Clues to Kinship

Compare embryos and adult structures to investigate evolutionary relationships.

L.8.4B.4 "Analyze displays of pictorial data to compare and contrast embryological and homologous/analogous structures across multiple species to identify evolutionary relationships."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the passage's clues for identifying shared ancestry, circle its warning about shared function, and number two table rows you will compare.

What Bodies Reveal

1 A flying animal and a swimming animal may look unrelated. To investigate ancestry, scientists compare early embryos with adult body parts. Embryos can reveal shared patterns before adult features take shape. The table records traits seen in four species. Read across each row, then compare rows: which similarities may reflect ancestry, and which may reflect a useful job?

EMBRYO AND ADULT STRUCTURE OBSERVATIONS

Species	Early embryo	Adult front limb or wing
Bat	Tail, pharyngeal arches, front limb buds	Wing with upper-arm, forearm, wrist, and long finger bones
Whale	Tail, pharyngeal arches, front limb buds	Flipper with upper-arm, forearm, wrist, and finger bones
Human	Tail, pharyngeal arches, front limb buds	Arm with upper-arm, forearm, wrist, and finger bones
Butterfly	Body segments, three pairs of leg buds, no backbone	Wings with no bones

2 A homologous structure has an inherited basic plan, even if it now does a different job. A lizard's leg and a turtle's leg share a similar arrangement of bones. An analogous structure does a similar job but comes from a different plan. A sparrow's wing and a dragonfly's wing both enable flight, yet only one has bones.

3 Embryo evidence strengthens comparisons of adult structures. Early mammal embryos may show a tail, pharyngeal arches near the head, and limb buds. In mammals, pharyngeal arches develop into parts of the head and neck. One matching trait cannot prove which species are closest relatives. Look for several traits together, and do not mistake a shared function for shared ancestry.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the listed embryo features of humans and butterflies differ? What does this suggest about their evolutionary relationship?

2. Compare the adult human arm and whale flipper. Why does the table support calling them homologous structures?

3. Both bats and butterflies fly. Why does the table support calling their wings analogous rather than homologous as wings?

4. Can this table show whether a bat is more closely related to a whale or a human? Use both embryo and adult-structure data to explain.

3 YOUR TURN

Your own words

Imagine a newly discovered glider whose early embryo has a tail, pharyngeal arches, and front limb buds. Its adult wing has upper-arm, forearm, wrist, and finger bones. In three sentences, compare it with species in the table, explain whether its wing is more likely homologous to a bat's wing or analogous to a butterfly's wing, and state one limit of this evidence.

ANSWER KEY

Clues to Kinship

GRADE 8 · L.8.4B.4

PART 1 · READ AND MARK

Underline the passage's clues for identifying shared ancestry, circle its warning about shared function, and number two table rows you will compare. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the listed embryo features of humans and butterflies differ? What does this suggest about their evolutionary relationship?	**The human embryo has a tail, pharyngeal arches, and front limb buds; the butterfly embryo has body segments and three pairs of leg buds but no backbone. The listed traits provide less evidence of close ancestry between humans and butterflies than among the mammals.**
2	Compare the adult human arm and whale flipper. Why does the table support calling them homologous structures?	**Both have upper-arm, forearm, wrist, and finger bones, despite their different shapes and uses. This shared bone plan supports inheritance from a common ancestor.**
3	Both bats and butterflies fly. Why does the table support calling their wings analogous rather than homologous as wings?	**Both wings enable flight, but the bat wing has arm and finger bones while the butterfly wing has no bones. Their embryo features also differ, so flight alone is not evidence that they inherited wings from a winged common ancestor.**
4	Can this table show whether a bat is more closely related to a whale or a human? Use both embryo and adult-structure data to explain.	**No. All three have the same listed embryo features and the same basic set of front-limb bones, so these observations do not distinguish which pair is closest.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The glider shares the listed embryo features of the bat, whale, and human. Its wing is more likely homologous to the bat's wing because both have the same basic set of limb bones, unlike the butterfly's boneless wing. These traits do not show which of the three mammals is the glider's closest relative.

Accept answers that use the listed embryo traits and underlying structures rather than appearance or function alone. The table supports broad comparisons, not a ranking of the mammals' closest relationships.