

External assessment 2024

Multiple choice question book

# Biology

## Paper 1

### General instruction

- Work in this book will not be marked.



Queensland  
Government

**QCAA**

Queensland Curriculum  
& Assessment Authority

## **Section 1**

### **Instruction**

- Respond to these questions in the question and response book.
- 

### **QUESTION 1**

Which term describes a group of organisms consisting of a common ancestor and all its lineal descendants?

- (A) clade
- (B) subgroup
- (C) population
- (D) community

### **QUESTION 2**

Polymerase chain reaction is a technique used in DNA profiling to

- (A) cut DNA at specific sites.
- (B) create more copies of DNA.
- (C) determine the order of nucleotides.
- (D) separate DNA fragments based on size.

### **QUESTION 3**

What is a key difference between spermatogenesis and oogenesis?

- (A) Spermatogenesis produces haploid cells, whereas oogenesis produces diploid cells.
- (B) Spermatogenesis produces four functional gametes, whereas oogenesis produces one.
- (C) Spermatogenesis occurs throughout life, whereas oogenesis only occurs after puberty.
- (D) Spermatogenesis begins with haploid cells, whereas oogenesis begins with diploid cells.

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**QUESTION 4**

The table shows data on four plant species. Which is most likely to be a pioneer species?

	<b>Germination rate</b>	<b>Presence of nitrogen-fixing bacteria</b>
(A)	slow	present
(B)	slow	not present
(C)	rapid	present
(D)	rapid	not present

**QUESTION 5**

A limitation of the biological species concept is that it does not account for species that

- (A) reproduce asexually.
- (B) are reproductively isolated.
- (C) are morphologically indistinguishable.
- (D) have a different number of chromosomes.

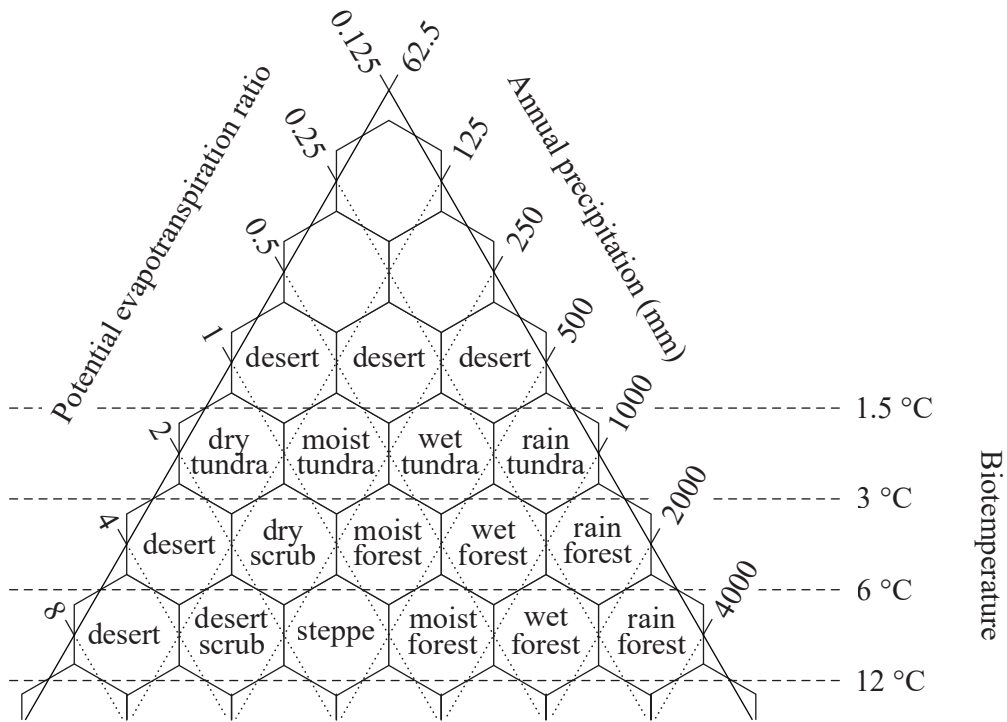
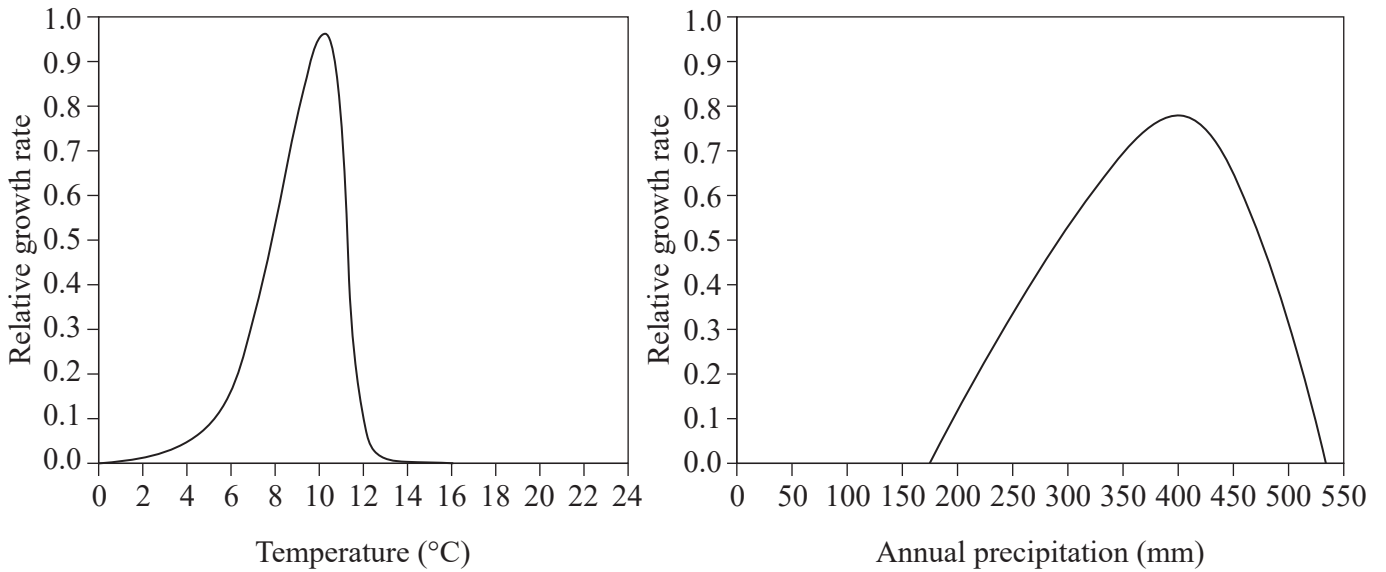
**QUESTION 6**

What can introduce new alleles into a population?

- (A) point mutations
- (B) non-disjunction
- (C) random fertilisation
- (D) independent assortment

QUESTION 7

Tolerance ranges for species X and a Holdridge life zone classification chart are shown.



Based on this data, the preferred habitat for species X is

- (A) desert.
- (B) steppe.
- (C) wet tundra.
- (D) moist forest.

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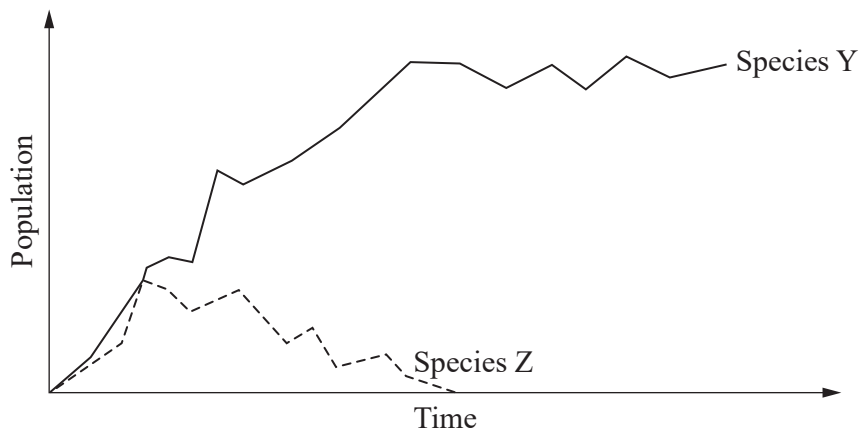
**QUESTION 8**

In the Linnaean system of classification, two species of the same class will also belong to the same

- (A) order.
- (B) genus.
- (C) family.
- (D) phylum.

**QUESTION 9**

The graph shows how populations of two species living in the same area changed over time.



Which species interaction is indicated?

- (A) predation, where species Y preyed on species Z
- (B) predation, where species Z preyed on species Y
- (C) competition, where species Y outcompeted species Z
- (D) competition, where species Z outcompeted species Y

**QUESTION 10**

A key function of histones is to

- (A) add nucleotides to a growing DNA strand.
- (B) bind to specific sections of DNA to initiate replication.
- (C) allow DNA to tightly condense so it fits into the nucleus.
- (D) join amino acids to form a polypeptide chain during translation.

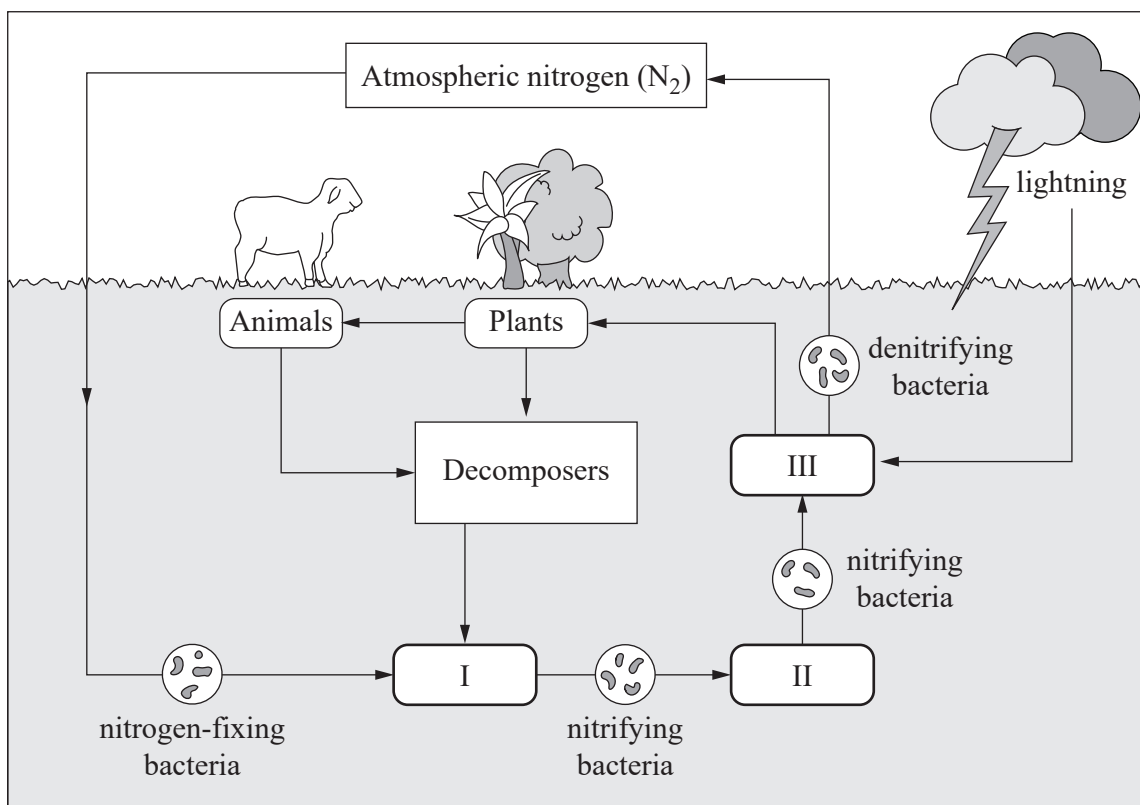
**QUESTION 11**

Which mode of inheritance leads to continuous variation in the phenotypes of a population due to the cumulative effect of multiple genes?

- (A) codominance
- (B) polygenic inheritance
- (C) incomplete dominance
- (D) multiple allele inheritance

**QUESTION 12**

The diagram shows key processes in the nitrogen cycle.



Which option correctly identifies I, II and III?

	I	II	III
(A)	nitrites (NO <sub>2</sub> <sup>-</sup> )	nitrites (NO <sub>2</sub> <sup>-</sup> )	ammonium (NH <sub>4</sub> <sup>+</sup> )
(B)	nitrites (NO <sub>2</sub> <sup>-</sup> )	ammonium (NH <sub>4</sub> <sup>+</sup> )	nitrites (NO <sub>2</sub> <sup>-</sup> )
(C)	nitrites (NO <sub>2</sub> <sup>-</sup> )	ammonium (NH <sub>4</sub> <sup>+</sup> )	nitrites (NO <sub>2</sub> <sup>-</sup> )
(D)	ammonium (NH <sub>4</sub> <sup>+</sup> )	nitrites (NO <sub>2</sub> <sup>-</sup> )	nitrites (NO <sub>2</sub> <sup>-</sup> )

**QUESTION 13**

The role and space that an organism fills in an ecosystem is referred to as its

- (A) niche.
- (B) ecoregion.
- (C) environment.
- (D) microhabitat.

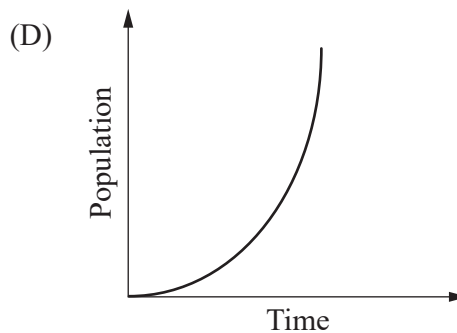
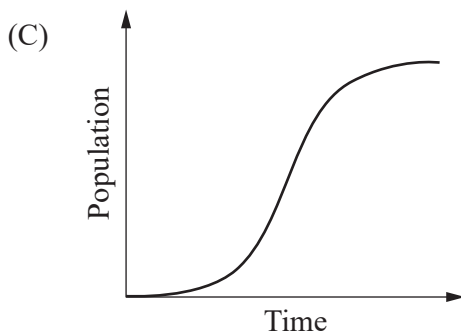
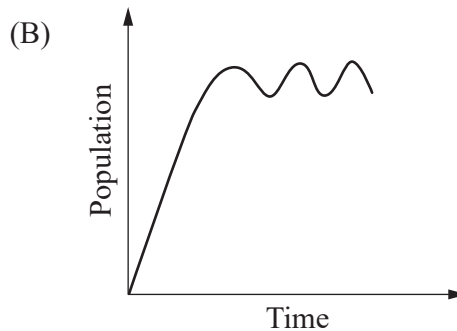
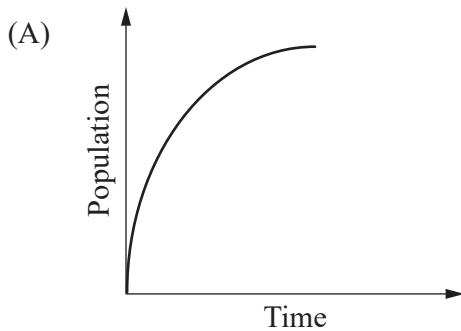
**QUESTION 14**

Compared to K-strategists, species classified as r-strategists tend to

- (A) have more offspring.
- (B) have longer lifespans.
- (C) reach sexual maturity later.
- (D) live in more stable habitats.

**QUESTION 15**

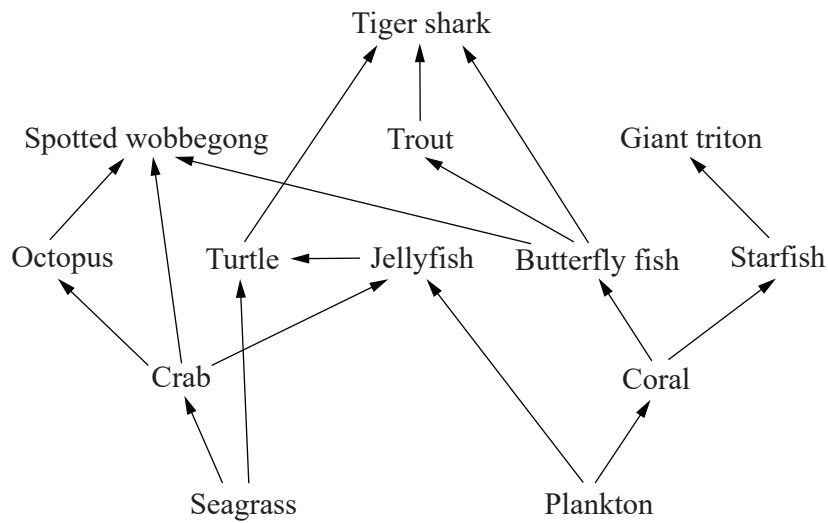
Which graph best illustrates exponential growth?



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**QUESTION 16**

The diagram shows feeding relationships for an ecosystem where tiger sharks are a keystone species.



Which species is most likely to experience an increase in predation if tiger sharks are removed?

- (A) trout
- (B) starfish
- (C) jellyfish
- (D) spotted wobbegong

**QUESTION 17**

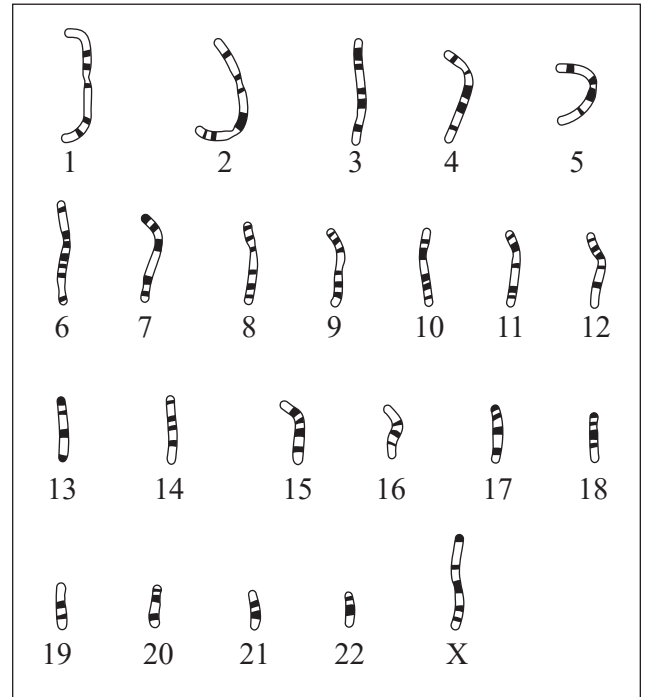
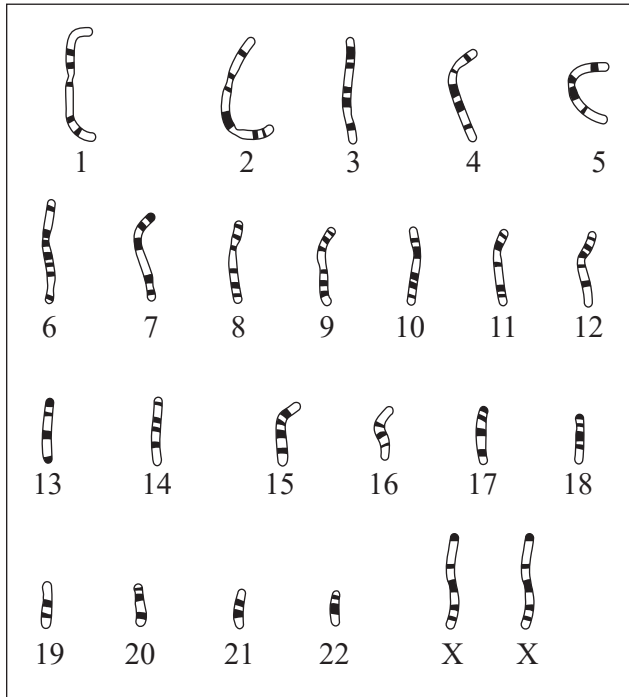
Which genetic tool is **not** required to make recombinant DNA?

- (A) DNA ligase
- (B) plasmid vectors
- (C) restriction enzymes
- (D) transcription factors



**QUESTION 18**

Karyotypes for two human gametes are shown.



If the two gametes produced a zygote, the resulting embryo would be

- (A) male, with trisomy.
- (B) female, with trisomy.
- (C) male, with monosomy.
- (D) female, with monosomy.

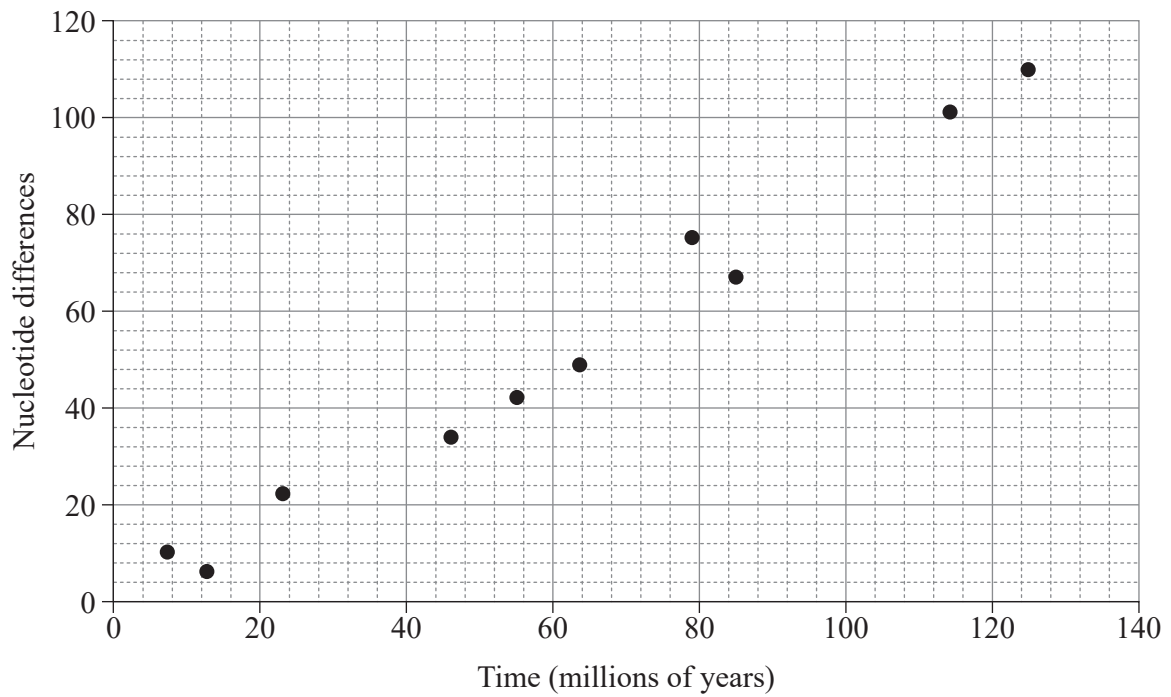
**QUESTION 19**

Which diversification pattern involves the independent development of similar structures in two species with no recent common ancestor?

- (A) coevolution
- (B) parallel evolution
- (C) divergent evolution
- (D) convergent evolution

QUESTION 20

The graph shows the number of nucleotide differences observed in the cytochrome c gene of 10 species and their time since divergence.



Cytochrome c genes from two new species were compared and found to have 60 nucleotide differences. Based on this information, the two species diverged approximately

- (A) 48 million years ago.
- (B) 60 million years ago.
- (C) 72 million years ago.
- (D) 120 million years ago.

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## References

### Question 7

Adapted from Halasz, P 2007, *Holdridge life zones*, [https://en.wikipedia.org/wiki/File:Lifetzones\\_Pengo.svg](https://en.wikipedia.org/wiki/File:Lifetzones_Pengo.svg).  
Licensed CC BY-SA

### Question 9

Thwink.org 2014, *Competitive exclusion principle*,  
[www.thwink.org/sustain/glossary/CompetitiveExclusionPrinciple.htm](http://www.thwink.org/sustain/glossary/CompetitiveExclusionPrinciple.htm)

### Question 12

Modified from *Nitrogen Cycle*, Wikimedia Commons 2019, Dreo, J,  
[https://commons.wikimedia.org/wiki/File:Nitrogen\\_Cycle\\_2.svg](https://commons.wikimedia.org/wiki/File:Nitrogen_Cycle_2.svg). CC BY-SA 3.0

### Question 16

Queensland Museum 2023, *Marine food web*,  
[www.museum.qld.gov.au/learning-resources/learnings/marine-food-web](http://www.museum.qld.gov.au/learning-resources/learnings/marine-food-web)

### Question 20

Langley, CH, Fitch, WM 1974, 'An examination of the constancy of the rate of molecular evolution',  
*Journal of Molecular Evolution*, 3, 161–177, <https://doi.org/10.1007/BF01797451>



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