U3A Science and Technology Group
Meeting 14 November 2022
Decoding the Genome

This month's talk was by Dr Alistair Reid, a clinical scientist working on decoding the secrets of genomics – the science of identifying genes, what they do and how they do it.

The first part of the talk traced the development of understanding about genes and how they were eventually discovered. The journey began with Pythagoras and his spermism theory. There followed many theories and what, in hindsight, appear to be insights into what we currently understand about genes and genetics. Thus, Aristotle asserts that what passes from man to woman is not matter but messages, and Wolff (1700's) that a guiding hand decodes information in the fertilized egg to form a human.

There were many misconceptions as well. Paracelsus (1520's), for example, maintained that a sperm contained mini-human homunculii that just grew into a full sized human, while Darwin's pangenesis mechanism (1868) held that each part of a body contributed small particles (gemmules) to the gonads and thus to any offspring.

Mendel's (1822-1884) study of how characteristics of pea plants, such as tall/short plants, passed through generations established that information about both tall and short must be in both parents and both sets of information are passed onto the child plants. de Vries and Correns independently rediscovered the effects and Mendel was acknowledged some 20years after his publication.

Big steps in understanding chromosomes and genes came in the early 20th century with the chemical characterisation of DNA and RNA, but it was not until the 1940's and x-ray structural analysis that the structures of these key molecules could be undertaken.

It took many years of painstaking work by Wilkins, Franklin, Watson, Crick and others, to get to the now well-known 1953 double helical structure of DNA and to the identification of the 3-letter code based on four bases. Since then, technology and techniques have developed enormously to the point where today we can analyse a complete human genome in a day, locate genes in DNA, modify genes in living organisms and sort out the biochemistry of how genes work.

The second part of the talk looked at what might be possible, in the short and long term, in developing targeted medicines, understanding mutations, predicting “social” traits from genes and protecting space travellers from the harsh environment “out there”.

The talk was fully appreciated by the large audience.