The Nucleus

The nucleus is made up of genomes. These contain all the information for all the cells of all different types. This is known as DNA. The genomes can be transcribed and translated for protein synthesis. There is a limited number of genomes but they can be used differentially, which is how we get phenotypic variation.

The nucleus specifies and controls the activity of the cell. In protein synthesis, it is responsible for the transcription of DNA into RNA, the processing of RNA into mRNA, the binding of ribosomes to the mRNA to produce amino acids and the translation of the amino acids to produce the relevant protein.

In eukaryotes, such as plant and animal cells, the DNA is found in the nucleus. Small amount of DNA are also found in mitochondria (plant and animal) and chloroplast (plant only).

The nucleus is the largest and most obvious organelle of the cell. It is separated from the rest of the cell and its cytoplasm by the nuclear envelope, a double membrane. This allows for selective and controlled movement of material.

NUCLEAR ENVELOPE

This is a double membrane. It consists of two lipid bilayers with a lumen in-between the two ayers. This separates the contents of the nucleus from the cytoplasm.

The bilayers contain embedded proteins that are each space about 2140 nm apart. The average diameter of the entire nucleus is about 6μ m. The nucleus 2140 proteins in the envelope allows for bidirectional traffic flow.

Proteins tend to enter the Nuleus the most. This includes material for DNA synthesis, such as the proces to transmittion. It is highly includes a the material that enters is very specific and controlled. One of the only things to leave the nucleus is RNA.

NUCLEAR LAMINA

This is a protein lattice that supports the nuclear envelope. When a cell divides, the nuclear envelope is broken down to allow the full replication of the cell genome. The envelope must disappear transiently and this is able to happen due to the reversible disassembly of the lamina.

NUCLEAR PORES

These can be seen on the nucleus through a process called freeze fracturing. The cell can then be looked at under an electron microscope. There are approximately 3000 pores on the nuclear envelope, each measuring about 100nm in diameter. They allow for 2-way passage across the envelope.

The nuclear pores are much larger and more complex structures than first thought. If you look at the structure of them, you can see that on the outside there are a number of small projections called cytoplasmic filaments. On the inside is a 'nuclear basket'.