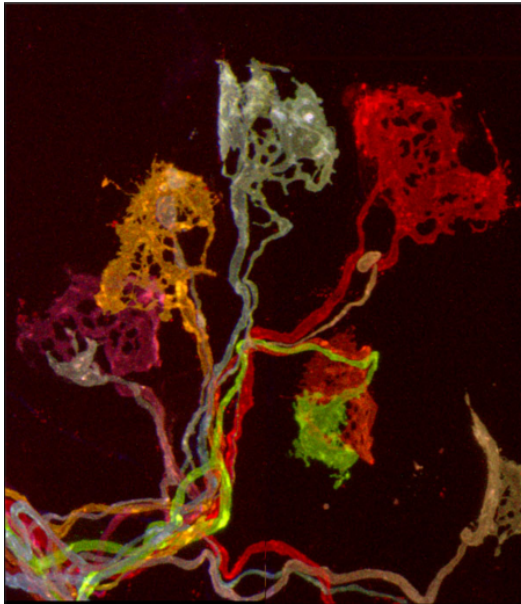
- Normal printer: **220 ppi/dpi** (pixels/dots per inch)
- Slideshows (projects/monitors) 72 dpi



Which image is 72 ppi and which is 220 ppi?
- Screens only show 72 ppi.
- Can only tell when printed out or zoomed in.

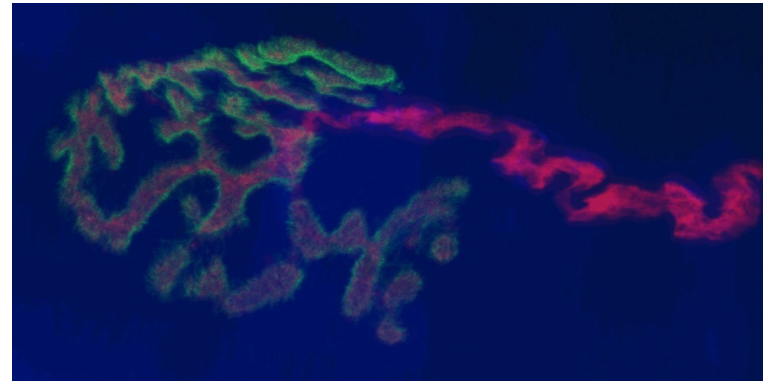
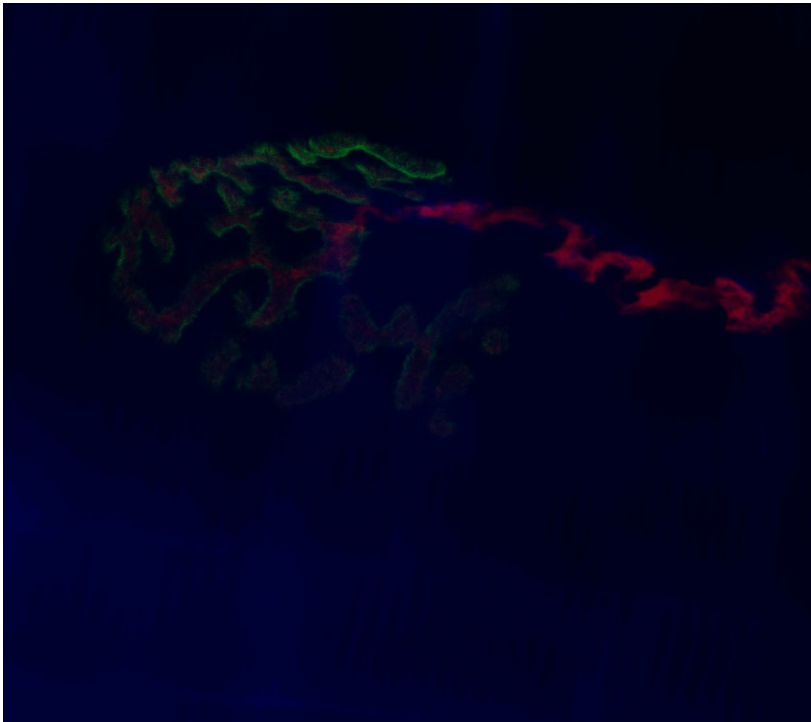
How to Insert Images into Powerpoint

- 'Insert' > 'Pictures' (or drag them in)
 - Don't copy/paste– bad things can happen
- Resize to make it smaller if you want
 - **Avoid** resizing to make it bigger! Powerpoint will add pixels (interpolate)
 - Either retake the picture or keep it small
 - Note: if you are in a pinch, and need to resize an image to make it bigger quickly, just resize it in Powerpoint. The image won't be perfect, but it is still acceptable for the thesis.
- Check quality by zooming up to 300% (3 x 72 ppi = ~220 ppi)



How to Adjust Images in Powerpoint

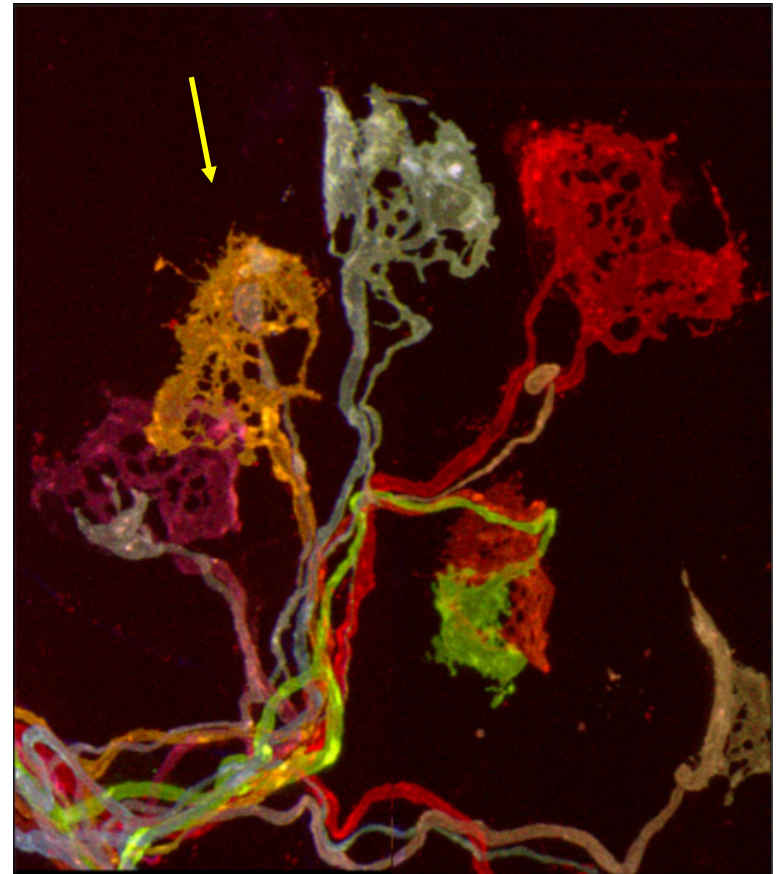
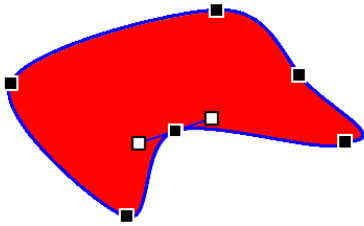
1. Select Picture > 'Picture Format' > 'Crop'
2. Select Picture > 'Picture Format' > 'Corrections'



Handling Vector Objects

Common vector objects

- **Shapes, schematics, flow-charts**
 1. Can be made in Powerpoint
 - Insert shape, then Right-click > Edit Points to customize



Handling Vector Objects

Common vector objects

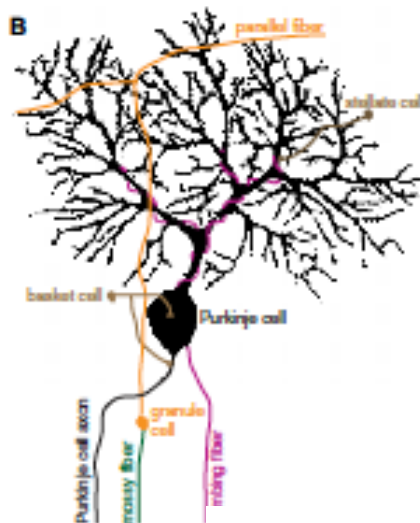
- Shapes, schematics, flow-charts
- **Graphs:** Options:
 1. Can copy and paste excel graphs in Powerpoint
 2. Save graph as PDF or SVG and then 'insert' object in Powerpoint
 3. If these fail, save the graph as a raster object, by:
 - A. Save as TIF or PNG from your original graphing program
 - The resolution will be determined by the original program.
 - B. Save as a PDF then open in Photoshop/Gimp (rasterize it)
 - This allows you to set the resolution (220 ppi) at a specified size
 - C. Screen shot as large as possible in your original graphing program, then insert as a raster object in powerpoint.
 - Zoom up and make it as big as your display before the screen shot to get as a large size as possible.

'Adapting Figures' Successfully

- Zoom up (300% or greater) before screen capture/copy

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613



Screen shot at 100%

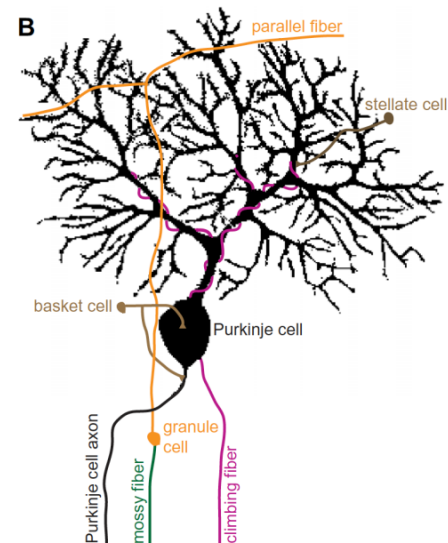
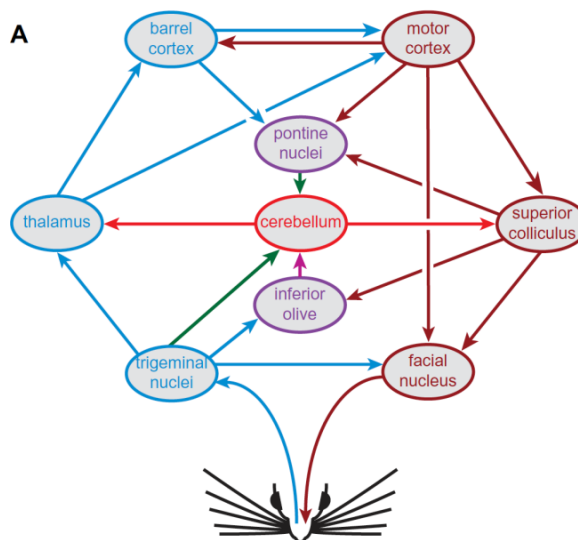
- Pixelated ☹️

L. W. J. Bosman and A. Konnerth / Neuroscience 162 (2009) 612–623

61

Screen shot at 300%

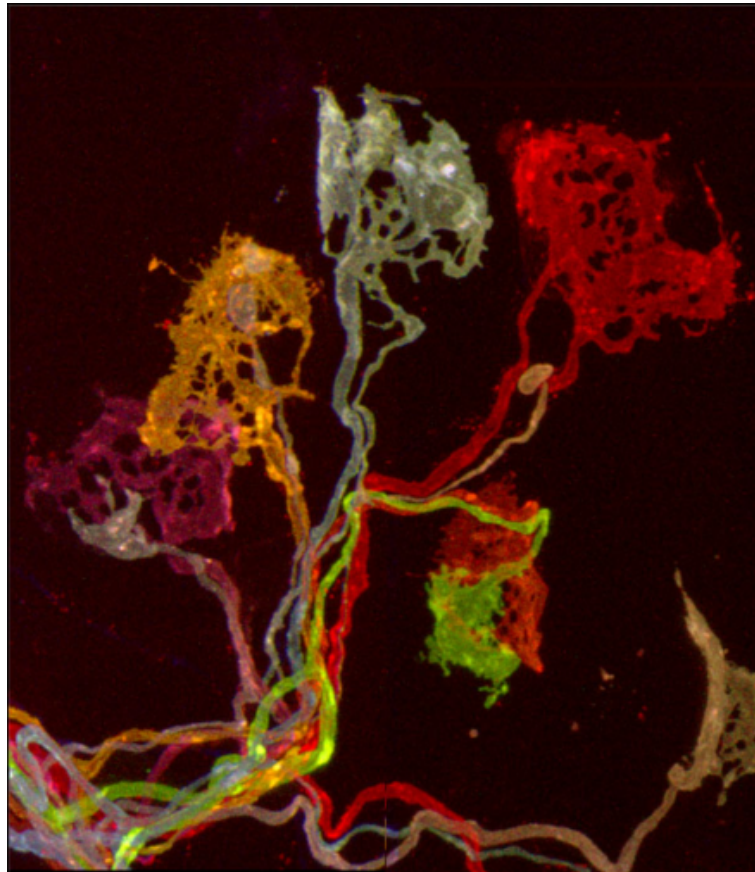
- No pixelation 😊



A Word on File Size

Your final .pptx shouldn't more > ~ 20 MB

- If > 20 MB, your images probably have excess pixels
- 'File'>'Compress Pictures' > 220 will reduce all your images
 - **Note:** this will delete all extra pixels in your images. So be sure the pictures are the size you want them. Otherwise, you will have to re-insert the originals to restore the quality



Incorporating figures into your thesis

- When you're finished:
 - 'File' > 'Save As' a PDF (preserve vector and raster objects)
 - Insert PDF into your final thesis document (Word doc or PDF file)

DONE

- **Summary**
 - Insert or drag pictures into Powerpoint (DO NOT COPY AND PASTE!)
 - Move your image around. If you scale (only scale down/smaller, not bigger), then compress to 220 ppi to reduce file size.
 - Use vector objects when possible (arrows, asterisks, text, legend, shapes, graphs, etc)
 - Save as .PPTX until your figure is finalized
 - Save as PDF and insert into your thesis document (.doc).