we the curious
**Theme Day**

# A Question of Taste Post 16 duration: 5-5.5 hours

Over 2500 students each year take part in this popular, lab-based PCR workshop. An unusual human trait is explored through DNA extraction, PCR and gel electrophoresis enabling students to determine their own genotype in relation to tasting the bitter chemical PTC. The possible evolutionary significance of this characteristic is discussed, along with the broader social, medical and ethical implications of gene technology.

## Key Words:

PCR. DNA. Genetics. Gene. Allele. Gel electrophoresis. Enzymes. Variation. Evolution. Ethics.

## Learning objectives

Gain direct experience of the techniques involved in using producing a genetic fingerprint of a sample of their own DNA, including using micropipetting, DNA extraction, gel electrophoresis, and PCR
Be able to define DNA as a long, thin molecule, composed of nucleotides, with a double helical structure
Recognise that the base order of some of DNA acts as a protein code and that there is genetic variation between individuals
Gain an understanding that DNA can be extracted and then manipulated and copied
Understand that PCR is a technique that enables us to select specific sections of DNA and copy them billions of times
Understand that gel electrophoresis is a way of analysing PCR results
Explore the ethical and moral issues raised by various applications of gene technology
Analyse results to compare genotype and phenotype
Recognise how studying human DNA can help us understand the evolution of our own and other species
Relate their results to contemporary research on the evolution of bitter taste detection in humans and chimps
Appreciation the importance of accuracy and minimising contamination in the laboratory, particularly when working with DNA

## Content: Example Timetable

**Example Timetable:**

10:00 - Arrival and welcome
10:15 - Introduction to protocol, DNA overview
10:45 - Students cheek cell swab & micropipette practise
11.30 - Extracting DNA and PCR preparation
12:00 - Lunch break and time to explore We The Curious
13.15 - Set up restriction enzyme digest
14.00 - Restriction enzyme activity
14.30 - Gel loading
14.45 - Genetic testing ethics and debate session
15.00 - View results and summary
15:15 - Departure or more free time to explore We The Curious

## Curriculum Links:

**OCR (Spec A):** Development of practical skills in Biology, Cell structure, Nucleotides and nucleic acids, Genetics and evolution, the principles of the polymerase chain reaction and its application in DNA analysis, the principles and uses of electrophoresis for separating nucleic acid fragments

**OCR (Spec B):** Development of practical skills in biology, Nucleic acids, the principles and uses of the Polymerase Chain Reaction, the principles and uses of agarose gel electrophoresis, the nature and use of SNPs (single nucleotide polymorphisms) in human genome studies

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**AQA:** Structure of DNA, Cell structure, DNA, genes and chromosomes, genetic diversity and adaptation, inheritance, using restriction enzymes to cut a fragment containing the desired gene from DNA, the principles of the polymerase chain reaction as an in vitro method to amplify DNA fragments, genetic fingerprinting

**Edexcel (Spec B):** Using gene sequencing, understand how PCR can be used to amplify DNA samples, and how these samples can be used to predict the amino acid sequence of proteins and possible links to genetically determined conditions, using gene sequencing and in forensic science, to identify criminals and to test paternity, using DNA profiling

**WJEC:** Working scientifically, nucleic acids and their functions, alleles as different forms of the same gene. Application of reproduction and genetics: gene technology and its applications; the sequencing of genomes, the use of PCR and recombinant DNA technology. The ethical implications of these technologies

## Potential Hazards

Students will work in a lab environment with TAE buffer and gel electrophoresis tanks.