

## tpo\_39\_passage\_2

Between 80 and 85 million years ago, Gondwanaland, a giant continent made up of what today is Africa, Antarctica, Australia, and South America, broke up, thus causing what is now New Zealand to become separated from the larger landmass. After the separation, any creature unable to cross a considerable distance of ocean could not migrate to New Zealand. Snakes and most mammals evolved after the separation. Thus there are no New Zealand snakes, and bats, which flew there, and seals, which swam there, were the only mammals on New Zealand when Polynesian settlers (the Maori) arrived there about a thousand years ago. When the Maori arrived in New Zealand, they encountered birds that had been evolving for 80 million years without the presence of mammalian predators. The most striking of these animals must have been moa. Now extinct, moa were gigantic wingless birds that stood as much as 10 feet (3 meters) tall and weighed as much as 550 pounds (250 kilograms). They are known from a diverse array of remains including eggshells, eggs, a few mummified carcasses, vast numbers of bones, and some older fossilized bone. The species of moa that are currently recognized occupied ecological niches customarily filled elsewhere by large mammalian browsing herbivores. They may have had relatively low reproductive rates; apparently, they usually laid only one egg at a time. It seems possible that when Captain James Cook first visited New Zealand in 1769, moa (or at least one of the moa species) may have still survived in the remote areas in the western part of New Zealand's South Island. If so, these individuals would have been the last of their kind. Climatic conditions in New Zealand appear to have been relatively stable over the period during which moa became extinct. Different factors could have worked in concert to account for their abrupt disappearance. Vegetation was considerably altered by the Maori occupation of New Zealand, a change not easily explained by climate variation or other possible factors. Forest and shrubland burning appears to have reduced the prime habitat of many moa species. However, the main forest burning started around 700 years ago, after what current archaeological evidence indicates was the most intensive stage of moa hunting. While there appears to have been extensive burning on the east side of New Zealand's South Island, large forest tracts remained in the most southern part of the island. Because major habitat destruction seems to have occurred after moa populations already were depleted, and because some habitat that could have sheltered moa populations remained, it would seem that other factors were also at work in the extinction of these birds. For South Island, human predation appears to have been a significant factor in the depletion of the population of moa. At one excavated Maori site, moa remains filled six railway cars. The density of Maori settlements and artifacts increased substantially at the time of the most intensive moa hunting (900 to 600 years ago). This period was followed by a time of decline in the Maori population and a societal transition to smaller, less numerous settlements. The apparent decline fits the pattern expected as a consequence of the Maori's overexploitation of moa. Finally, the Maori introduced the Polynesian rat and the dog to New Zealand. The actions of these potential nest predators could have reduced moa populations without leaving much direct evidence. The Maori may have also inadvertently brought pests and disease organisms in fowls, which could have crossed over to eradicate moa populations. The possibility of analyzing ancient DNA to identify past diseases of extinct animals is being explored. However, evidence of such diseases is difficult to determine directly from paleoecological or archaeological remains. For these reasons, it is hard to determine the likelihood that introduced disease

organisms were a cause of the decline of moa, but they are potentially significant. While the last of these possible causes remains speculative, definite clues exist for the action of the first two causes. The story of moa species and their demise raises ecological issues on the vulnerability of species to human-caused changes-including altered vegetative cover of the landscape, change in the physical environment, and modification of the flora and fauna of a region by eliminating some species and introducing others.

#### question 1

Paragraph 1 supports which of the following inferences about mammal evolution?

A Bats and seals most probably originated in New Zealand and then migrated to other parts of the world.

B Most mammal species were already present in Gondwanaland before it broke up, between 80 to 85 million years ago.

C No mammals that evolved after New Zealand separated from Gondwanaland were able to migrate to New Zealand.

D No mammals evolved from the animals that originally inhabited New Zealand.

#### question 2

According to paragraph 2, moa

A had large wings

B hatched many eggs at one time

C had no mammals that preyed on them

D were ordinarily small in size and light in weight

#### question 3

Why does the author provide the information that "Climatic conditions in New Zealand appear to have been relatively stable over the period during which moa became extinct" ?

A To eliminate what might seem to be a plausible explanation of the extinction of moa

B To explain why some moa species may still have existed at the time of Captain Cook' s first visit to New Zealand

C To explain why, in the late 1700s, moa most likely lived in remote areas of New Zealand

D To suggest that climate conditions in New Zealand varied widely when moa were plentiful

question 4

According to paragraph 4, why is forest burning considered only a partial explanation for the disappearance of moa?

A Forest burning was far less intense on New Zealand' s South Island, where the majority of moa habitats were located.

B Moa populations had already been significantly reduced before most of the forest burning started.

C Moa became extinct long after the Maori had stopped the practice of forest burning.

D Moa gradually adapted to changes that resulted from forest burning.

question 5

Why does the author say that "At one excavated Maori site, moa remains filled six railway cars." ?

A To indicate how large the moa population was before it was hunted

B To indicate that scientists were very interested in learning details about moa

C To illustrate the intensity with which the Maori hunted moa

D To suggest that moa hunting was largely limited to New Zealand' s South Island

question 6

Paragraph 5 presents which of the following as evidence that hunting was one of the factors responsible for the decline of moa?

- A The length of the period during which moa were intensively hunted
- B The decline in the size of the Maori population in the period after moa were intensively hunted
- C The large number of Maori living today in areas that were moa habitats
- D The large number of hunting weapons that archaeologists have excavated

question 7

According to paragraph 6, scientists may never know if diseases contributed to the extinction of moa because

- A previous research to establish the role of diseases in the extinction of animals did not yield any significant findings
- B scientists have difficulty identifying past diseases from paleoecological and archaeological data
- C moa' s fossilized remains contain no DNA
- D conducting such research is time-consuming and expensive

question 8

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- A The extinction of moa suggests the vulnerability of species to human-caused changes to the species' environment.
- B Some species, such as moa, are vulnerable to changes in their environment.
- C The environmental changes that moa experienced included modifications to plant and animal life and the introduction and elimination of certain animal species.
- D The story of moa raises issues that are important for ecologists to consider.

## question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

Between 80 and 85 million years ago, Gondwanaland, a giant continent made up of what today is Africa, Antarctica, Australia, and South America, broke up, thus causing what is now New Zealand to become separated from the larger landmass. After the separation, any creature unable to cross a considerable distance of ocean could not migrate to New Zealand. Snakes and most mammals evolved after the separation. Thus there are no New Zealand snakes, and bats, which flew there, and seals, which swam there, were the only mammals on New Zealand when Polynesian settlers (the Maori) arrived there about a thousand years ago. When the Maori arrived in New Zealand, they encountered birds that had been evolving for 80 million years without the presence of mammalian predators. [ ] The most striking of these animals must have been moa. [ ] Now extinct, moa were gigantic wingless birds that stood as much as 10 feet (3 meters) tall and weighed as much as 550 pounds (250 kilograms). [ ] They are known from a diverse array of remains including eggshells, eggs, a few mummified carcasses, vast numbers of bones, and some older fossilized bone. [ ] The species of moa that are currently recognized occupied ecological niches customarily filled elsewhere by large mammalian browsing herbivores. They may have had relatively low reproductive rates; apparently, they usually laid only one egg at a time. It seems possible that when Captain James Cook first visited New Zealand in 1769, moa (or at least one of the moa species) may have still survived in the remote areas in the western part of New Zealand's South Island. If so, these individuals would have been the last of their kind. Climatic conditions in New Zealand appear to have been relatively stable over the period during which moa became extinct. Different factors could have worked in concert to account for their abrupt disappearance. Vegetation was considerably altered by the Maori occupation of New Zealand, a change not easily explained by climate variation or other possible factors. Forest and shrubland burning appears to have reduced the prime habitat of many moa species. However, the main forest burning started around 700 years ago, after what current archaeological evidence indicates was the most intensive stage of moa hunting. While there appears to have been extensive burning on the east side of New Zealand's South Island, large forest tracts remained in the most southern part of the island. Because major habitat destruction seems to have occurred after moa populations already were depleted, and because some habitat that could have sheltered moa populations remained, it would seem that other factors were also at work in the extinction of these birds. For South Island, human predation appears to have been a significant factor in the depletion of the population of moa. At one excavated Maori site, moa remains filled six railway cars. The density of Maori settlements and artifacts increased substantially at the time of the most intensive moa hunting (900 to 600 years ago). This period was followed by a time of decline in the Maori population and a societal transition to smaller, less numerous settlements. The apparent decline fits the pattern expected as a consequence of the Maori's overexploitation of moa. Finally, the Maori introduced the Polynesian rat and the dog to New Zealand. The actions of these potential nest predators could have reduced moa populations without leaving much direct evidence. The Maori may have also inadvertently brought pests and disease organisms in fowls,

which could have crossed over to eradicate moa populations. The possibility of analyzing ancient DNA to identify past diseases of extinct animals is being explored. However, evidence of such diseases is difficult to determine directly from paleoecological or archaeological remains. For these reasons, it is hard to determine the likelihood that introduced disease organisms were a cause of the decline of moa, but they are potentially significant. While the last of these possible causes remains speculative, definite clues exist for the action of the first two causes. The story of moa species and their demise raises ecological issues on the vulnerability of species to human-caused changes-including altered vegetative cover of the landscape, change in the physical environment, and modification of the flora and fauna of a region by eliminating some species and introducing others.

#### question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

- A. Because New Zealand had no large mammals, moa had no mammalian predators and occupied the ecological niches that elsewhere were occupied by large mammalian herbivores.
- B. Initially, moa had a high reproductive rate, but over time it significantly declined, largely due to changes in New Zealand's climatic pattern.
- C. DNA analysis of moa remains revealed that the extinction of moa species occurred less than three centuries ago.
- D. The extinction of moa was primarily caused by the hunting and deforestation activities of the Maori, who arrived in New Zealand about one thousand years ago.
- E. Scientists claim that forest burning is the factor most responsible for the disappearance of moa.
- F. The Maori introduced dogs, rats, and perhaps disease organisms, which may have contributed to the extinction of moa, but evidence is not available.