

IBERS Biology: Parasites and Drug Screening Workshop 1 (Microscopes and Drug Screening)

Aims:

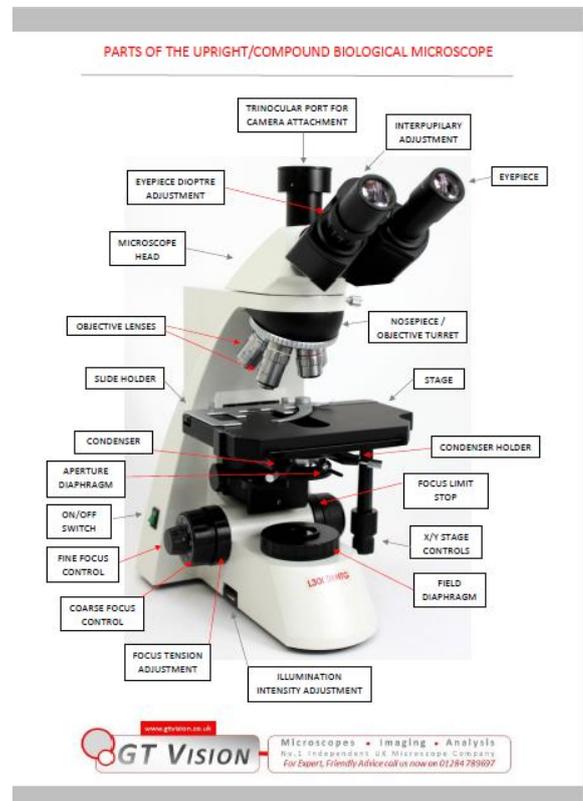
In this research experiment you will observe the free-living nematode body plan of *Panagrellus redivivus* and its phenotype by looking at images from microscopy. You will gain an understanding of some different types of microscopes we use for everyday work in the lab and also some of the more powerful microscopes in the electron microscopy suite in Aberystwyth. You will then conduct a drug assay to determine which nematodes are resistant to the drug and which nematodes are susceptible.

Section 1. Microscopy

For our everyday work in the lab we often use two types of microscopes, the compound microscope and the stereo microscope. We can explore these a little further here:

Compound Microscope

The compound microscope can be used to see a variety of biological material at different magnifications. It is equipped with multiple lenses, which includes the objective lens that have magnifications of 4x, 10x, 40x and 100x and the eyepiece lens that can increase each of these magnifications 10x further. We tend to use this type of microscope when we want to look at slides.



<https://www.gtvision.co.uk/GT-Vision-Microscopy-Blog/Getting-The-Most-From-Your-Compound-Microscope>

This website shows you how to set up your new compound microscope:

<https://www.gtvision.co.uk/GT-Vision-Microscopy-Blog/Getting-The-Most-From-Your-Compound-Microscope>

Stereo microscope

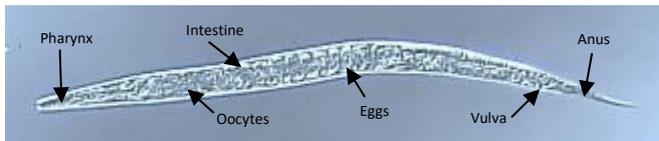


A stereo microscope has lower magnification levels than the compound microscope and uses reflective light to observe the image. These microscopes are useful for looking at solid objects, so they are ideal if we want to observe the free-living nematode *P. redivivus*.

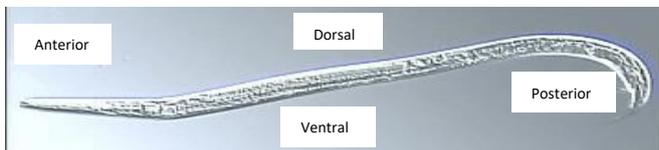
Have a look at this youtube clip to see how these worms look under the microscope

<https://www.youtube.com/watch?v=a769yu-Dk6Y>

Using the images from the video and the diagrams below (Figure 1) you can draw the basic nematode body plan and label from the accompanying diagram (Figure 1).



Adult female *P. redivivus*



Adult male *P. redivivus*

Images from: <https://faculty.ucr.edu/~pdeley/vce/Panagrellus/redivivus/thumbs.html>

Section 2. Drug screening

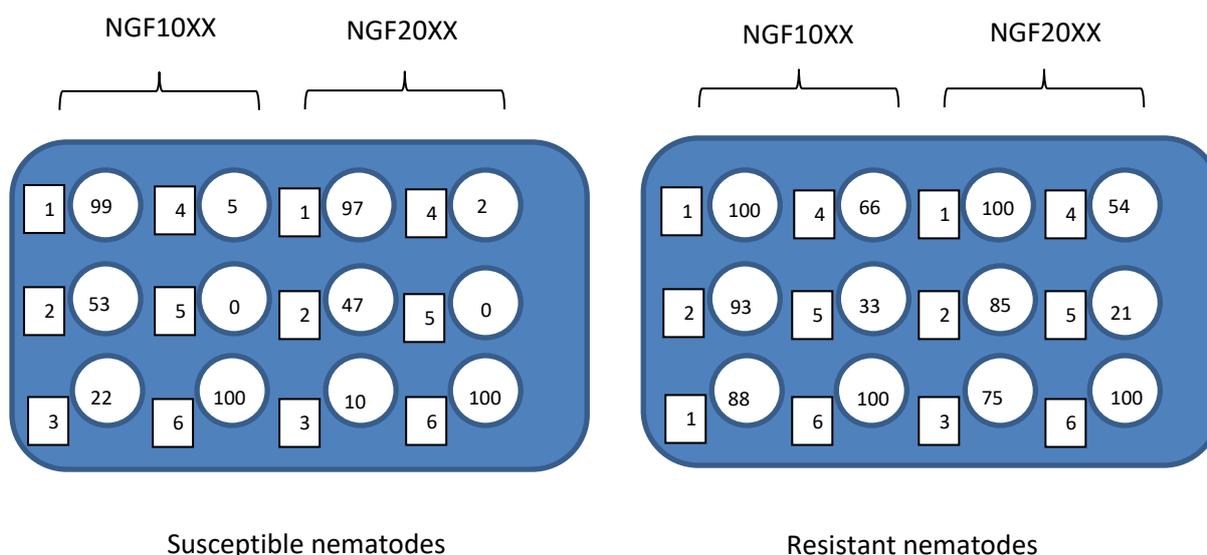
We are going to simulate the effects of a drug screening trial. In the lab we can set up an experiment using our *P. redivivus* worms to determine the effects of a new drug. We have two sets of drugs NGF 10XX and NGF 20XX. NGF 20XX is twice the potency of NGF 10XX. We will set the experiment up in a well plate containing 12 wells, using the volumes provided in the table below:

Test Number	Diluted nematode solution (e.g. 1:100) μl	Distilled water μl	Solvent μl	Drug μl	Total Volume μl	Final drug concentration mM
1 (Solvent control)	100	100	800	0	1000	0mM
2	100	100	700	100	1000	0.1mM
3	100	100	600	200	1000	0.2mM
4	100	100	300	500	1000	0.5mM
5	100	100	0	800	1000	0.8mM
6 (water control)	100	900	0	0	1000	0mM

To start the experiment, we place our nematodes (about 100 worms per well) in the distilled water and observe their movement before we add our drugs.

In your well plates there are 12 wells the first 6 wells are used to set up the drug concentrations for NGF 10XX and the second set of 6 wells for NGF 20XX.

Here is some example data for you to work with, the number written in each well below (circle) denotes the nematodes still moving after the drug has been applied. The numbers in squares next to the wells correspond to the test numbers in the table above. Would you expect them to all be moving normally after you add the drugs? Do you expect NGF10XX or NGF 20XX to have a bigger effect on the movement of the nematodes? As you increase the concentration of the drugs do you expect the nematode movement to be altered?



You can record your results in a table. You can then plot your results on a graph should you choose to write up your experiment as a mini paper at the end of the module. We will

validate the drug resistant and drug susceptible nematodes in the next set of workshops by using molecular biology techniques.

Section 3. Tour of the Electron microscopy suite

Click on the links below to have a virtual tour of the electron microscopy suite at Aberystwyth and have closer look at some of the microscopes we have.

<https://www.aber.ac.uk/virtual-tour/courses/explore/institute-of-biological-environmental-and-rural-sciences/advanced-microscopy-bioimaging-lab-1>

<https://www.aber.ac.uk/en/ibers/about-us/facilities/bioimaging/>