

## From Birds, to Pigs, to People: Influenza Lecture

The DNA of a virus is only about 13,600 nucleotides long - and that's extremely short compared to human DNA, which is closer to 3,000,000,000. So how do viruses vary so much, from the fairly harmless flu virus to the more-often-than-not fatal bird flu? Actually, it's down to less than the nucleotides - it's more like a difference of a few atoms.

After school on Monday 10 October, all Year 12 biologists attended a lecture by Dr. TJ Ragan on Influenza - how we acquire it, how it attaches to cells, and the differences between a common strain and a rare one such as bird flu.

The flu virus can only stick to cells in the first place because of specific antigens on the surface of the cell. The antigens on the surface of cells in birds, which carry the virus naturally, are very slightly different from those in humans, so normally there would be almost no chance of the virus crossing over. However, pigs cells have the same antigens as both humans and birds, so pigs can contract the virus from birds. The virus then can then mutate into a form that can be contracted by humans, hence we get the flu.

There are waves of flu every year, and new vaccines have to be made as the virus mutates at such a fast rate. The new strain is made in the colder months when farmers take their animals inside and live in close proximity with them, as this is when the virus has the best chance of being transferred.

To give us an idea of the scales we were dealing with, Dr Ragan showed us a water molecule, representing each atom with a coloured stick. He then showed us an amino acid, with the same layout, consisting maybe ten or fifteen atoms. Next was a peptide, which was displayed as a long chain of amino acids, but the sticks were hard to distinguish and already we were getting a little lost. This peptide could be thought of as a short length of thread. The kind of protein on the surface of the virus that we were dealing with was more like several spools of this thread all tangled into one fluffy mass.

Comfortingly, Dr Ragan told us: "After years of practice and training, you can look at a protein like this and say, with conviction, that you have no idea what is going on!". He then proceeded to show us a simpler version, and some of the group were even able to name a few of the sections.

Research is currently being done into a vaccine for all strains of flu, as it has been found that in rare cases, some people's immune systems can attack the section of a virus' antigen that does not mutate. This showed us all that, although such complex ideas are already in place, there is a lot more to be discovered in the field of molecular biology.