The following information relates to;

Achievement Objective

Evolution LW 7-3: Understand that DNA and the environment interact in gene expression.

and

Achievement Standard 901159: Level 2 Demonstrate understanding of gene expression

Mutations

A mutation is any change on the DNA sequence that is not properly repaired. A section of nucleotides on the DNA sequence that code for specific proteins is called a gene. Therefore, a mutation on the DNA sequence can affect the expression of genes.

Mutations may result from mistakes in DNA replication. Mutagens can increase the base rate of mutations. Mutagenic agents include;

- Ionisation Radiation – atomic, gamma rays or X rays may cause a simple change (substituting one base for another) or deletions of genetic material.
- UV light rays – can cause two thymine bases next to each other to form a bond between them = dimmer.
- Chemicals – mustard gas, formaldehyde, nitrous acid/gas.
- Viruses – some viruses e.g. hepatitis B insert their own DNA into the host cell and may disrupt the host genes = causing a mutation = producing liver cancer.

Mutations are usually recessive in diploids and are inherited in a Mendelian way. The vast majority of mutations are neutral however, some mutations can be harmful. Beneficial mutations increase an organism's chance of survival and introduce totally new alleles into a population. Mutations are the ultimate source of genetic diversity and are one of the driving forces of evolution.

Gene mutations include

- Insertion
- Deletion
- Bases mismatching

- Missense Substitution
- Nonsense substitution
  Gene Mutation – which is a charge in the DNA nucleotide coding. Gene mutation could involve a single nucleotide (point mutation) of a triplet.

Examples: *Drosophila* Mutants

T.H. Morgan bred *Drosophila* by the thousands, and his team tried to create mutant flies with x-rays, acids, and other toxic substances. Finally, in one unaltered lineage of flies, the researchers found a surprise. Every single fly in that line had been born with red eyes, until one day a fly emerged from its pupa with white eyes. Something had spontaneously changed in the white-eyed fly. Within several years Morgan and his team found 80 different mutations in *Drosophila.* Most mutant types would die off in the natural world but have been maintained over many generation in laboratory conditions.

Drosophila genetics activity

References

http://evolution.berkeley.edu/evolibrary/article/history_18
http://www.dnaftb.org/10/animation.html