

Dev. Understanding genetics + Evolution

Level: GSCE AQA 8461

Subject: Biology

Exam Board: Suitable for all boards

Topic: Dev. Understanding genetics + Evolution

Level: Medium

This is to be used by all students preparing for AQA Biology 8461 foundation or higher tier but it is also suitable for students of other boards



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Q1. Charles Darwin proposed the theory of natural selection.

(a) What is meant by natural selection?

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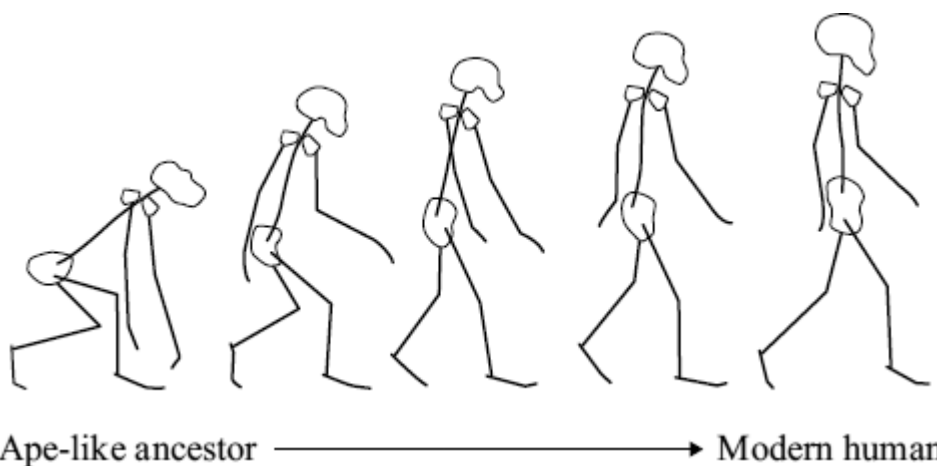
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(2)

(b) The drawings show stages in the evolution of the human skeleton.

All the drawings are to the same scale.



Use information from the drawings to describe **two** trends in the evolution of the human skeleton.

1

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2

.....

(2)

(c) Darwin said that humans had evolved from ape-like ancestors.

Many people disagreed with him at the time.

Give **two** reasons why.



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1

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2

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(2)

- (d) Lamarck's theory of evolution stated that useful changes which occur in an organism during its lifetime will be inherited by its offspring.

Give **one** way in which Darwin's theory differs from Lamarck's.

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(1)

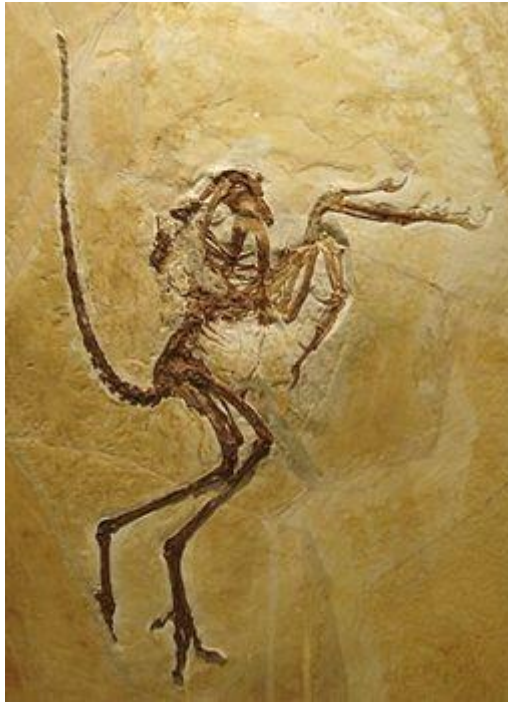
(Total 7 marks)



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Q2. The photograph shows a fossil of a prehistoric bird called *Archaeopteryx*.



By Ghedoghedo (own work) [CC-BY-SA-3.0 (<http://creativecommons.org/licenses/by-sa/3.0>) or GFDL (<http://www.gnu.org/copyleft/fdl.html>)], via Wikimedia Commons; By Steenberg from Ripon, United Kingdom (Small Fishing Boat In North Sea) [CC-BY-2.0 (<http://creativecommons.org/licenses/by/2.0>)], via Wikimedia Commons.

(a) Describe **three** ways fossils can be made.

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(3)

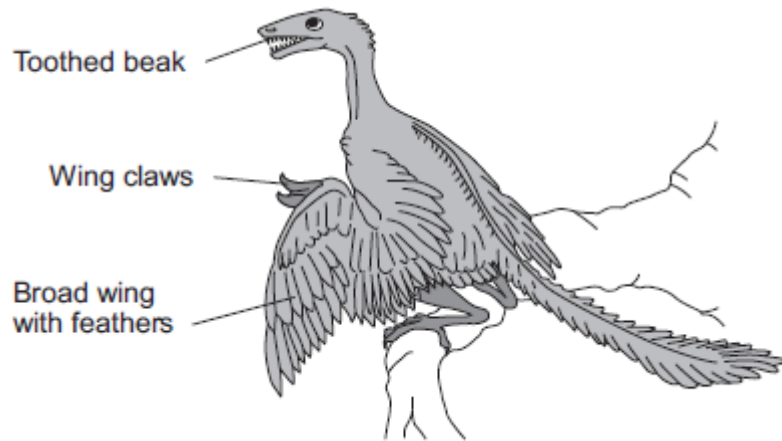
(b) The drawing shows what an *Archaeopteryx* might have looked like when it was alive.

Scientists think that *Archaeopteryx* was a predator.



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- (i) Look at the drawing.

Write down **three** adaptations that might have helped *Archaeopteryx* to catch prey.

How would **each** adaptation have helped *Archaeopteryx* to catch prey?

Adaptation 1

How it helps

.....

Adaptation 2

How it helps

.....

Adaptation 3

How it helps

.....

(3)

- (ii) *Archaeopteryx* is now extinct.

Give **two** reasons why animals may become extinct.

1

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2

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(2)

(Total 8 marks)



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- Q3.** An animal called *Tiktaalik* became extinct about 360 million years ago.

The photograph shows the fossilised skeleton of *Tiktaalik* and a model of what scientists think *Tiktaalik* looked like.

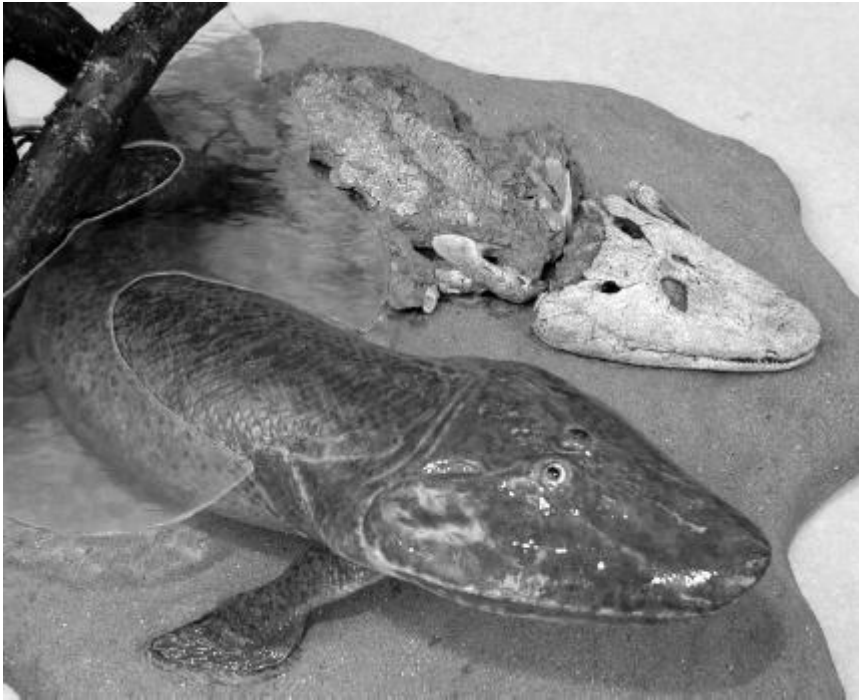


Image © University of Chicago, Shubin Lab. Model by Tyler Keillor

- (a) Scientists found only the fossilised skeleton of *Tiktaalik*.

Explain why.

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(2)

- (b) Scientists think that *Tiktaalik* lived mostly in water, but that it was one of the first animals to be able to move onto land.

Use evidence from the photograph to suggest why.

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(2)
(Total 4 mark)

Q4. Charles Darwin proposed the theory of natural selection.

Many people at the time did not accept his theory.

- (a) There was a different theory at the same time as Darwin's theory.

The different theory said that changes in an organism during its life could be inherited.

Who proposed this theory?

(1)

- (b) Studying fossils helps scientists understand how living things have evolved.

The diagram below shows a fossilised snake.



© Peter Menzel/Science Photo Library

Explain how the fossil in the diagram above may have formed.



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(3)

- (c) There are many types of rat snake in the world.

The table below shows two types of rat snake.



© Kazzpix/iStock/Thinkstock



© Talkir/iStock/Thinkstock

Type of snake	Japanese rat snake	Texas rat snake
Colour of snake	Green	Pale brown
Type of environment	Grass	Dry and dusty

The different types of rat snake have evolved from similar ancestors.

The rat snakes have evolved to to suit their environments.

Explain how the Japanese rat snake evolved to be different from the Texas rat snake.

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(4)



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- (d) Many species of snake have become extinct.

Give **one** reason why a species might become extinct.

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(1)
(Total 9 marks)

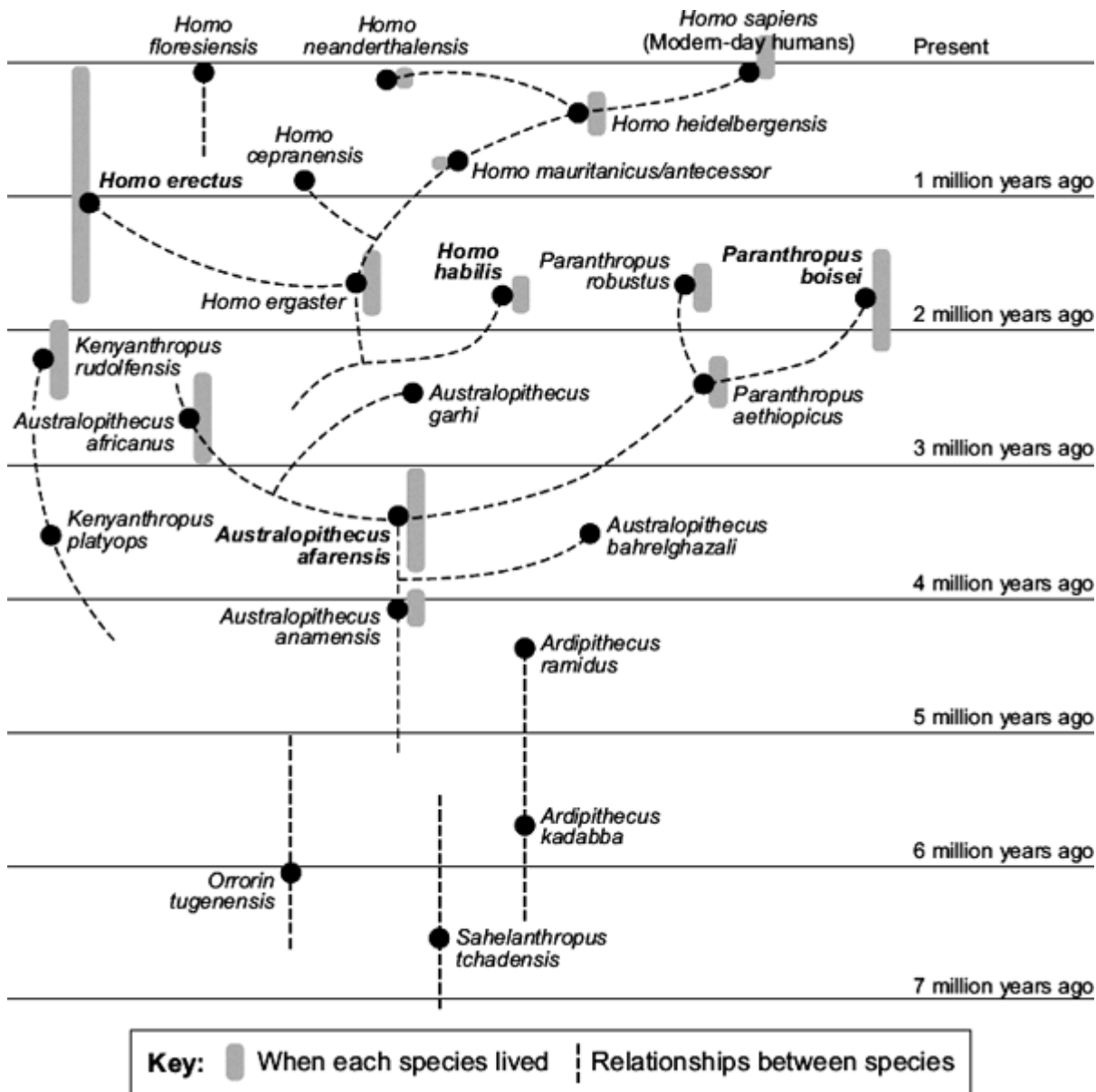


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Q5. The diagram shows an evolutionary tree for humans.

The diagram is based on a study of fossils.



(a) When did *Australopithecus afarensis* first appear?

..... million years ago.

(1)

(b) Which species was the direct ancestor of *Paranthropus boisei*?

.....

(1)



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- (c) Which species is most closely related to *Homo habilis*?

.....

(1)

- (d) About 250 fossils of *Homo erectus* have been found. About 50 of these fossils have been found in China.

A Chinese scientist has suggested the hypothesis that Chinese people evolved from *Homo erectus*.

Most scientists do **not** agree with this hypothesis.

Use the information above and information from the diagram to suggest **two** reasons why.

1

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2

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(2)

- (e) Darwin suggested the theory of natural selection. It was a long time before this theory was accepted by most scientists.

Give **two** reasons why it took a long time.

1

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2

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(2)

(Total 7 marks)



Q6. MRSA strains of bacteria are causing problems in many hospitals.

(a) The diagram shows a hand-gel dispenser.



Hand-gel dispensers are now placed at the entrance of most hospital wards.

Explain why.

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(2)

(b) Explain, as fully as you can, how MRSA strains of bacteria became difficult to treat.

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(3)

(Total 5 marks)



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Q7. The MMR vaccine is used to protect against measles.

- (a) Apart from measles, which **two** other diseases does the MMR vaccine protect against?

..... and

(1)

- (b) Read the information.

Measles is a dangerous disease caused by a virus.
Normally, MMR vaccinations are given at 1 year old and again at 4 years old.
Each vaccination is 90% effective in protecting against the measles virus.

In April 2013, there were 630 cases of measles in children aged 4 and over in a small area of the UK. Of these cases, 504 children had not been vaccinated against MMR at all and only a few had been given a second vaccination.

- (i) Calculate the percentage of the children who caught measles in April 2013 who had **not** been vaccinated against MMR.

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.....
.....

Percentage =

(2)

- (ii) Suggest **one** advantage to the population as a whole of children having the second MMR vaccination.

.....

(1)

- (c) (i) What does a vaccine contain?

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.....

(1)



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- (ii) Explain how a vaccination prevents infection.

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(3)

- (d) (i) Antibiotics can only be used to treat some infections.

Explain why antibiotics **cannot** be used to treat measles.

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(2)

- (ii) Why do antibiotics become less useful at treating an infection if the antibiotic is overused?

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(1)

(Total 11 marks)



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Q8. Darwin's theory of evolution states that all species of living things have evolved from simple life forms.

Darwin's theory was published in 1859.

(a) Give **two** reasons why Darwin's theory was only slowly accepted.

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(2)

(b) Darwin observed birds called finches on the Galapagos Islands, 1000 km from the coast of South America.

He saw that the birds were similar to, but not the same as, birds he had seen on the mainland of South America.

Recent evidence suggests that 13 different species of finch on the islands evolved from 1 species of finch that arrived from the mainland about 1 million years ago.

Describe how a new finch species may have evolved from the original species of finch that arrived from the mainland.

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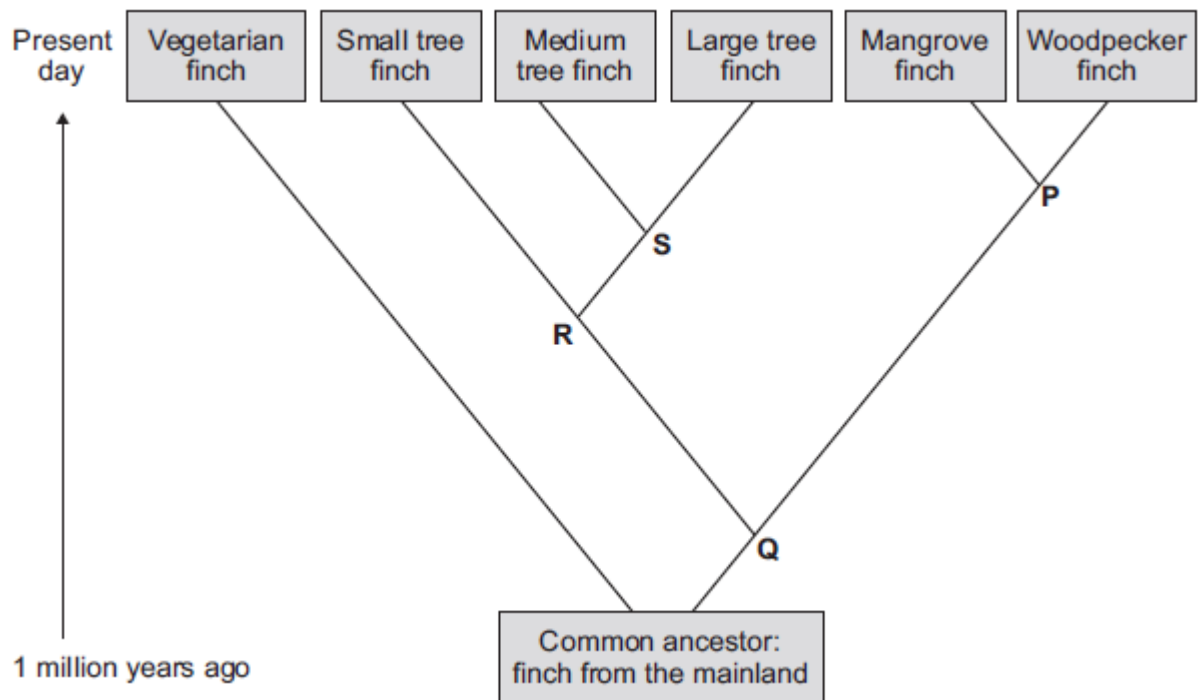
(4)



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- (c) The diagram below shows the evolutionary tree for some Galapagos finches.



- (i) Which type of present-day finch is **least** closely related to all the others?

.....

(1)

- (ii) Which branching point, **P**, **Q**, **R** or **S**, on the diagram above shows the most recent common ancestor of all the **tree finches**?

Write the correct answer in the box.

(1)

- (iii) Which **two** finches have the most recent common ancestor?

1

2



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(1)
(Total 9 marks)