

2011-2012 WHRO VideoClassroom Preview

Series Title:	Big Questions: The Nature Of Scientific Inquiry
Curriculum Area:	Science
Grades:	6-12
# of Programs/Length:	5/20:00 minute programs

It's a slow painstaking business unlocking the secrets of the universe. But occasionally an inspired individual makes sense out of confusion – and comes up with a theory or invention that changes the world and our understanding of how it works. This series, enthusiastically presented by Adam Hart David, focuses on the lives, works and struggles of scientists who have made these great intellectual leaps. How did they do it? What did they owe to their contemporaries? Why were their ideas so often resisted? What do their stories tell us about the nature of science and scientific inquiry? This series addresses National Science Standards.

1.) Faraday's Famous Inventions

The story of how Michael Faraday, a self-educated, working-class boy became a world famous scientist. His discoveries laid the foundation for our modern age, which relies so much on electricity as a carrier of power and information./He used the newly discovered source of current electricity (Volta 1800) to investigate the link between electricity and magnetism – the fact that an electric current could make a magnet move. He developed a simple electric motor in which a current-carrying wire moved in a magnetic field, then showed that movement of a wire in a field could generate an electric current (a “dynamo”). He discovered the principle of the Faraday Cage. He basically provided the basis for the industrial development of the 20th Century.

2.) Charles Darwin's Evolution

Charles Darwin put forward his theory of evolution in 1858, at a time when most people believed in the Creation. Central to the theory is the fact that species change, a notion that was completely contrary to the generally held belief – eloquently argued by William Paley – that all organisms were created by God and are unchangeable. During his famous voyage on the Beagle, Darwin found evidence that species do change over time. But how does this happen? Reading Malthus, Darwin saw how competition between individuals could lead to evolution through a process of natural selection.

3.) Mendel And The Gene Splicers

Mendel's experiments on pea plants showed that characteristics are passed from one generation to the next by some sort of “particles”, which he called “factors” but we know as genes. This idea is in contrast to Darwin's belief that inheritance involved the blending of features with each other, like the mixing of paints. So what are Genes? They are made of DNA, an immensely long, but tightly packed, molecule containing a sequence of organic bases (the genome) for a number of organisms, including humans, has been worked out, and this has led to the possibility of rearranging them into new patterns. This is the basis for genetic engineering.

4.) Mendeleev's Dream

The story of how Mendeleev devised the periodic table of elements. Dmitri Mendeleev revolutionized our understanding of the properties of atoms and created a table that probably adorns every chemistry classroom in the world. The ancient Greeks had the idea that everything was made from one of four elements – fire, water, earth and air. Mendeleev studied everything that was known about the elements and looked for patterns in their properties. He realized that there were some elements that had not yet been discovered, and that any pattern must allow for these gaps. This breakthrough enabled him to make predictions that turned out to be amazingly accurate and convinced scientists that his periodic table was one of the most powerful tools in modern science.

5.) Hubble's Expanding Universe (15:00 Preview Segment)

Edwin Hubble is renowned for determine that there are other galaxies in the Universe beyond the Milky Way, and for observing that the Universe is expanding at a constant rate. He became famous for showing that there are different types of galaxies: spiral, elliptical and irregular. Hubble proved that the Universe was bigger than previously thought by using stars that change regularly in brightness – Cepheid variable stars . Hubble found variable stars in other galaxies much farther away than the Andromeda Galaxy which eventually led to the discovery that the universe is expanding.