

BioMedical Admissions Test (BMAT)

Section 2: Biology

Topic B7 - Variation

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



Topic B7 - Variation

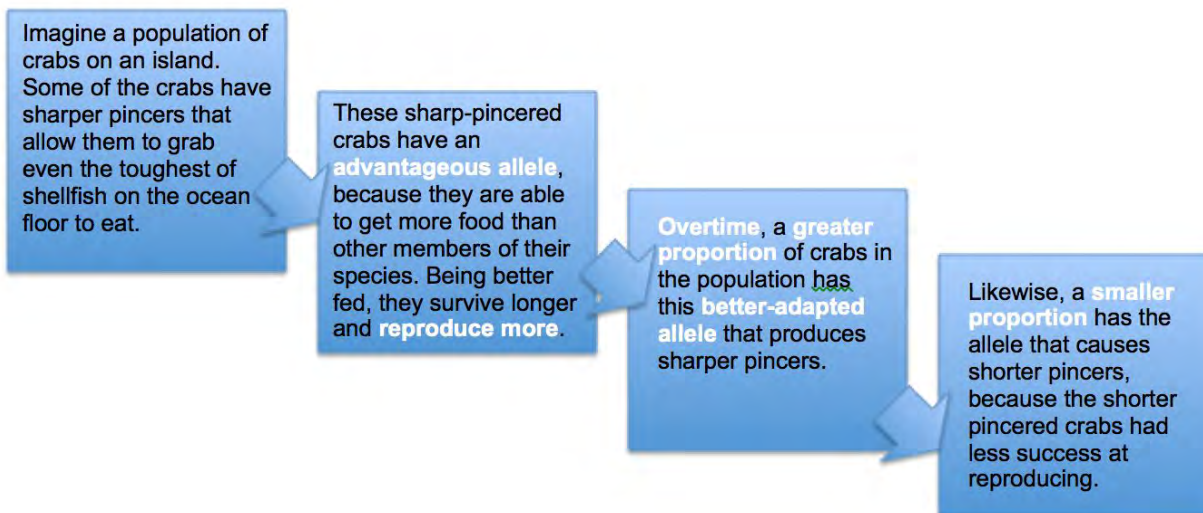
Natural selection and evolution

Within a population of a particular species, there will be genetic variation due to **mutations**. **Variation** refers to the differences between organisms of the same species.

You need to be able to distinguish between 2 important concepts:

- **Evolution** is the slow process whereby organisms change over many generations.
- **Natural selection** is the mechanism by which it occurs.

Charles Darwin explained evolution through the process of **natural selection**. The theory states that organisms who are better adapted to their environment are more likely to survive and produce offspring. This means that, over time, their genes and characteristics will become more common in the population. The example below shows how the crab population has **evolved by** means of **natural selection**:



Exam Tip - Remember, natural selection favours individuals with an advantageous **allele** that allows them to survive and reproduce. This **allele** could do anything from longer limbs to better eyesight!

Natural selection doesn't favour a higher reproductive capacity per say, but the particular **allele** which gives the individual a higher reproductive capacity!



Another example that is relevant to medicine is the increasing risk of **antibiotic resistance**:

- Within the bacteria population there is variation due to **mutations**
- One mutation provides resistance to certain antibiotics
- When the **selection pressure** of antibiotics is used (i.e. the patient starts using it), the bacteria with this **beneficial allele** will survive
- They will then reproduce and pass these **advantageous alleles** on, until the number of bacteria which are resistant increase

Sources of variation

Genes are passed on from parents to offspring, in various combinations, via **gametes**. Each individual is genetically unique because they have inherited genes from each of their parents, in a random combination. Examples of **exclusively genetic variation include eye colour, blood group and genetic disorders**, such as Huntington's, polydactyly and cystic fibrosis.

The **environment** can also cause members of the same species to show different characteristics. For example, you might notice your friend looks very different after coming back from a holiday with a sunburn and completely bitten by mosquitos.

Most variation is due to a **combination of genetic and environmental factors**. For example, your maximum height is decided by the genes that you inherit from your parents. However, your environment plays a key role too; you can't grow tall without the nutrients to do so! Other examples include body mass, skin colour and how well you do in school.

