

Paper 2 — Chapter 6

Inheritance and Evolution

Extinctions

_____ is when there are no living members of a species left. _____ is when a large number of extinctions happen at the same time.

Name 5 factors that may cause an extinction

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-
-
-
-

Evolution

Evolution is a change in the i_____ characteristics of a population over time through a process of n_____ s_____. All living things have evolved from simple life forms that first developed more than three THOUSAND/ MILLION/BILLION years ago.

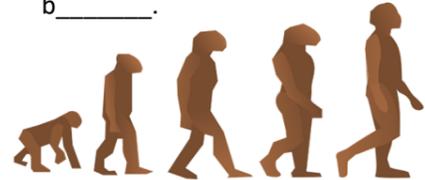
Evolution gives rise to p_____ best suited to their environment. If two populations of one species become so different that they can no longer interbreed to produce f_____ offspring they have formed two new s_____.

Evidence of Evolution

C_____ D_____ 's theory of e_____ by n_____ s_____ is now DISPROVED/WIDELY ACCEPTED /UNIVERSALLY ACCEPTED

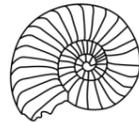
Evidence for the theory

1. Discoveries show characteristics are passed on to offspring in g_____.
2. In the f_____ r_____.
3. Resistance to a_____ evolves in b_____.



Fossils

Describe 3 ways fossils form in rocks



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-
-

Give reasons why Scientists cannot use fossils to explain how life started on earth

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-
-

Variation

Differences of individuals in a population is called v_____

Variation may be caused by...

- 1.) differences in the g_____
- ... or ...
- 2.) differences in the e_____
- ... or a combination of both

A normal population usually has...

NO/A SMALL AMOUNT OF/
EXTENSIVE

... genetic variation

Genetic variants may be caused by m_____

Mutations occur RARELY/
OCCASIONALLY/ CONTINUOUSLY

When it comes to phenotype...

... most mutations _____.

Some i_____ phenotype;

Very few d_____ phenotype.

Very rarely _____ phenotype is formed.

If the new phenotype gives an a_____ for the environment can lead to rapid e_____.

Selective Breeding

Selective breeding is when h_____ choose parent plants or animals with d_____ c_____ to produce offspring that will also have the characteristic. This continues for many generations but may cause i_____ and lead to defects or disease susceptibility.

Some desirable characteristics are as follows

- D_____ r_____ in food crops.
- High crop y_____.
- Animals which produce more m_____ or m_____.
- Domestic dogs with a g_____ nature.
- Large or unusual f_____.



Classification of Living Things Put these classification groups devised by Carl Linnaeus in order starting with the largest (family, kingdom, class, genus, species, order, phylum)

Organisms are named by the b_____ system of g_____ and s_____ e.g. Humans = *Homo sapiens*

Later new models of classification were proposed due to new evidence e.g.

- Better m_____ gave evidence of small internal structures
- New c_____ analysis
- E_____ trees show how organisms may be related
- F_____ data for extinct organisms

Solve the anagrams for Carl Woese's recent 'three-domain system'

AAACEHR (primitive bacteria usually in extreme environments)
AABCEIRT (true bacteria)
AAEKORTUY (includes protists, fungi, plants and animals).

Genetic Engineering

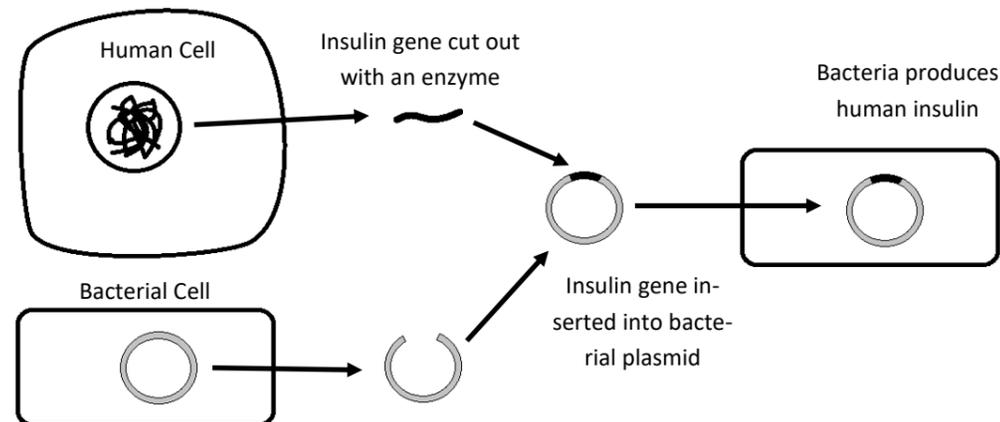
Genetic engineering involves cutting a g_____ from one organism and inserting it into the genome of another organism to give a d_____ characteristic.

Crop plants have been genetically engineered for d_____ resistance, i_____ resistance and bigger y_____.

Bacteria have been genetically engineered to produce human i_____ or to treat d_____.

(HT) What are the main steps in genetic engineering?

1. E_____ used to cut out desired g_____.
2. Gene inserted into a v_____ (e.g. bacterial p_____ or a v_____)
3. The v_____ is used to insert the gene into the target cell
4. Gene transferred to target organism at an e_____ stage in their development so that...



Resistant Bacteria

Bacteria evolve q_____ because they r_____ quickly. M_____ of bacteria produce new strains. Some strains are be r_____ to antibiotics. They s_____ and r_____. The resistant strain will then spread because there is no effective treatment. M_____ is an example of an antibiotic resistant bacteria.

How can we slow the development of antibiotic resistant bacteria?

- Doctors should stop...
- Patients should always...
- Farmers should not...

Give 2 problems with developing new antibiotics to treat resistant bacteria.

- 1.
- 2.

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Inheritance and Evolution

Extinctions

Extinction is when there are no living members of a species left. **Mass extinction** is when a large number of extinctions happen at the same time.

Name 5 factors that may cause an extinction

- **New predators**
- **New diseases**
- **New competitors**
- **Changes to the environment/habitat**
- **Catastrophic event e.g. Asteroid**

Evolution

Evolution is a change in the **inherited** characteristics of a population over time through a process of **natural selection**. All living things have evolved from simple life forms that first developed more than three THOUSAND/MILLION/BILLION years ago.

Evolution gives rise to **phenotypes** best suited to their environment. If two populations of one species become so different that they can no longer interbreed to produce **fertile** offspring they have formed two new **species**.

Evidence of Evolution

Charles Darwin's theory of **evolution** by **natural selection** is now ~~DISPROVED~~/WIDELY ACCEPTED /UNIVERSALLY ACCEPTED

Evidence for the theory

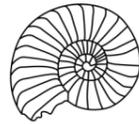
1. Discoveries show characteristics are passed on to offspring in **genes**.
2. In the **fossil record**.
3. Resistance to **antibiotics** evolves in **bacteria**.



Fossils

Describe 3 ways fossils form in rocks

- **Lack of decay conditions**
- **Minerals replace animal parts when they decay**
- **Animals leave traces e.g. footprints or burrows which form in rock**



Give reasons why Scientists cannot use fossils to explain how life started on earth

- **Fossil Record incomplete**
- **Many early soft bodied organisms don't leave traces**
- **Geological activity destroys fossils**

Variation

Differences of individuals in a population is called **variation**.

Variation may be caused by...

- 1.) differences in the **genes**
... or ...
- 2.) differences in the **environment**
... or a combination of both

A normal population usually has...

~~NO/A SMALL AMOUNT OF/~~
EXTENSIVE

... genetic variation

Genetic variants may be caused by **mutations**.

Mutations occur ~~RARELY/~~
~~OCCASIONALLY/~~**CONTINUOUSLY**

When it comes to phenotype...

... most mutations **have no effect**.

Some **influence** phenotype;

Very few **determine** phenotype.

Very rarely **a new** phenotype is formed.

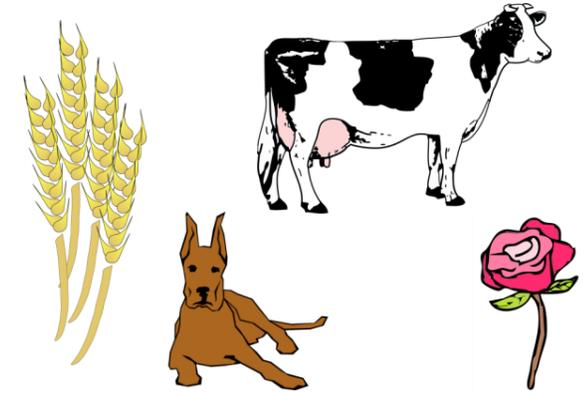
If the new phenotype gives an **advantage** for the environment can lead to rapid **evolution**.

Selective Breeding

Selective breeding is when **humans** choose parent plants or animals with **desirable characteristics** to produce offspring that will also have the characteristic. This continues for many generations but may cause **inbreeding** and lead to defects or disease susceptibility.

Some desirable characteristics are as follows

- **Disease resistance** in food crops.
- High crop **yields**.
- Animals which produce more **meat** or **milk**.
- Domestic dogs with a **gentle** nature.
- Large or unusual **flowers**.



Classification of Living Things Put these classification groups devised by Carl Linnaeus in order starting with the largest (family, kingdom, class, genus, species, order, phylum)

kingdom, phylum, class, order, family, genus, species

Organisms are named by the **binomial** system of **genus** and **species** e.g. Humans = *Homo sapiens*

Later new models of classification were proposed due to new evidence e.g.

- Better **microscopes** gave evidence of small internal structures
- New **chemical** analysis
- **Evolutionary** trees show how organisms may be related
- **Fossil** data for extinct organisms

Solve the anagrams for Carl Woese's recent 'three-domain system'

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Genetic Engineering

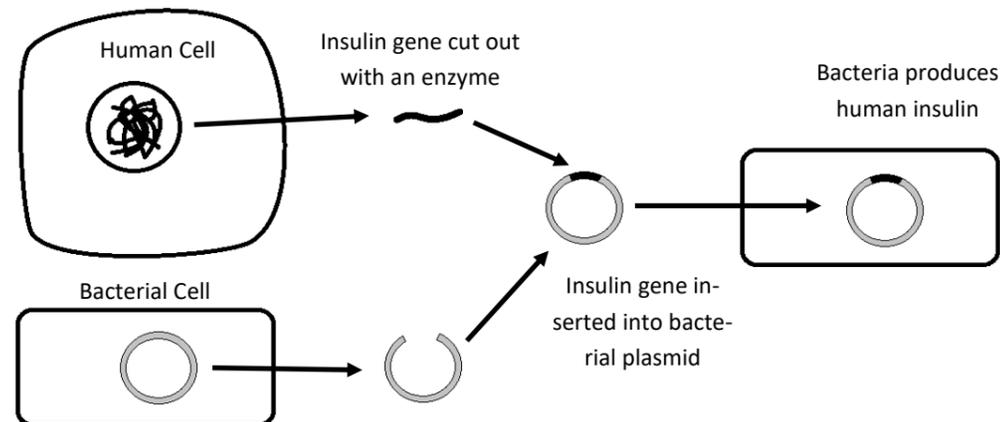
Genetic engineering involves cutting a **gene** from one organism and inserting it into the genome of another organism to give a **desirable** characteristic.

Crop plants have been genetically engineered for **disease** resistance, **insect** resistance and bigger **yields**.

Bacteria have been genetically engineered to produce human **insulin** or to treat **diabetes**.

(HT) What are the main steps in genetic engineering?

1. **Enzymes** used to cut out desired **gene**
2. Gene inserted into a **vector** (e.g. bacterial **plasmid** or a **virus**)
3. The **vector** is used to insert the gene into the target cell
4. Gene transferred to target organism at an **early** stage in their development so that **they develop with desired characteristics**.



Resistant Bacteria

Bacteria evolve **quickly** because they **reproduce** quickly. **Mutations** of bacteria produce new strains. Some strains are **resistant** to antibiotics. They **survive** and **reproduce**. The resistant strain will then spread because there is no effective treatment. **MRSA** is an example of an antibiotic resistant bacteria.

How can we slow the development of antibiotic resistant bacteria?

- Doctors should stop **prescribing antibiotics for mild or viral infections**
- Patients should always **complete the course to kill all bacteria**
- Farmers should not **use antibiotics for animals**

Give 2 problems with developing new antibiotics to treat resistant bacteria.

1. **Very expensive**
2. **Slower to develop then the time for new resistant strains to appear.**