

# Real-Life Research



THE UNIVERSITY of EDINBURGH  
Easter Bush  
Science Outreach Centre

Get hands-on  
with real-life  
science

## How to build a bone: PHOSPHO1 and bone mineralisation

### Glossary

<b>Alleles</b>	Different versions of the same gene. See <a href="#">Chromosome</a> ; see <a href="#">Genotype</a> .
<b>Base pairs</b>	The number of bases (i.e. As, Ts, Cs and Gs) in a DNA sequence. We talk about base pairs as DNA is usually a double-stranded molecule!
<b>Chromosome</b>	An X-shaped structure inside the cell nucleus which packages up DNA in the form of genes. Humans have 23 pairs, while mice have 20 pairs. One chromosome of each pair is inherited from the biological mother and father and each contains an allele of any given gene.
<b>Gel electrophoresis</b>	A technique in which charged molecules like DNA can be separated by size based on the speed which they migrate through a gel when a current is applied. Smaller DNA molecules will move faster (and farther) through the gel compared with larger ones.
<b>Genotype</b>	The collection of alleles which determines an organism's characteristics. See <a href="#">Phenotype</a> .
<b>Genotyping</b>	A method through which an organism's genotype can be determined. Often refers to Polymerase Chain Reaction.
<b>Heterozygous</b>	An organism whose genotype contains two distinct alleles of a given gene.
<b>Homozygous</b>	An organisms whose genotype contains two identical alleles of a given gene.
<b>Hydroxyapatite</b>	A mineral crystal made of calcium (Ca) and phosphate (PO <sub>4</sub> ) which makes up the inorganic part of bones and teeth.
<b>Knock-out mouse</b>	A mouse which has been genetically modified to ablate the function of a gene in order to study its biology.
<b>Mutation</b>	A change to a DNA sequence.
<b>Osteoblasts</b>	The specialised cells which form new bone tissue.



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<b>Phenotype</b>	The set of observable characteristics of an organism which arise from its genotype.
<b>Phosphatase</b>	An enzyme which is able to break up molecules to release phosphate ions ( $\text{PO}_4^{3-}$ ).
<b>Polymerase chain reaction (PCR)</b>	A technique for the amplification of DNA <i>in vitro</i> (this describes biological experiments outside their normal environment). PCR amplifies DNA using complementary primers for specific target DNA sequences. See <b>Primers</b> .
<b>Primers</b>	Short DNA molecules which are complimentary to target sequences either side of e.g. a section of a gene and which are specific to these sequences. Primers are the key to specificity of PCR.
<b>Restriction endonuclease</b>	An enzyme capable of cleaving DNA at or near a specific sequence of bases.
<b>Single nucleotide polymorphism (SNP)</b>	A type of mutation where a single base is changed to a different base. SNPs are the most common mutations which occur naturally.

