



The following essays were written by year 10/12 pupils from [Cheadle Hulme High School](#) during a lesson, three days after they attended an extracurricular experience day arranged by the [Manchester Fly Facility](#) in July 2014. On this day, ~80 pupils experienced a 30 min lecture and four 25 minute teaching/practical sessions:

20 pupils/group	Group A	Group B	Group C	Group D
9 am	Lecture (30 min)			
15 mins	move to rooms			
9.45-10:10	3 - Modern Neurobiol. Research Tools	2 - Why Genetic Markers	4 - Ageing & Mobility	1 - Classical Genetics
5 mins	move rooms			
10:15-10:40	1 - Classical Genetics	3 - Modern Neurobiol. Research Tools	2 - Why Genetic Markers	4 - Ageing & Mobility
5 mins	move rooms			
10:45-11:10	4 - Ageing & Mobility	1 - Classical Genetics	3 - Modern Neurobiol. Research Tools	2 - Why Genetic Markers
5 mins	move rooms			
11:15-11:40	2 - Why Genetic Markers	4 - Ageing & Mobility	1 - Classical Genetics	3 - Modern Neurobiol. Research Tools

- **Lecture:** pupils learned about the history, rationale and widespread application of flies in research
- **Practical 1:** pupils experienced classical genetic marker mutations and modern fluorescent markers and identified them under the microscope
- **Practical 2:** pupils learned about laboratory applications of genetic marker mutations, using fly stock keeping as an example to perform Punnett squares
- **Practical 3:** pupils learned about concepts of the nervous system and modern genetic tools and strategies in fly to study its function and disease, including the example of anti-epileptic drug screens
- **Practical 4:** pupils carried out motor skill experiments plotting the performance of young *versus* aged flies and learned about the use of this experiment during research on ageing and neurodegeneration

As the following essays illustrate, the day was highly successful in that it was well received and achieved our key learning objective: that pupils appreciate the importance of using the simple model organism *Drosophila* for scientific research. Importantly, on parallel evaluation sheets pupils indicated relevance of the day for their curriculum. We have since used experiences of that day to further improve our resources and strategies to be tested on [future school visits](#).

Using Drosophila for Science Research and Discovery

After spending a fun filled day learning interesting facts about drosophila and reasons for its study, I feel as though I have furthered my understanding not just of drosophila, but also the nervous system. This was due to the facts that it was engaging and was explained in a way which made it easy to understand.

To begin with I had no knowledge of drosophila, yet I soon learned that drosophila is a small fruit fly which is used in the research of the nervous system and behaviour. This is due to the fact that it has a similar nervous system to that of mammals therefore can be used to make discoveries and further the research of the human body and such things such as mutations. They are useful to use for research as they are very small therefore lots of them can be stored at the same time. I learned that the equivalent to the population of Manchester of drosophila can be stored in a single tray! This is helpful as researchers can study lots of fruit flies at once. Also they breed very quickly and a single fruit fly becomes a grand-father in 25 days which helps scientist look at the offspring as a result of certain genes and alleles.

The fruit flies can be used to study the effects of certain genes which cause mutation. This is done by breeding 2 flies which both have the gene, yet both have a control such as curled wings or white eyes. This is so that if the alleles are the same then the fly that no longer carries the gene dies. This means that they know that all of the offspring contain the gene that they are studying. This helps them study the mutations as these appear in humans as well. This means that scientists are able to study the mutation and know more about it and help them to discover ways to get rid of them mutation.

During the time I spent learning about drosophila the experiments were useful in furthering my understanding. For example learning about epilepsy and how the flies can suffer from epileptic fits helped me understand the nervous system more, as it was explained very simply yet covered the whole topic. I also learned about the effect of ageing on flies and how fresh flies are more energetic than flies that are weeks old as they don't live for long. This helped to further my understanding of flies and also the reason why older creature find it harder to get around and are less energetic than young flies.

All in all I enjoyed the visit and the activities.

Using Drosophila for science research and discovery

Drosophila melanogaster is a fruit fly, a little insect about 3mm long. It is also one of the most valuable of organisms in biological research, particularly in genetics and developmental biology. *Drosophila* has been used as a model organism for research for almost a century, and today, several thousand scientists are working on many different aspects of the fruit fly. Its importance for human health was recognised by the award of the Nobel Prize in medicine/physiology to Ed Lewis, Christiane Nusslein-Volhard and Eric Wieschaus in 1995. Part of the reason people work on it is historical - so much is already known about it that it is easy to handle and well-understood - and part of it is practical: it's a small animal, with a short life cycle of just two weeks, and is cheap and easy to keep large numbers. Mutant flies, with defects in any of several thousand genes are available, and the entire genome has recently been sequenced. *Drosophila* is so popular, it would be almost impossible to list the number of things that are being done with it. Originally, it was mostly used in genetics, for instance to discover that genes were related to proteins and to study the rules of genetic inheritance. More recently, it is used mostly in developmental biology, looking to see how a complex organism arises from a relatively simple fertilised egg. Embryonic development is where most of the attention is concentrated, but there is also a great deal of interest in how various adult structures develop, mostly focused on the development of the compound eye, but also on the wings, legs and other organs.

I found out that flies are a vital part of science and we would not be as developed in medicine as we are today without *Drosophila*. In my opinion I thought it was rubbish when I first saw it, but now Manchester University has explained it to me, I think it amazing a very important for life.

Using *Drosophila* for scientific research and discovery.

Drosophila are fruit flies, they are found practically everywhere humans go. Much like the name suggests they enjoy eating fruit. At the start of the morning I thought fruit flies were something which was studied for a PhD or a degree. By the end of the sessions I had learnt that fruit flies were and still are vital to medical advances. Because fruit flies have similar genomes to humans we can locate the causes to diseases on their genomes and then once we have isolated the cause it is a lot easier to cure the disease.

Drosophila have been used for over a century to combat and cure disease. They are able to alter the genes in them. They are used for two main reasons. Firstly there are lots of fruit flies easily available. This is because they follow humans and reproduce in large numbers. The second reason is that fruit flies have a very short life span meaning if the experiment fails then they are able to get a new batch very shortly.

Drosophila are comparable to larger organisms. Firstly both animals have similar genomes as they are both animals. Secondly the fly has many similar fundamental processes to be carried out such as moving, respiration and others. Therefore if they get a disease they can find out what caused it and then fix it on the fly. They can then try this on a mouse, which is again closer to human. If the solution works on the mouse they can then try and fix it on a human.

From the experiments I learnt that flies, like humans deteriorate with age, and that we experience similar things to them such as seizures and finally that there are many different trends such as curly wings and small or no wings.

After enduring or rather enjoying my time with drosophila enthusiasts from the University of Manchester, I learnt valuable information about fruit flies and drosophila. Whilst studying these fascinating creatures the time was not the only thing that flew by!

To begin with, I was unaware to the importance of fruit flies yet I soon came to the realisation that fruit flies are vital to the development of science. Fruit flies can in fact be used to study our nervous systems as they share a very similar nervous system to us therefore enabling us to make links between them. The fun doesn't stop there; the flies can also be used to see what mutation is produced when a certain gene is changed. It has come apparent that drosophila is the most effective tool to unravel the functions of novel genes.

We learnt via multiple methods: we manipulated punnet squares in order to know which mutations a fly should get so the mutation is obvious but not harmful; we also gave flies epileptic fits which taught us what happens when all motor neurones are sending messages at the same time; furthermore we looked down the sights of a microscope to see the visible mutations to flies and identified the mutation; and we also looked at the effect of old-age on the mobility of flies by seeing whether old flies can fly as well as young flies.

I learnt that old flies cannot fly as well as young flies; I learnt about punnet squares and how they can be used in real-life situations, I learnt some fruit flies can be epileptic because of a temperature increase and/or being shaken. I also learnt much, much more. Overall, I thoroughly enjoyed my time with the scientists at the University of Manchester.

What are Drosophila?

A Drosophila, or more commonly known as the 'Fruit Fly', is a small insect that typically feeds on over ripening or gone of fruit.

A Drosophila is used to aid the research into pharmaceuticals against disease. The relationship between fly and human genes is so close that the sequences of newly discovered human genes, including disease genes, can often be matched against flies. This helps towards the research in the development of effective drugs against human diseases. The flies' genome is very similar to a human's which means it is easy to create mutants and carry out experiments on fruit flies, the functions of many fly genes have been established because of it. For example, the first 'jet lag' and 'learning' genes were discovered in Drosophila, this means they will have similar genes to compare with humans.

None less than six Nobel prizes have been awarded for the research into Drosophila.

Genetic markers are commonly used in Drosophila research, for example within balancer chromosomes or P-element inserts, and most phenotypes are easily identifiable either with the naked eye or under a microscope. The use of punnet squares are used to determine the possible outcome of offspring that could have a particular mutation that is useful for research. The stock is always high and the different characteristics are found in a wide variety. This can be from white eye to curved-wings or even no eyes at all. The different phenotypes are endless including ways to determine behaviour by causing seizures from the glimpse of a blue light.

This research is fascinating and incredible about how much has been achieved.

Using Drosophila for Science, Research and Discovery

By ...

Drosophila is the scientific word for fruit fly. I have learnt that Drosophila is extremely important to making new scientific discoveries, such as cancer research, as they are mainly used in genetic research. They are used for research because they have similar genes to us humans. Also there is a huge population of fruit fly that is sustainable, and fruit flies are grandparents in 3 weeks, as they reproduce quickly, so we don't have to worry about their population decreasing if we keep doing research on them. They are also low maintenance creatures with a simple diet, so are cheap to take care of. They have a short life span, so in 30 years there will have been around 800 generations of fruit flies, much less than with mice. Also that just by breathing on fruit flies, they will be knocked out so that is a convenience for scientists.

We can learn a lot from fruit flies to benefit humans. It is easy to create mutations in fruit flies, so we can find out the functions of those genes, which will also be the function in humans, which can be helpful in the development of new drugs. Fruit flies get conditions humans get like Alzheimer's, and by monitoring the drosophila could help towards new discoveries on how to stop or slow down the formation of Alzheimer's.

From the experiments we carried out, we found out that there are lots of mutations that can occur in fruit flies. These mutations might not be visible by the human eye as they are very small creatures but can be seen under the microscope. I for one got very scared looking at them that close but however it is important to research the differences. Another test showed that as fruit flies get older they lose some of their mobility, just like humans do. Also that Drosophila helped in the discovery of Punnett squares to help show how genes get passed on through generations, and dominant and recessive genes, which helps scientists when breeding new fruit flies.

Drosophila for science research and discovery.

Drosophila is the study of flies used extensively in genetic research because of its large chromosomes, numerous varieties, and rapid rate of reproduction. Fruit flies become parents in only 7 days causing their genes to be inherited quickly. I found out that fruit flies share 75% of genes that cause disease with humans. This is extremely helpful for scientists when studying genetics.

Because of the research in drosophila Ed Lewis, Christiane Nusslein-Volhard and Eric Wieschaus were awarded the Nobel Prize in Physiology or Medicine in 1995. One experiment we carried out showed how flies can get epileptic fits. By shaking the test tube quickly, the fruit flies would stop moving and would fall to the bottom of the test tube. This is due to the neurones sending impulses to the muscles and the same time.

I also found out that ageing affects flies movement similar to humans. a climbing wall expressed the fact that a 5 week old fly climbs up the wall slower compared to 1 one week old fly. This shows that they suffer from many diseases that bigger organisms have. This can be used in genetics. Many people study the different variations that flies can obtain. A few examples are that flies can get different coloured eyes (compared to the red eye found in wild flies). Irregular facets and vestigial are also found. Flies can inherit multiple markers.

I found out that flies can be studied by their behaviour mood including their aggression and motivation. This also shows the importance of drosophila. Scientists would want to study this because of the connections to humans. from learning about drosophila I can clearly see how the rearch is more important than most people may first think. I think that a increasing number of scientists will study drosophila as there are many advantages compared to disadvantages.

Using Drosophila for Science Research and Discovery

By ...

Drosophila is the scientific word used for fruit flies. They are small flies which are difficult to view properly without a microscope. I have learnt drosophila is a widely studied subject at Manchester University and has a large importance in the biology of the human body.

Drosophila can help with scientific research and discovery as they have a very short life span which enables scientists to study them through generations. As well as this they can monitor their life cycles and how they vary due to evolution or deliberate changes they may make to them. The population is sustainable and doesn't take up a large amount of space in a lab. Part of the reason people work with Drosophila is because so much is already known about them and they are easy to look after. It is also very cheap to look after them so doesn't become a large cost to research.

Drosophila are mostly used in genetics, for example to discover that genes were related to proteins and to study the rules of genetic inheritance. About 75% of human disease genes match those in fruit flies. As well as this fruit flies can suffer from Alzheimer's, cancer and epilepsy and therefore are comparable to humans. As they are so similar to larger organisms such as us drosophilists can experiment on them with different medicines and cures and see which ones work well or make the situation worse. New medicines and cures can therefore be discovered without having to test on humans first to check they are safe to use.

In the practicals we carried out on the day I learnt a few things. One of these was that many different markers can be used on drosophila to identify them. One can look at them very closely with a microscope and help pick certain ones out. I also learnt that these flies can have similar diseases to us such as epilepsy. As well as this I learnt that the flies can only survive at certain temperatures, if the temperature gets too high their brain stops working properly and they black out.