

Inheritance

Why does a diploid cell have two copies of each autosomal gene?

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P, F1 and F2 generations

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Why can pea plants self-fertilize?

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Gene versus allele

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Phenotype

Inheritance

Why is an allele recessive?

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Phenotypic plasticity

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Cause of phenylketonuria (PKU)

P: pure-breeding parents crossed. F1: their offspring. F2: offspring of F1 crossed together or self-pollinated.

It formed when two haploid gametes, one from each parent and each carrying one copy, fused into a zygote.

A gene is a heritable factor at a locus influencing a characteristic; an allele is one alternative form of a gene.

They produce both male gametes (in pollen) and female gametes (in ovules) on the same plant, so self-pollination is possible.

It usually codes for a non-functional protein, so its effect only shows when no dominant (functional) allele is present.

The observable traits of an organism, resulting from genotype and environmental factors.

A recessive allele of an autosomal gene for the enzyme that converts phenylalanine to tyrosine.

Capacity to develop traits suited to the environment by varying patterns of gene expression; not a change in genotype; may be reversible.

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**Single-nucleotide polymorphism
(SNP)**

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**How many alleles of a gene can an
individual inherit?**

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ABO alleles and dominance

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Codominance example

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Incomplete dominance example

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What determines sex in humans?

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**Why are X-linked traits more common
in males?**

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Genotype of a haemophilia carrier

Only two, although any number of alleles can exist in the gene pool.

A base position where the nucleotide differs between individuals; SNPs create multiple alleles in a gene pool.

Blood group AB ($I^A I^B$): heterozygote has a dual phenotype with both A and B antigens.

I^A and I^B are codominant; both are dominant to i .

The sex chromosome in the sperm: X gives XX (female-typical), Y gives XY (male-typical).

Mirabilis jalapa (four o'clock flower): red $\times$ white gives pink, an intermediate heterozygote.

$X^H X^h$: a heterozygous female, unaffected but able to pass X^h to children.

The X carries far more genes than the Y, and males have one X, so a single recessive X-linked allele is expressed.

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Pedigree clue for a recessive allele

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**Genetic basis for prohibiting marriage
between close relatives**

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**Inductive versus deductive reasoning
in pedigrees**

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Continuous variation

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Discrete variable example

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**Six aspects shown by a box-and-
whisker plot**

Relatives are more likely to carry the same rare recessive allele, so children are more likely to be homozygous recessive.

Two unaffected parents have an affected child.

A trait can take any value in a range, due to polygenic inheritance and/or environment, e.g. skin colour.

Inductive: deducing a general pattern from some cases. Deductive: using that pattern to work out specific individuals' genotypes.

Outliers, minimum, first quartile, median, third quartile, maximum.

ABO blood group: distinct categories with no intermediates.