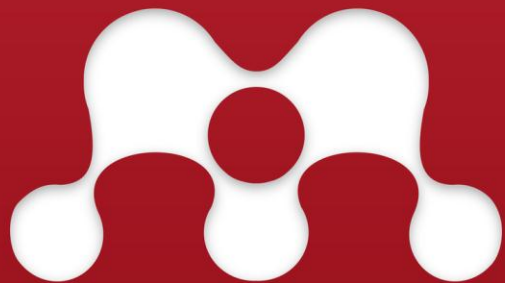


Computer Applications

ImageJ 10

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MENDELEY



ImageJ

Image Processing & Analysis in Java



Measuring and Counting objects - preparation

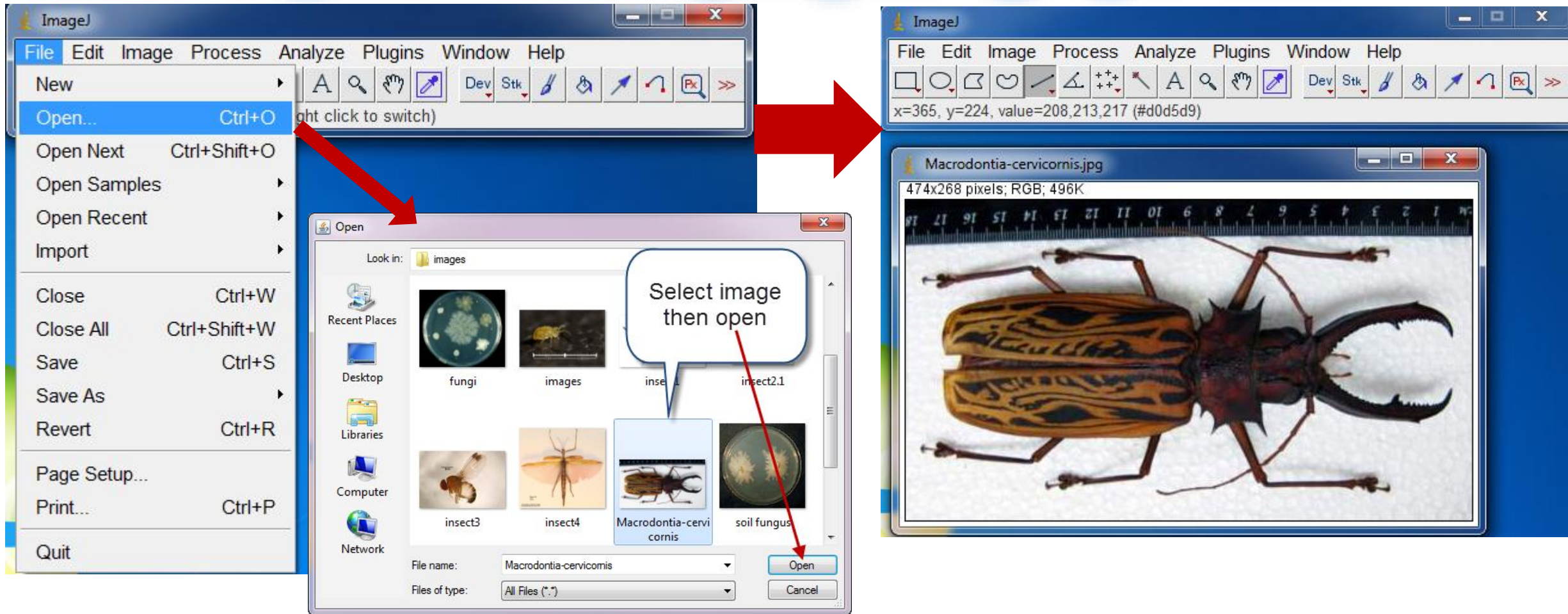
- ❖ To make measurements to the objects (distance, length, width, size, area, angle,.. etc..) in the scientific image, the image **should be included a well-known measurement object** (such as a ruler, known dimensions square object, known radius circular object... etc..) to set a measurement scale depending on it.



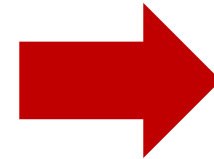
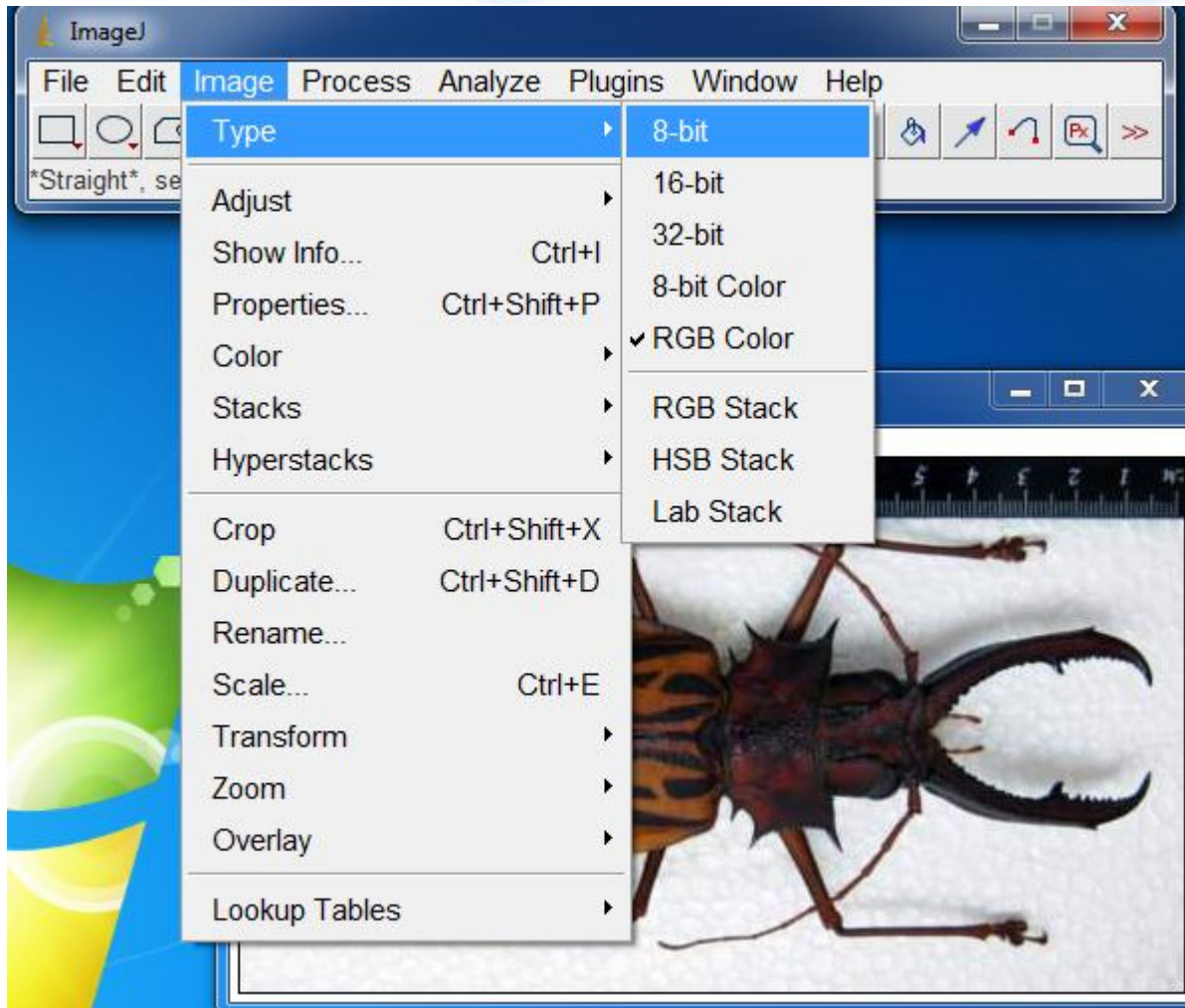
Measuring and Counting objects - preparation

- ❖ The starting image should be as high resolution as possible. The high quality image the high accuracy measurements.
- ❖ Open the image in the imageJ: **File >> Open >> brows then open OR Drag your image and drop it on ImageJ tools ribbon.**
- ❖ Convert the color image to grayscale 8-bit image: **Image >> Type >> 8-bit.**
- ❖ Scale measurements: **Draw straight line between two points of known measurements object >> go to Analyze >> Set Scale >> write the known length in “known distance” box >>write the measurements units in “Unit of length” box >> OK**
- ❖ Now the object is ready for measurements.

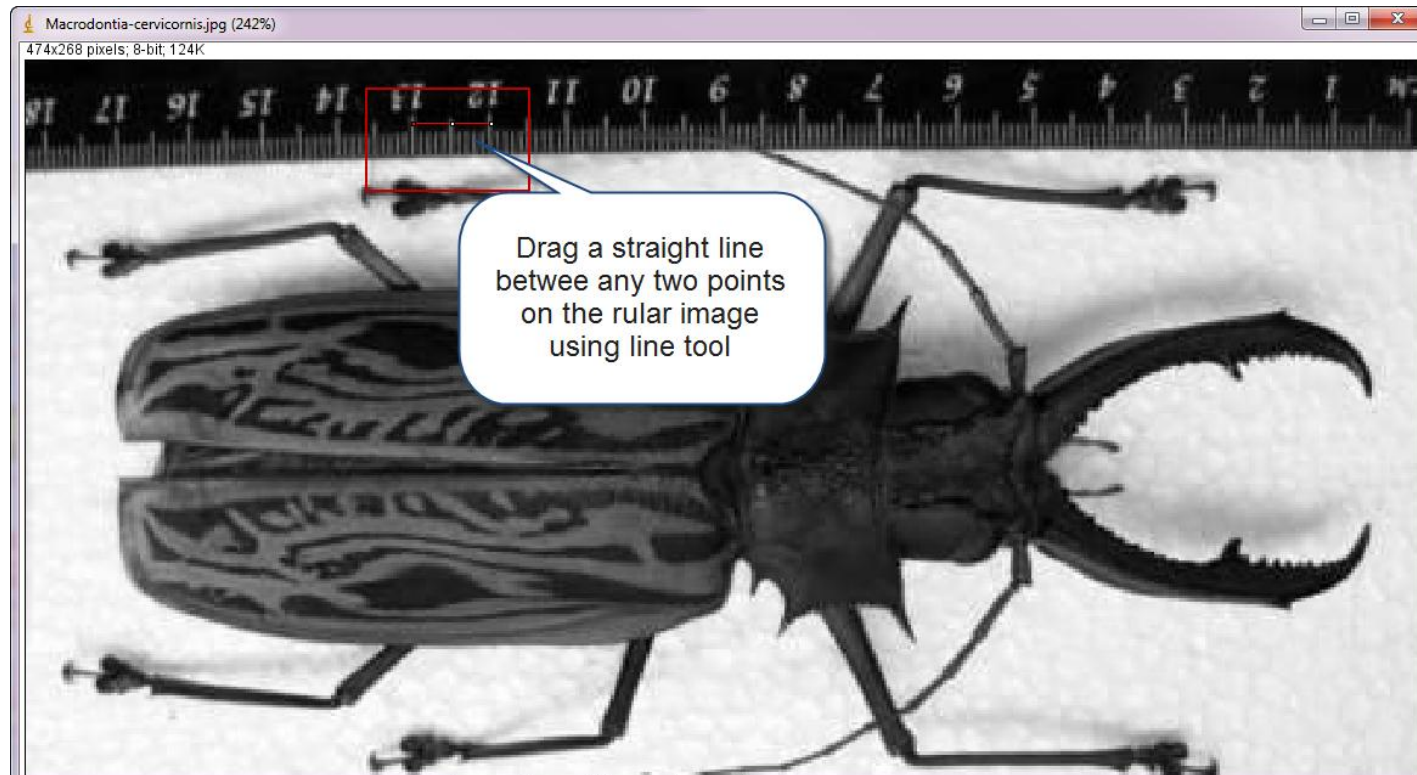
Measuring and Counting objects - preparation



Measuring and Counting objects - preparation



Measuring and Counting objects - Scaling



ImageJ

File Edit Image Process Analyze Plugins Window Help

Measure Ctrl+M
Analyze Particles...
Summarize
Distribution...
Label
Clear Results
Set Measurements...
Set Scale...
Calibrate...
Histogram Ctrl+H
Ctrl+K

Wand (tracing) tool

Set Scale

Distance in pixels: 26.4712 1

Known distance: 10.0

Pixel aspect ratio: 1.0

Unit of length: mm 2

Click to Remove Scale

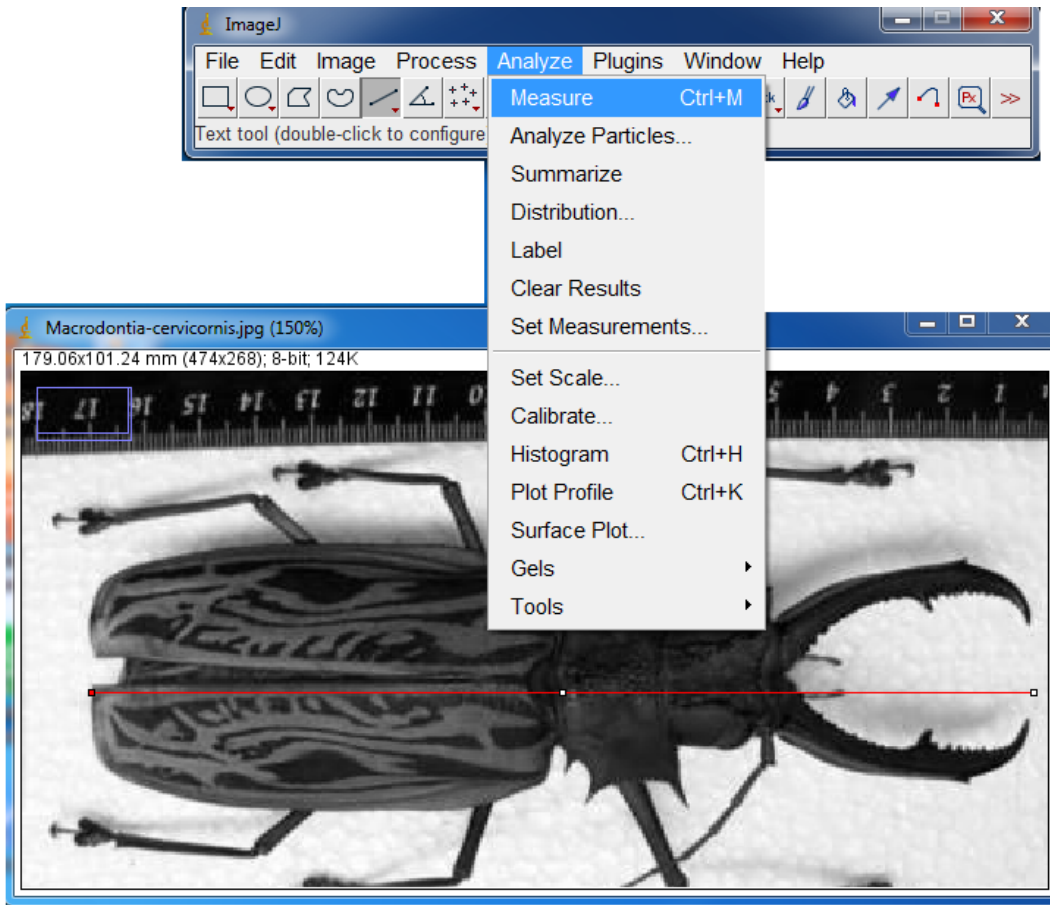
Global

Scale: 2.6471 pixels/mm

3 OK Cancel Help

Measuring and Counting objects - measurements

- ❖ Measuring the length: **Drag a straight line along the insect >> Analyze >> measure OR Ctrl+M >> The results will appears in results window.**



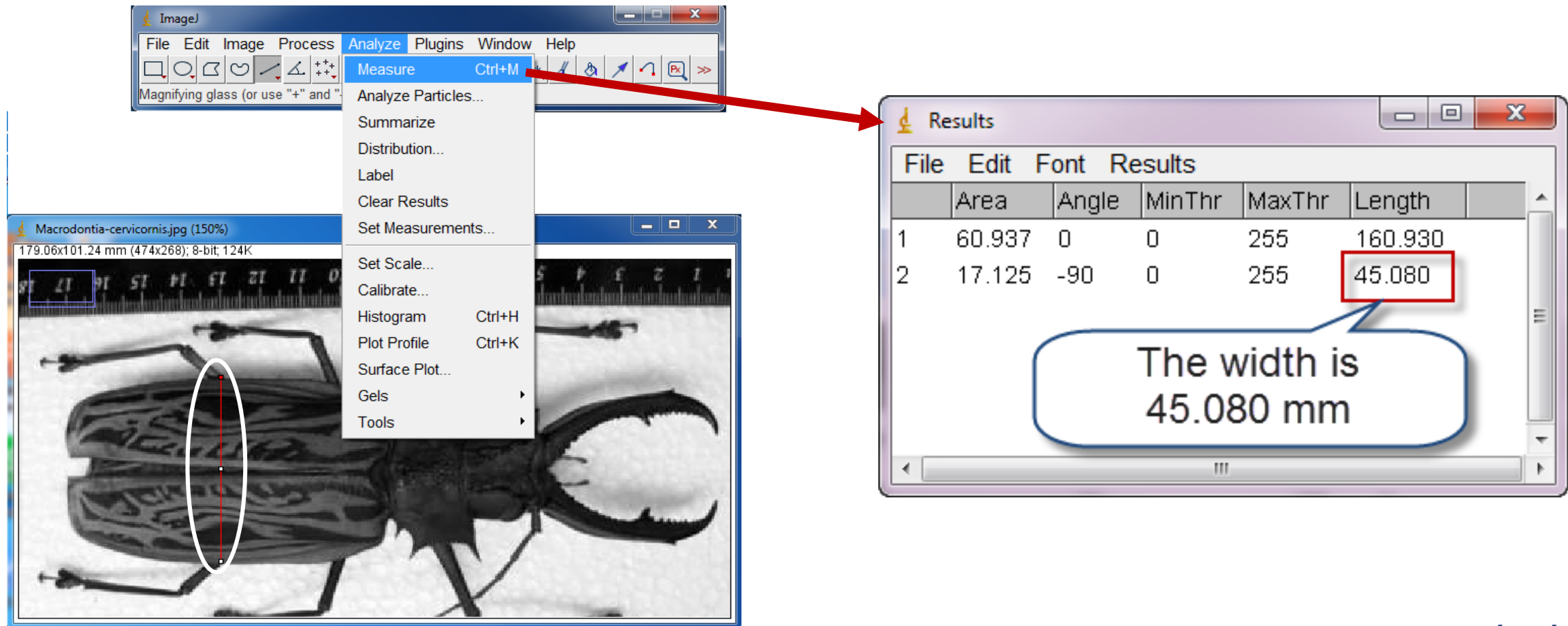
The 'Results' window displays a table with the following data:

File	Edit	Font	Results			
	Area	Angle	MinThr	MaxThr	Length	
1	60.937	0	0	255	160.930	

A red box highlights the 'Length' column, and a callout box points to the value '160.930' with the text: 'The length is 160.930 mm'.

Measuring and Counting objects - measurements

- ❖ Measuring the width: **Drag a straight line along widest area of the insect >> Analyze >> measure OR Ctrl+M >> The results will appears in results window.**



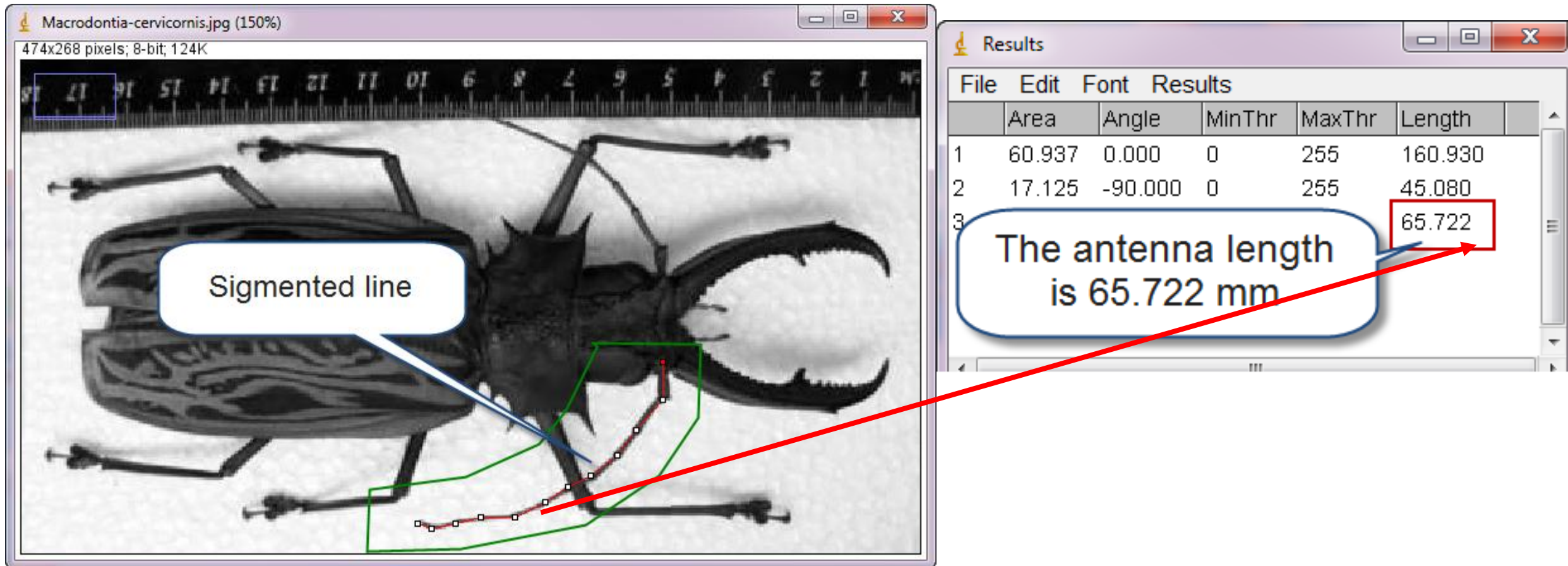
The screenshot shows the ImageJ interface with the 'Analyze' menu open. The 'Measure' option is selected, and a red line is drawn across the widest part of the insect in the main image window. A red arrow points from the 'Measure' option to the 'Results' window, which displays a table of measurements. The 'Length' column for the second measurement is highlighted with a red box, and a callout bubble indicates that the width is 45.080 mm.

File	Edit	Font	Results			
	Area	Angle	MinThr	MaxThr	Length	
1	60.937	0	0	255	160.930	
2	17.125	-90	0	255	45.080	

The width is 45.080 mm

Measuring and Counting objects - measurements

- ❖ Measuring the antenna length: **Drag a segmented line (right click on line tool and change to segmented) along the antenna >> Analyze >> measure OR Ctrl+M >> The results will appears in results window.**



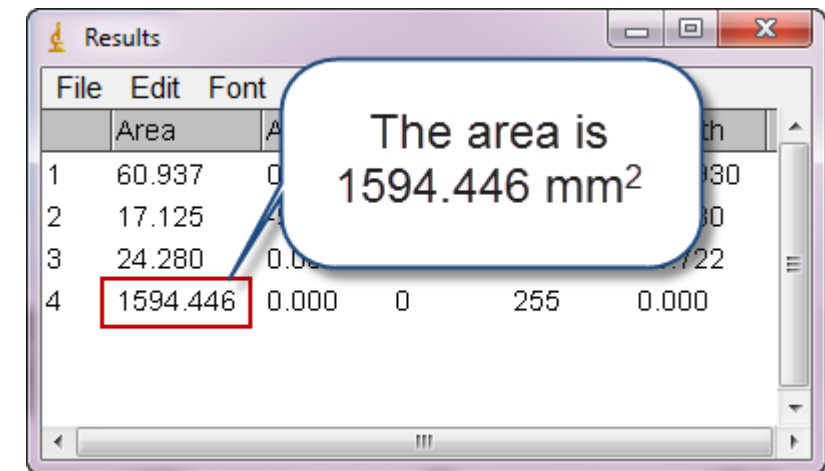
The screenshot displays the ImageJ interface. The main window shows a grayscale image of a beetle, *Macrodonia-cervicornis*, with a segmented line drawn along its antenna. A callout box labeled "Sigmented line" points to the line. The Results window on the right shows a table of measurements for three objects. The third object's length is highlighted as 65.722 mm, with a callout box stating "The antenna length is 65.722 mm".

	Area	Angle	MinThr	MaxThr	Length
1	60.937	0.000	0	255	160.930
2	17.125	-90.000	0	255	45.080
3					65.722

The antenna length is 65.722 mm

Measuring and Counting objects - measurements

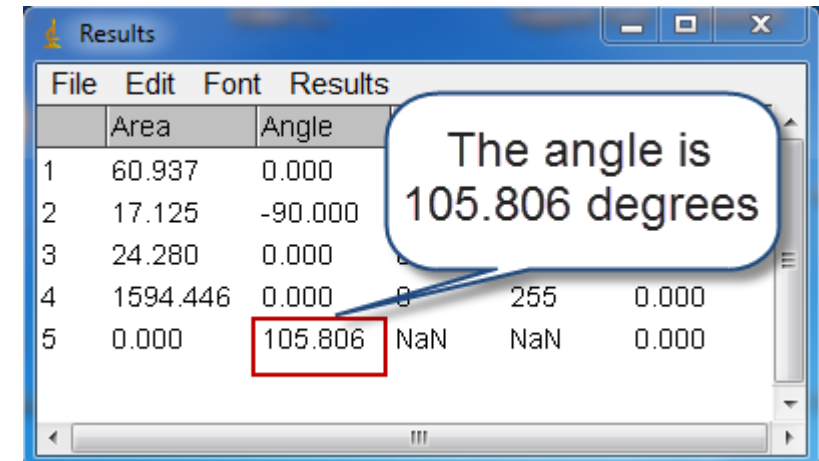
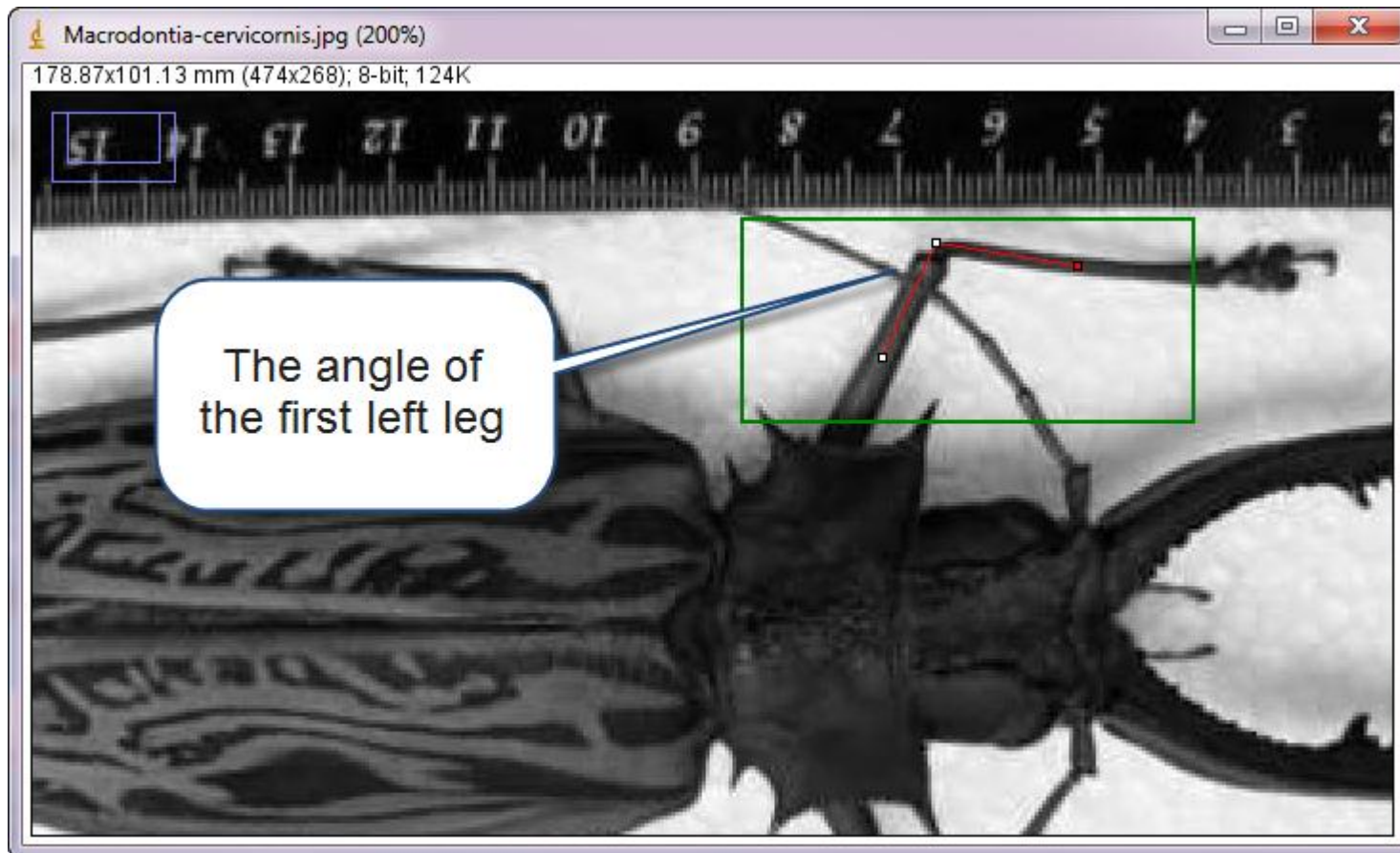
- ❖ Measuring the left wing area: **Select the left wing area by Free hand selection**  **>> Analyze >> measure**
OR Ctrl+M >> The results will appears in results window.



File	Edit	Font	Area	A	th
1	60.937	0			30
2	17.125	4			30
3	24.280	0.00			722
4	1594.446	0.000	0	255	0.000

Measuring and Counting objects - measurements

- ❖ Measuring the leg angle: **Draw angle on the leg using Angle Tool**  **>> Analyze >> measure OR Ctrl+M >>**
The results will appears in results window.

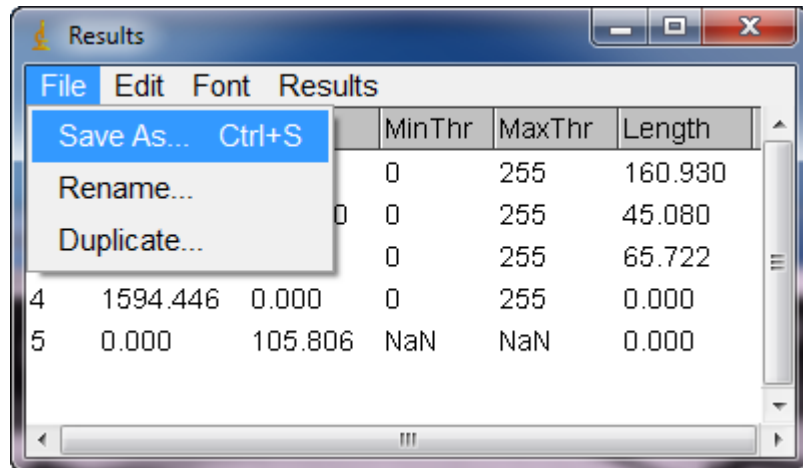


File	Edit	Font	Results
1	60.937	0.000	
2	17.125	-90.000	
3	24.280	0.000	
4	1594.446	0.000	255 0.000
5	0.000	105.806	NaN NaN 0.000

The angle is 105.806 degrees

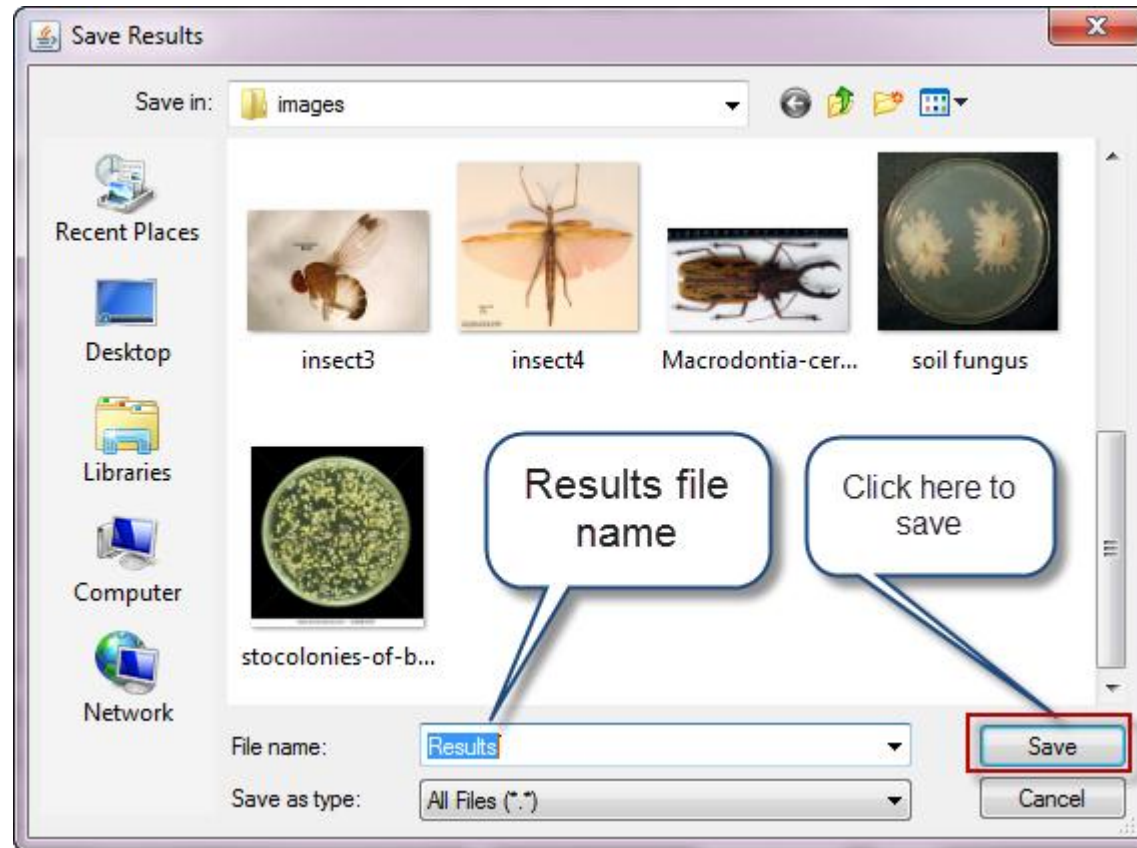
Measuring and Counting objects – Save results

❖ The results can be saved as Excel sheet: **File >> Save as >> Brows then save.**



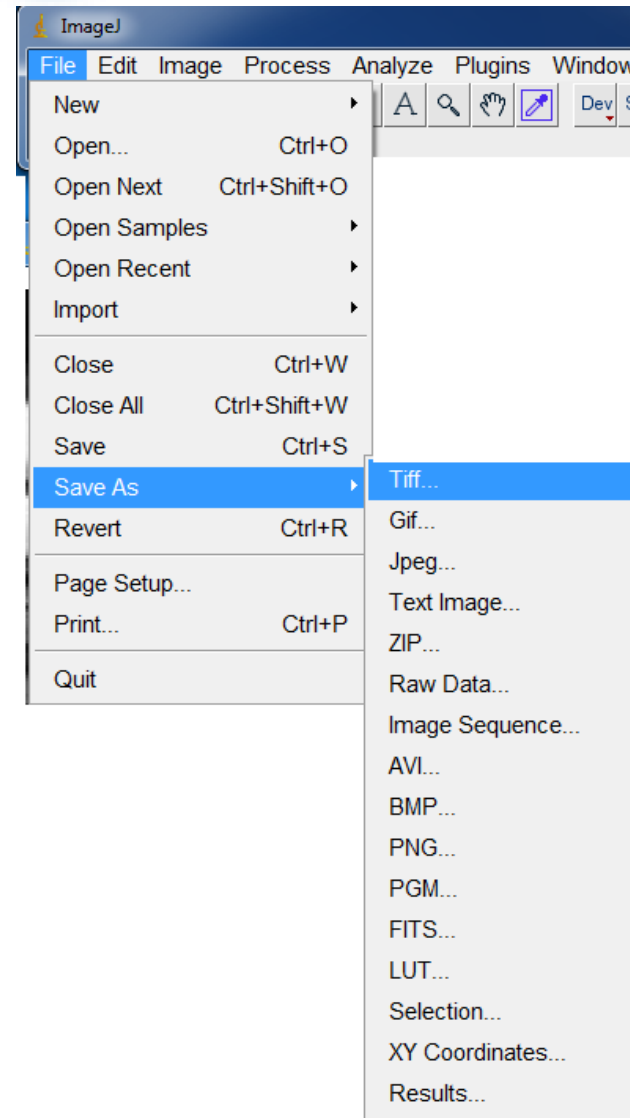
The Results window displays a table with the following data:

	MinThr	MaxThr	Length		
Save As... Ctrl+S					
Rename...	0	255	160.930		
Duplicate...	0	255	45.080		
	0	255	65.722		
4	1594.446	0.000	0	255	0.000
5	0.000	105.806	NaN	NaN	0.000



Measuring and Counting objects – Save image

Images from digital cameras are usually saved as JPEG files. JPEG is a type of memory compression that results in the loss of some data. A JPEG image degrades each time it is opened, edited and resaved. It is best to save a file in a 'lossless' format such as a TIFF during the editing process: **File >> Save As >> Tiff**



Measuring and Counting objects – Counting

To count objects in the work field manually, you must do what below:

- ❖ Open Image.
- ❖ Use Multi-Point tool.
- ❖ Pint the objects you want to count.
- ❖ When finish go to Analyze >> measure >> the results window will appear containing the pointed objects count with X and Y coordinates of each point position.

Measuring and Counting objects – Counting

To count objects in the work field automatically, you must do what below:

- ❖ Open Image>
- ❖ Convert Image to gray scale 8 bit.
- ❖ Threshold the Image (make it black and white).
- ❖ Process >> Binary >> Watershed (to separate merged objects).
- ❖ Go to Analyze >> Analyze particles and type the upper and lower limits for particle size >> OK >> each particle size will be outlined and numbered in new window. The data window will contains measurement for each particle.