

Exercise walk-through

Evidence of Evolution ■ 7.6

eXercise

You must be able to

- describe evidence from **fossils** 化石, **homologous structures** 同源结构, and **molecular** data
- distinguish homologous from **analogous** 同功 structures
- explain how each supports common descent

Method — Fossil evidence

Fossils show that life has changed over time, and reveal **transitional forms** linking older and newer groups.

Method — Homologous structures

Homologous structures have the **same basic plan** but different functions (e.g. the bones of a human arm, whale flipper, and bat wing). They suggest a **common ancestor**.

Method — Analogous structures

Analogous structures have the **same function** but **different** underlying structure (e.g. bird wing vs insect wing). They arise from **convergent evolution**, not close common ancestry.

Method — Molecular evidence

Similar **DNA and protein sequences** between species indicate how closely related they are — the more similar, the more recent the common ancestor.

Practice 2.1 ■ 1 mark

What do homologous structures suggest?

Solution 2.1

Method: Homologous structures

Worked steps

A common ancestor (shared ancestry) **B1**.

Practice 2.2 ■ 1 mark

Give one type of molecular evidence for evolution.

Solution 2.2

Method: Molecular evidence

Worked steps

Similar DNA or protein sequences between species **B1**.

Practice 2.3 ■ 1 mark

What are transitional fossils?

Solution 2.3

Method: Fossil evidence

Worked steps

Fossils showing features intermediate between older and newer groups **B1**.

Exam-style 3.1 ■ 1 mark

The similar bone arrangement in a human arm and a whale flipper is an example of

- A** analogous structures
- B** homologous structures
- C** vestigial organs
- D** convergent evolution

Solution 3.1

Method: Homologous structures

A analogous structures

B homologous structures



C vestigial organs

D convergent evolution

Worked steps

B — homologous structures.

Exam-style 3.2 ■ 1 mark

A bird's wing and an insect's wing both allow flight but have very different structures.

- (a) State whether they are homologous or analogous.
- (b) Explain what this tells you about their evolutionary relationship.

Solution 3.2

Method: Analogous structures

Worked steps

(a) Analogous **B1**. (b) They evolved independently (convergent evolution) for the same function, so they do **not** indicate a close common ancestor **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain how comparing DNA sequences can show how closely two species are related.

Solution 3.3

Method: Molecular evidence

Worked steps

The more similar two species' DNA sequences are, the fewer changes have accumulated since they diverged, so the more recently they shared a common ancestor

M1 A1.