

APOLLO

Evolution and speciation

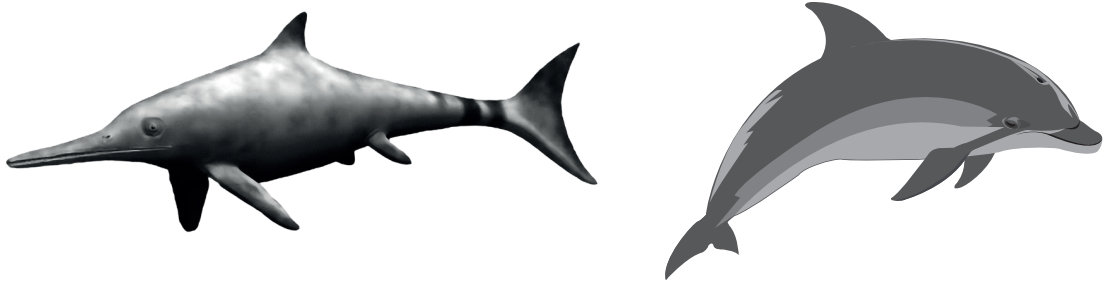
HL

Biology

First assessment 2025

12 questions | questions

- 33.** The images show an ichthyosaurus and a dolphin. Ichthyosaurus is an extinct aquatic reptile, known only from fossil remains. Dolphins are mammals.



How have these species evolved?

- A. Their streamlined bodies show divergent evolution.
- B. Their streamlined bodies are analogous structures.
- C. Their pentadactyl limbs are an example of convergent evolution.
- D. Their pentadactyl limbs are analogous structures.

21. What applies to the process of speciation?

	Mechanism	Change
A.	Reproductive isolation	Populations become more different in their traits
B.	Behavioural isolation	Allele frequency remains constant
C.	Interbreeding	Stabilizing selection occurs
D.	Temporal isolation	Hybrids produced

33. What describes analogous structures?

- A. They are formed from divergent evolution.
- B. They share a common ancestor.
- C. They came from different evolutionary origins.
- D. They have the same structure but different functions.

Turn over

34. How are interspecific hybrids formed?

- A. Cross-breeding members of different species
- B. Selective breeding between individuals of the same species
- C. Reproductive isolation between different species
- D. Mutations within individuals of a given species

21. The salamander genus *Ensatina* from California, USA, has evolved several different forms, depending on location. Two such forms are shown.

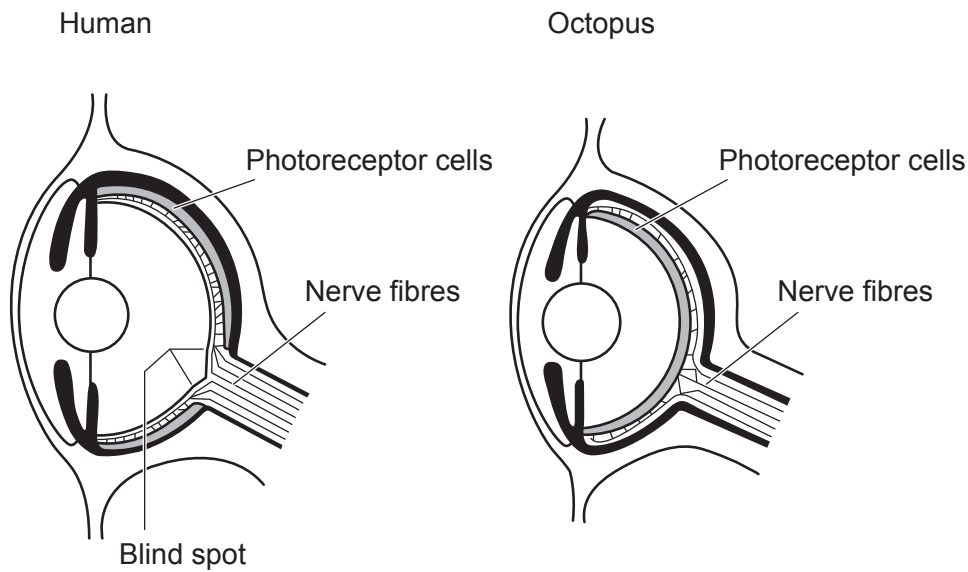


What determines if these forms are members of the same species?

- A. Have similar appearance
- B. Populations mix freely
- C. Produce fertile offspring
- D. Can interbreed

Turn over

33. Human and octopus eyes have a similar structure and function but humans and octopuses have a different evolutionary origin.



What explains the similar structure of these eyes?

	Type of evolution	Relationship of structures
A.	convergent	analogous
B.	convergent	homologous
C.	divergent	homologous
D.	divergent	analogous

Turn over

1. The table shows the number of amino acids that are different in the sequences of the protein FOXP2 from a human compared with four other primate species.

Primate species	Number of amino acid differences compared to human
<i>Pan paniscus</i>	2
<i>Pan troglodytes</i>	2
<i>Gorilla gorilla</i>	2
<i>Pongo pygmaeus</i>	3

(a) Identify the total number of different genera named in the table. [1]

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(b) Deduce whether it is possible to conclude that *Pan paniscus* and *Gorilla gorilla* are more closely related to each other than to humans. [2]

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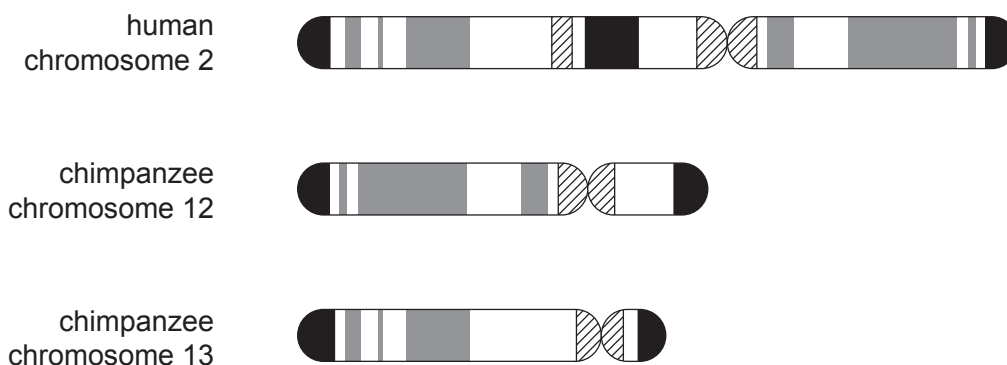
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(Question 1 continued)

Humans have 46 chromosomes. However, each of the four other primates in the table have 48 chromosomes.

Scientists analysed chromosome 2 in humans and chromosomes 12 and 13 in chimpanzees (*Pan troglodytes*). The diagrams show a summary of their findings.

**Key:**

-  DNA base sequence usually associated with telomeres
-  DNA base sequence usually associated with centromeres

- (c) Using evidence from the diagrams, justify the hypothesis that chromosome 2 in humans arose from the fusion of chromosomes 12 and 13 with a shared primate ancestor.

[4]

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Answers written on this page
will not be marked.



(Question 1 continued)

(d) Some infectious diseases in humans are caused by viruses that originated in other primates.

(i) State **one** structural feature of a virus. [1]

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(ii) State the term used for an infectious disease that can transfer from other species to humans. [1]

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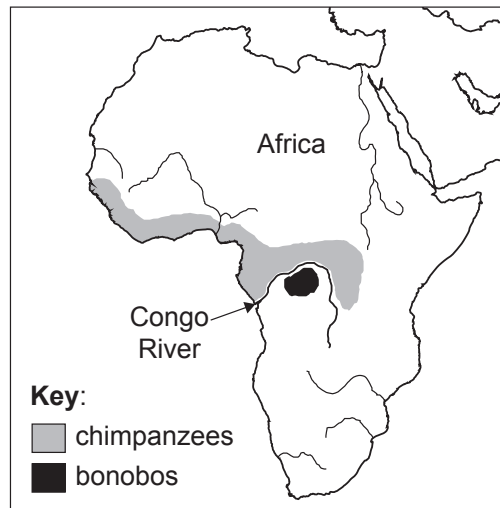


Turn over

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

7. The map shows the distribution of chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*) on either side of the Congo River as it flows towards the Atlantic Ocean in the Democratic Republic of Congo. Bonobos occupy the dense wet forest south of the Congo River, whereas chimpanzees occupy a forested habitat north of the river. Both species are descended from a common ancestor.



- (a) State the type of speciation shown by the two species.

[1]

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- (b) Describe how both species evolved from the common ancestor.

[3]

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(Question 7 continued)

- (c) The bonobo is classified as an endangered species. Explain how deforestation could contribute to the decline in the population size of bonobos. [2]



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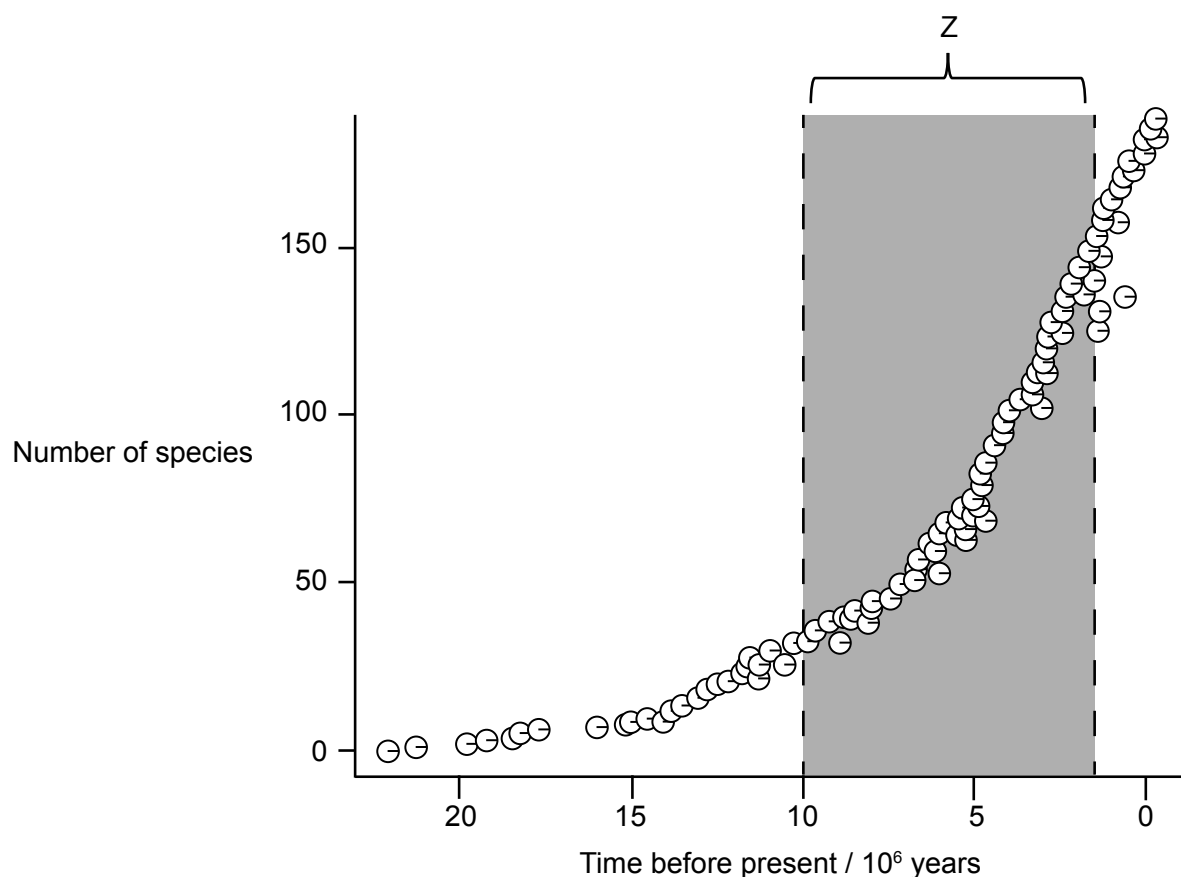
33. What is evidence for evolution?

- I. Homologous structures such as pentadactyl limbs
 - II. Domestication of dogs from wolves
 - III. Inheritance of acquired characteristics
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- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

33. What is the evolutionary origin and function of analogous structures in living organisms?

	Evolutionary origin	Function
A.	different origin	similar function
B.	different origin	same or different function
C.	same or different origin	same function
D.	same origin	different function

32. The number of hummingbird species in South America has increased continuously as shown in the graph.



What could be a reason for the increase in the number of hummingbird species during the period labelled Z?

- A. Food and shelter are plentiful and there is little intraspecific competition.
- B. Closely related species can coexist indefinitely in the same niche.
- C. A wide range of unoccupied potential niches exists, leading to adaptive radiation.
- D. There are few limiting factors on the population size of hummingbirds.

- 33.** Polyploidy has been a cause of rapid speciation in some plant genera, such as *Helianthus*. Which observation is evidence that speciation has occurred?
- A. A polyploid plant reproduces asexually.
 - B. A polyploid plant produces male and female gametes.
 - C. Fertile offspring are produced when a polyploid plant crosses with a diploid plant.
 - D. Fertilization can occur between polyploid individuals.