

# DinoEye, Simple Image Analysis & Networking

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## Introduction

### DinoEye (<http://www.dino-lite.com/>)

For those of you who like to capture images of live or prepared specimens, the DinoEye is a very practical, portable digital eyepiece that works like a digital camera hooked up to a microscope. Students in our departmental labs are occasionally asked to take pictures of some of the slides or specimens they are studying. Until recently, the biology department was using an eyepiece adaptor attached to a digital camera (would only fit an old Nikon camera), to take pictures. These then had to be uploaded individually to the instructor's or students' laptops for image analysis. One common complaint was that the camera settings were difficult to set up, as the field of view did not take up the entire screen if not "zoomed in". This was particularly problematic when using calibration tools with stage micrometer images. i.e. Images were taken at the same magnification setting, but not "optically zoomed in" at the same setting. With the DinoEye, images can easily be projected, captured and quickly saved to a computer, without fussing with camera settings such as optical zoom.

## Methods

Our department teaching labs share four AM-423X DinoEye digital eyepieces and one Eye-Catch (currently unavailable older version). The software used to capture images comes with the eyepiece but alternate software such as ImageJ and Irfanview, both FREEWARE for PCs, can also

be used. There are links to several open source / freeware websites listed at the end of this paper.

### Installation of DinoCapture (PC) and DinoXcope (Mac)

To install DinoCapture or DinoEye (Mac), follow this online link:

<http://www.dino-lite.com/support.php>

Select the 5<sup>th</sup> on the list for PCs, or the 3<sup>rd</sup> on the list for Mac (see Figure 1).

**NOTE:** Do not connect the USB cable of the DinoEye prior to installation.

### Instructions for PCs (for Friday AM mini workshop)

A prepared slide of *Paramecium caudatum* has been set up on the microscope for you. It is set up using the 10X objective lens, therefore at a magnification of 100X.

### Capturing an image

1. Focus the specimen using the fine adjustment knob if necessary.
2. Remove the right eyepiece and slide the DinoEye in its place.
3. Focus again while watching the screen.
4. Enter the **Real time mag** at top right corner. In this case, it would be 100.

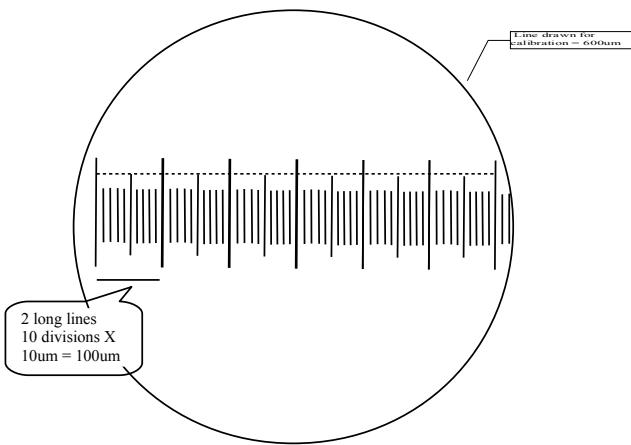
DinoCapture	AM311S/AM313/AM413/AD413/AM411/AM423/AMH/AM451 Series Compatible with Windows XP, Vista. (With Multi-Microscopes function)	3.3.0.16 2009/6/9	 <a href="#">Download</a>
DinoXcope	AM311S/AM313/AM413/AD413/AM411/AM423/AMH/AM451 Series For Mac OS 10.4 or later	1.3.2 2010/4/12	 <a href="#">Download</a>

**Figure 1:** Screen images for downloading PC (top) and Mac (bottom) versions of software.

5. Click on the image or **camera icon** to take a picture of your specimen.
6. Place your cursor on the image located in the scroll list on the left hand side. This allows you to name the picture taken by typing in a representative name. Do not click on the blinking cursor, simply start typing. I would name it *Paramecium caudatum @ 100X*
7. To begin measuring these cells, you must first calibrate using **stage micrometer images** located on the scroll list.

## Calibrations

1. Find the **Stage @ 100X** image.
2. **Double click or click on File, open.**
3. Enter **Input mag** as 100. Do not skip this step, it is necessary for taking measurements later!
4. You are able to see more than one half of the stage micrometer ruler. The distance between each division is 10 $\mu\text{m}$  (0.01mm) and there are 10 divisions between 2 long lines. Therefore the distance between each set of long lines is 100 $\mu\text{m}$  (0.1mm). See figure below.
5. Click on the **Ruler icon**. Select **Calibration**. It will say, "Please take the measurement on the calibration standard", click OK.
6. Make a line from the first line to the last long line visible in your field of view. Click again when you get to the end.
7. Enter the **actual dimension** as 600 $\mu\text{m}$ . Ok. (If  $\mu\text{m}$  is not an option, change it under settings.)
  - Repeat step 6 for Stage images taken at 400X and 1000X if time permits.



- Open 400X stage image. Enter **Input mag** as 400. There are 16 lines in view. The distance from the first to the 16<sup>th</sup> is 150 $\mu\text{m}$  (15 intervals of 10 $\mu\text{m}$  each). Enter actual dimension as 150 $\mu\text{m}$ .
- 1000X shows only 7 lines. The distance between these 6 intervals is 60 $\mu\text{m}$ . Enter actual dimension as 60 $\mu\text{m}$ . Do not forget to **Input mag** as 1000.

## Measuring Cells

### *Paramecium caudatum @ 100X*

1. Open the *Paramecium caudatum* image (double-click). Check **Input mag** box for total magnification.
2. Right click, move cursor to **measure** position. Ensure **Measure with adjusted mag rate** is checked.
3. Go to the top of this menu list and select **line**.
4. **Click, drag, click** to take a measurement for cell length and then cell width.
5. At this point the blue text showing cell measurements will **flash**, move your cursor next to the cell in an appropriate location and click to have them remain at this position.
6. There is a scale bar on the bottom left corner of the image. This serves as a useful tool to double check your measurement.
  - If at any time you make a mistake, right click and select **undo** to remove measurements.

### *Red Blood Cells @ 400x (or 1000X if preferred)*

1. Take an image of red blood cells. Open the *RBC* image (double-click). Check **Input mag** box for total magnification.
2. Right click, move cursor to **measure** position. Ensure **Measure with adjusted mag rate** is checked.
3. Go to the top of this menu list and select **diameter circle**.
4. **Click, drag, click** to take a measurement for cell diameter.
5. At this point the blue text showing cell measurements will **flash**, move your cursor next to the cell in an appropriate location and click to have them remain at this position.
6. There is a scale bar on the bottom left corner of the image. This serves as a useful tool to double check your measurement.
  - If at any time you make a mistake, right click and select **undo** to remove measurements.

## Instructions for MACs

### *Capturing Images*

Click the camera icon button in the upper left corner of the application window. The captured image will be saved in the directory specified in the application **Preferences**. The filename will be a unique time stamp with .png appended to the time stamp. The format is YYYYMMDD\_hhmmssfff.png Where YYYY is the year, MM is the month, DD is the day, hh is the hour, mm are the minutes, ss are the seconds and fff are the milliseconds.

Each captured image will be added to the **Picture** scroll list. The actions are

- double clicking the image thumbnail will open the image in the measurement window
- the Esc key will delete the selected image
- to drag the image to another application or location, press **control** while clicking on the image

### **Creating a Real Time Movie**

Click the real time movie icon button in the upper left-hand corner of the application window. In the real time movie window, set the following fields:

- **Frame rate** sets how often an image or frame will be captured
- **Enable recording time limit** sets how long the movie will record.

To start recording, click **Start Recording**. The movie will stop recording once the time limit has been reached. The movie recording can be manually stopped by pressing the **Esc** key. The recorded movie will be added to the **Video** scroll list. Double clicking on a movie thumbnail will open it in Quick Time Player if applicable.

The recorded movie is saved automatically using a unique time stamp filename as described above. The **.mov** extension will be appended to the filename. The movie destination folder can be set in the application **Preferences**.

### *Drawing on an Image*

Open an image in the measurement window by double-clicking on an image in the **Picture** scroll list. In the measurement window, select from the **Tools** menu. The drawing line width default is **3 Pixels** for images captured at 1280 x 960. Play around with it.

The text pop up menu allows you to enter a time stamp, text label, and/or text comment. Your changes can be saved by clicking the **Save As...** button. You can also change the colour for your drawing tool in the **Set Colors** window.

### *Calibrations and Measurements*

MACs use same instructions as for PCs.

## Notes for the Instructor

**Open Source Software** (links can be found on the ABLE website)

*My Mini Was Put Together Using the Following Open Source Software:*

1. OpenOffice.org (like MSOffice)
2. ImageJ
3. Jing (screen capture)

*List of Course Management Systems (CMS)/Learning Management Systems (LMS):*

1. Moodle (Acadia uses this and has named it ACORN)
2. Efront
3. Joomla
4. Nucleus CMS

*Other Free Sites Used by Acadia University Students:*

1. Zotero (collect and cite articles with a single click)
2. Yammer (microblogging, create groups or communities, share documents and tag content)Materials

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