Reading passage

THE HISTORY OF THE TORTOISE

If you go back far enough, everything lived in the sea. At various points in evolutionary history, enterprising individuals within many different animal groups moved out onto the land, sometimes even to the most parched deserts, taking their own private sea water with them in blood and cellular fluids. In addition to the reptiles, birds, mammals and insects which we see all around us, other groups that have succeeded out of water include scorpions, snails, crustaceans such as woodlice and land crabs, millipedes and centipedes, spiders and various worms. And we mustn't forget the plants, without whose prior invasion of the land none of the other migrations could have happened.

Moving from water to land involved a major redesign of every aspect of life, including breathing and reproduction. Nevertheless, a good number of thoroughgoing land animals later turned around, abandoned their hard-earned terrestrial re-tooling, and returned to the Water. Seals have only gone part way back.

They show us what the intermediates might have been like, on the way to extreme cases such as whales and dugongs. Whales (including the small whales we call dolphins) and dugongs, with their close cousins the manatees, ceased to be land creatures altogether and reverted to the full marine habits of their remote ancestors. They don't even come ashore to breed. They do, however, still breathe air, having never developed anything equivalent to the gills of their earlier marine incarnation. Turtles went back to the sea a very long time ago and, like all vertebrate returnees to the water, they breathe air. However, they are, in one respect, less fully given back to the water than whales or dugongs, for turtles still lay their eggs on beaches.

There is evidence that all modern turtles are descended from a terrestrial ancestor which lived before most of the dinosaurs. There are two key fossils called "Proganochelys quenstedti" and *Palaeochersis talampayensis* dating from early dinosaur times, which appear to be close to the ancestry of all modern turtles and tortoises. You might wonder how we can tell whether fossil animals lived on land or in water, especially if only fragments are found. Sometimes it's obvious. Ichthyosaurs were

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reptilian contemporaries of the dinosaurs, with fins and streamlined bodies· The fossils look like dolphins and they surely lived like dolphins, in the water· With turtles it is a little less obvious· One way to tell is by measuring the bones of their forelimbs·

Walter Joyce and Jacques Gauthier, at Yale University, obtained three measurements in these particular bones of 71 species of living turtles and tortoises· They used a kind of triangular graph paper to plot the three measurements against one another· All the land tortoise species formed a tight cluster of points in the upper part of the triangle; all the water turtles cluster in the lower part of the triangular graph· There was no overlap, except when they added some species that spend time both in water and on land· Sure enough, these amphibious species show up on the triangular graph approximately half way between the 'wet cluster' of sea turtles and the 'dry cluster' of land tortoises· "The next step was to determine where the fossil fell· The bones of "quenstedti and P. talampayensis leave us in no doubt· Their points on the graph are right in the thick of the dry cluster· Both these fossils were dry-land tortoises· They come from the era before land tortoises returned to the water· You might think, therefore, that modern land tortoises have probably stayed on land ever since those early terrestrial times, as most mammals did after a few of them went back to the sea· But apparently not· If you draw out the family tree of all modern turtles and tortoises, nearly all the branches are aquatic·

Today's land tortoises constitute a single branch, deeply nested among branches consisting of aquatic turtles· This suggests that modern land tortoises have not stayed on land continuously since the time of P. quenstedti* and P. talampayensis· Rather, their ancestors were among those who went back to the water, and they then re-emerged back onto the land in (relatively) more recent times·

Tortoises therefore represent a remarkable double return· In common with all mammals, reptiles and birds, their remote ancestors were marine fish and before that various more or less worm-like creatures stretching back, still in the sea, to the primeval bacteria· Later ancestors lived on land and stayed there for a very large number of generations· Later ancestors still evolved back into the water and became sea turtles· And finally they returned yet again to the land as tortoises, some of which now live in the driest of deserts·

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SECTION 1: Multiple Choice Questions (Questions 1-5)

Choose the correct letter, A, B, C, or D.

1. What initial point does the writer make about the early evolution of animal life?
   A. Animals first adapted to live in parched desert environments.
   B. All animal species originally originated from marine environments.
   C. Plants migrated to land after land animals were fully established.
   D. Reptiles were the first animal group to successfully move to land.
2. According to the second paragraph, how do turtles differ from whales and dugongs?
   A. Turtles continue to rely on air for breathing.
   B. Turtles have completely lost their land-dwelling ancestors' features.
   C. Turtles must return to land in order to reproduce.
   D. Turtles can live continuously in deep ocean waters without returning to land.
3. Why were *Proganochelys quenstedti* and *Palaeochersis talampayensis* significant to the researchers?
   A. They were identified as the direct ancestors of modern marine mammals.
   B. They provided fossil evidence of animals transitioning from land to sea.
   C. They represented early turtle ancestors dating back to the era of dinosaurs.
   D. They contained well-preserved soft tissues of early reptilian forelimbs.
4. How did Joyce and Gauthier determine the habitat of the fossilized turtles?
   A. By measuring and plotting three forelimb bone dimensions on a triangular graph.
   B. By comparing the thickness of shell fossils with living tortoises.
   C. By examining the types of plant matter found near the fossil remains.
   D. By analyzing the salt concentration in the surrounding rock strata.
5. What conclusion is drawn regarding the evolutionary path of modern land tortoises?
   A. They have lived on land continuously without ever returning to the sea.
   B. They descended from aquatic turtles that had previously re-entered the water.
   C. They evolved directly from ancient marine mammals like whales.
   D. They are entirely unrelated to the fossils *P. quenstedti* and *P. talampayensis*.

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SECTION 2: True / False / Not Given (Questions 6-10)

Do the following statements agree with the information given in the Reading Passage?

TRUE if the statement agrees with the information
FALSE if the statement contradicts the information
NOT GIVEN if there is no information on it

6: Scorpions and land crabs were among the animal groups that successfully adapted to terrestrial life.

7: Whales re-developed an internal gill system to help them breathe under water.

8: Amphibious turtle species plotted on the triangular graph fell completely within the 'wet cluster'.

9: Joyce and Gauthier's research project at Yale University received funding from international research grants.

10: Tortoises are described as having undergone a "double return" in their evolutionary history.

SECTION 3: Matching Features / Information (Questions 11-15)

Match each description or statement (Questions 11-15) with the correct creature group (A-E) listed below.

Creatures Groups	Statement / description
A. Whales and Dugongs	11: Plotted approximately halfway between the 'wet cluster' and 'dry cluster' on the triangular graph.
B. Seals	12: Animals that have gone only part of the way back to a full marine lifestyle.
C. Amphibious turtles	13: Ancient reptilian contemporaries of dinosaurs that had fins and streamlined bodies like dolphins.
D. Modern land tortoises	14: Creatures that abandoned land entirely, ceased coming ashore even to breed, yet still breathe air.
E. Ichthyosaurs	15: Represent a single branch deeply nested within a family tree of mostly aquatic species.

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SECTION 4: Completion Tasks (Sentence & Summary Completion) (Questions 16-20)

Complete the sentences/summary below. Choose NO MORE THAN TWO WORDS from the passage for each answer.

16. Early land animals carried their own private seawater inside their blood and _____.

17. Land plants were essential because without their prior _____ of the land, other animal migrations could not have occurred.

18. Moving from water to land required a total redesign of essential functions, such as breathing and _____.

19. The forelimb bone measurements of *P. quenstedti* and *P. talampayensis* placed them directly in the thick of the _____ cluster on the graph.

20. The remote ancestors of all mammals, reptiles, and birds were originally _____ fish.

_____Good Luck! and do your best_____

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