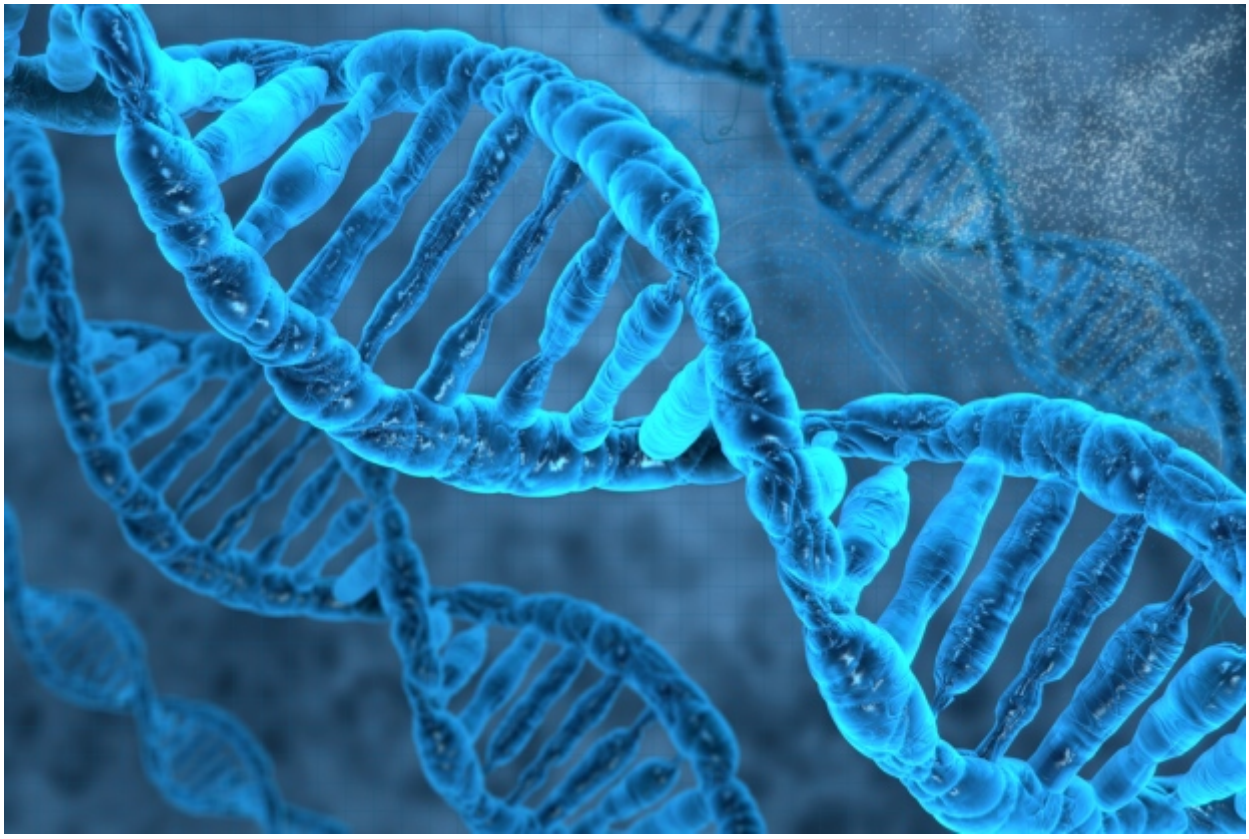
Science
Stage 5
Genes and technology
Part 1



Distance Education Science Network

Glossary

The following words, listed here with their meanings, may be found in the learning material in this unit.

chromosome	structure in nucleus containing hereditary (genetic) information
DNA	deoxyribonucleic acid
gene	segments of DNA located on chromosomes and determine a particular characteristic in an organism
genetic trait	characteristic or feature passed on from parents to offspring
helix	a spiral
mutation	a faulty replication of DNA
nucleus	a structure in a cell where genetic information is stored
hereditary	passed from one generation to another (inherited from parents)

Lesson 1: Inherited traits

Why do we look the way we do? What makes us unique? We may look a bit like one of our parents, or a brother or a sister, but we are still different.

Have a careful look at the photographs of individuals and their family groups below. What is one thing you notice?

They are all human, except one.

The dog.

Figure 1

Activity 1 – Similarities and differences

a) What features do all the people in the photographs share? List four similarities.

_____

_____

b) What are some of the differences in the features of the people? List four differences you can see.

_____

_____

Check your response by going to the Suggested answers section.

We all share certain general characteristics. This makes us human. Yet we are all unique. We each have features that make us an individual.

Features such as hair colour and eye colour are passed on from parents to their offspring. We say the features are inherited.

The word *inherited* means that genetic traits are passed on from the parents to their offspring.

An inherited characteristic is called a genetic trait.

Our particular genetic traits make us unique.

Consider the daughter in this family:

Figure 2

Can you see one genetic trait the daughter has inherited from her mother?

We could say the shape of her eyes or the perhaps the shape of her nose or her straight hair.

The daughter has inherited some genetic traits from her mother and some from her father.

Activity 2 - Genetic traits

Complete the following sentences by using the words in the word bank.

inherited	parents	unique	similarities

a) As humans we all have certain _____ in appearance, such as two eyes, arms, legs and we stand upright.

b) We each have features that make us _____.

c) These features are called genetic traits and they are _____. This means genetic traits are passed on from _____ to their offspring.

Check your response by going to the suggested answers section.

Observable genetic traits

Some genetic traits are easy to see. They can be easily observed.

Here are some examples of observable genetic traits.

Do you have any of these genetic traits?

1) Cleft chin – this is a chin with a dimple in the middle.

Below is a father and his son who has inherited a cleft chin

Figure 3

Figure 4

2) Tongue rolling – this means being able to roll your tongue upwards. Being able to roll your tongue is inherited. A person can't learn to do it or be trained to do it.

Figure 5 **Tongue roller** **Non-tongue roller**

3) Vulcan sign – being able to spread your fingers two by two. Some people just can't make the Vulcan sign.

Figure 6

Activity 2 – My genetic traits

Which observable genetic traits have you inherited?

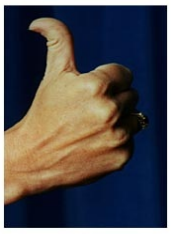
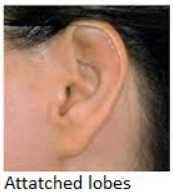
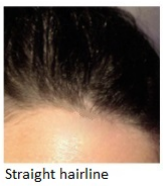
The following table lists observable genetic traits.

Each genetic trait has two possible variations. For example with the genetic trait of tongue rolling – you are either a tongue roller or you are a non-tongue roller.

Complete the table by deciding which genetic trait you have inherited. Circle the box that most applies to you (either *'variation one'* or '*variation two'*)

If you are able to complete this activity with family members or with some other people, use the blank box to record the names of the people who share a particular genetic trait with you.

Description of Trait	Variation One	Variation Two	People who share the trait
Tongue rolling – try to fold your tongue upwards	Can roll my tongue	Can't roll my tongue	
Cleft chin – do you have a dimple in your chin?	Have a cleft chin	Do not have a cleft chin	
Ear Wax – ear wax is either orangey brown or it is grey. If you are not sure check using a cotton bud	Ear wax is orangey brown	Ear wax is grey	
Vulcan's sign – spread your fingers two by two to make a V shape between your middle finger and ring finger	Can make the Vulcan sign	Cannot make the Vulcan sign	
Skin type – freckles or no freckles?	Freckles	No freckles	
Hair type – curly(wavy) or straight?	Curly/wavy hair	Straight hair	
 Front upper teeth – gap or no gap?	A gap	No gap	
 Length of the second toe	Second toe is longer than the big toe	Second toe is shorter than the big toe	

 The shape of the little finger – place your hand palm down flat on a table. Is your little finger straight or does the end bend in towards the other fingers	Little finger bent	Little finger straight	
  Straight thumb Hitchhikers thumb	Hitchhikers thumb	Straight or regular thumb	
  Detatched lobes Attatched lobes Ear lobes – how do they join your face?	Attached earlobes	Detached earlobes	
  Right thumb on top Left thumb on top Clasping hands position – without thinking about it clasp you hands. Which thumb is on top?	Left thumb is on top	Right thumb is on top	
  Widows peak hairline Straight hairline Shape of the hairline – is it straight or do you have a widow's peak?	Straight hairline	Widow's peak	

Colour Blindness

Colour blindness is also an inherited trait yet it is not observable. Most genetic traits are not observable because traits also control everything that happens inside our bodies.

A person who is colour blind does not see colour the way a person does who has normal vision. Colour blindness is usually only found in males. About 7% of males are colour blind.

You can't tell by looking at someone if they are colour blind. A test called the Ishihara Test is used to identify people who are colour blind. Here is a small sample of the test.

Can you see numbers?

Figure 7

People with normal vision see the number **74** and the number **29**.

People who may have inherited some form of colour blindness don't see numbers, only coloured dots.

Since you can't see this inherited trait, some people only find out they are colour blind when they are quite old. So if someone has looked at the plates and didn't see numbers they should go and have a complete and accurate test. The entire test has up to 32 colour plates. These are just two samples taken from the Ishihara Test.

Summary

Our genetic traits make us all unique.

Genetic traits determine our features and how our bodies function.

Genetic traits are inherited.

Inherited means that genetic traits are passed on from parents to their offspring.

Some genetic traits are observable – like hair colour and eye colour.

Most genetic traits are not observable, for example, colour blindness.

Complete the exercises for Lesson 1 in the Send-in exercises.