

Inheritance

IGCSE Biology ■ Topic 17

IGCSE Biology



Inheritance

What we will cover

- 1 Chromosomes, genes & DNA
- 2 Sex determination
- 3 Making a protein
- 4 Mitosis vs meiosis
- 5 Inheritance key words
- 6 Monohybrid crosses

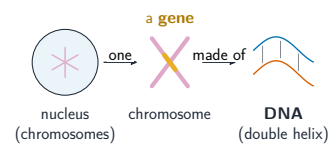


1 Genes

Inheritance

Genes

Chromosomes, genes and DNA

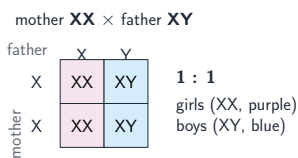


- A **gene** is a length of DNA that **codes** 编码 for one **protein** 蛋白质.
- An **allele** 等位基因 is an alternative form of a gene. For example, a gene for eye colour may have a brown allele and a blue allele.

Inheritance

Genes

Sex determination

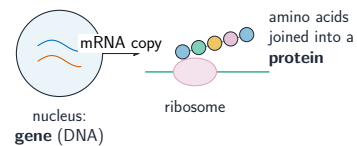


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Genes

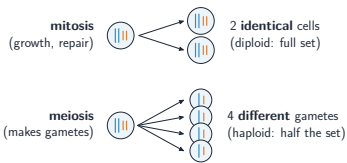
Making a protein



A gene's **base sequence** 碱基序列 sets the amino-acid order.

- **mRNA** 信使 RNA copies the gene
- a **ribosome** 核糖体 reads it
- amino acids join into the protein

Mitosis vs meiosis



- **mitosis** 有丝分裂 – 2 **identical diploid** 二倍体 cells; growth & repair
- **meiosis** 减数分裂 – 4 **different haploid** 单倍体 **gametes** 配子

2 Crosses

Inheritance key words

BB → brown eyes
Bb → brown eyes
bb → blue eyes

B (brown) is dominant
b (blue) is recessive

- **genotype** 基因型 – the alleles; **phenotype** 表现型 – what you see
- **dominant** 显性 (B) shows with one copy
- **recessive** 隐性 (b) needs two
- **homozygous** 纯合子 BB/bb;
heterozygous 杂合子 Bb

Monohybrid crosses

Bb × Bb (both parents)

gametes

	B	b
B	BB	Bb
b	Bb	bb

3 : 1
3 dominant (blue)
1 recessive (orange)

A **Punnett square** 庞纳特方格 predicts the offspring.

- $Bb \times Bb \rightarrow 3:1$
- $Bb \times bb \rightarrow 1:1$

A **test cross** 测交 (against bb) reveals an unknown genotype.

Codominance and sex linkage

codominance 共显性

both alleles show: $I^A I^B \rightarrow$
blood group 血型 AB

sex linkage 伴性遗传

a gene on the X; **colour blindness** 色盲 is commoner in boys

3 Recap

Worked example – a monohybrid cross

In peas, T (tall) is dominant to t (dwarf). Two heterozygous tall plants are crossed. Give the offspring ratio.

- Heterozygous tall $\Rightarrow$ both parents are Tt.
- Each parent makes two kinds of gamete: T and t.
- Fill in every combination (the square, right).
- Genotypes: 1 TT : 2 Tt : 1 tt.
- TT and Tt both look tall, so phenotypes are 3 tall : 1 dwarf.

	T	t
T	TT	Tt
t	Tt	tt

Only tt is dwarf: 1 in 4.

Show the parent genotypes, the gametes, then the square. A recessive phenotype needs both recessive alleles.

Topic 17 – key takeaways

1 Genes

a gene codes for a protein; alleles are forms

2 Division

mitosis identical; meiosis halves & varies

3 Dominant

shows with one copy; recessive needs two

4 Crosses

$Bb \times Bb \rightarrow 3:1$; $Bb \times bb \rightarrow 1:1$

Check yourself

- 1 What does a gene code for?
- 2 Which gamete decides a baby's sex?
- 3 What does meiosis make?
- 4 What ratio does $Bb \times Bb$ give?



Answers 1. one protein 2. the sperm 3. four different haploid gametes 4. 3:1