

invite gifted &amp; talented Year 5 and 6

children with a love of science to

**'Let's Go Beyond The Genome!'**

**G.A.T.E.WAYS** is an independent organisation offering challenging and enriching activities and experiences to develop and extend highly able children. Established in 1994, G.A.T.E.WAYS runs a range of stimulating school programs as well as the Saturday *Brainwaves Club*. This *JOURNEY* for both girls and boys will run over four sessions. Our DNA is what makes us human, as well as what makes us unique. The human genome contains a complete set of instructions for building a human being. Since the complete human genome sequence was published in 2003, it has become faster and easier for scientists to access the information about the health and development that is contained in our DNA. In this Journey, you will learn all about DNA, genes, and inheritance, be amazed by genetic technologies and challenged by ethical debates. Let's go... beyond the genome!

**Requirements:**

Bring an A4 ring binder with paper; plastic sheet protectors; coloured pencils or Textas; morning tea (no nuts please); a small photograph of yourself to the first day – to be returned with your report; a stamped, self-addressed envelope for your report.

**Session 1: Introducing... Dazzling DNA and the Great Genome!**

What is DNA? Where is it found and what does it do? In this session, we will answer these questions and investigate the units and patterns of inheritance common to all living organisms, including humans. We'll look at cells, chromosomes and genes and examine the structure of the DNA molecule. You'll get hands-on and build a model of DNA, and find out how DNA is sequenced in a simulation activity.

**Session 2: Cracking the Genetic Code**

The human genome sequence is approximately 3 billion base pairs long. Our 25,000 genes make up only 1.5% of this sequence. So what is all the rest of our DNA for? In this session, we will discover how scientists use 'bioinformatics' to make sense of DNA sequence data. We'll examine some real DNA sequences from the human genome and test our analytical skills as we go hunting for genes! We'll also discover how your cells can 'read' genes to create the proteins that allow them to function.

**Session 3: Switched On Genes**

Every cell in your body contains the same DNA, but a lung cell is different from a liver cell, and a blood cell is different from a brain cell. How is this possible? The answer is epigenetics! Epigenetics is the study of changes to gene activity that occur without changes to DNA sequence. Today we will look at gene 'switches' or modifications to the structure of DNA that turn genes on or off. A hands-on modelling activity will help us understand how these switches work.

**Session 4: Let's Get Ethical**

Sequencing the human genome allowed scientists to identify genes that contribute to various conditions and diseases, such as cancer and cystic fibrosis. This means that doctors and scientists are now better able to understand these conditions and how to treat them. With knowledge of an individual's DNA sequence, treatments could even be 'personalised'. But who should have access to genome sequencing? Could genetic information be misused? What are the privacy issues? Today we will consider the ethical implications of the genome sequencing. We'll discover the principles of 'bioethics' and debate ethical issues in a hypothetical genetic screening scenario.

**Homework Requirements & Assessment**

Between sessions students may be asked to do some homework. At the end of the program a short written report will be completed on each student and forwarded home to parents. A copy should be made and forwarded to the school

**ABOUT THE PRESENTER**

Bobbie O'Brien completed her undergraduate Bachelor of Arts/ Bachelor of Science degrees at the University of Melbourne in 2006. In 2007, she completed an Honours degree in the Developmental Epigenetics Laboratory at Murdoch Children's Research Institute, and went on to attain a Master of Philosophy degree in the same group in 2010. Bobbie is also a qualified primary school teacher, having completed her Diploma of Education in 2012. She is passionate about science and education and enjoys combining these passions with G.A.T.E.WAYS © G.A.T.E.WAYS