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Animals in the Book of Mormon: Challenges and Perspectives

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Abstract: When the Book of Mormon first appeared, skeptics said that references to horses, asses, elephants, and other animals (such as swine and cows) were out of place. During the first century after its publication, Book of Mormon critics argued that such animals never existed anywhere in the Americas before the arrival of Columbus and western Europeans in the late fifteenth century. In time, however, scientific discoveries showed that species of horses, asses, elephants, and other animals had once been present in North America, although dating to an earlier period than that covered in the Book of Mormon.1 Encouraged by such discoveries, the present authors and some other specialists reasoned that future research and investigation would show that some of these species survived into historical times consistent with the account in the Book of Mormon.

It can no longer be argued that there were no horses, asses, or elephants in the Americas. The issue has shifted to when such animals became extinct. As we approach the end of the second century since the publication of the Book of Mormon, the skeptical reader is more likely to claim that these animals disappeared before the advent of modern humans or long before the time covered by the Nephite record. Some Latter-day Saints are challenged by what they consider a lack of evidence supporting the historicity of the animals mentioned in the Book of Mormon. People of faith, however, are not alone in their challenges. Secular scholars have their own difficulties interpreting the past. An understanding of some of these challenges and the nature of the tools and evidence needed to address such questions can provide a helpful perspective to those who may be troubled by this issue.

Animals in the Book of Mormon

Challenges and Perspectives

Wade E. Miller and Matthew Roper

When the Book of Mormon first appeared, skeptics said that references to horses, asses, elephants, and other animals (such as swine and cows) were out of place. During the first century after its publication, Book of Mormon critics argued that such animals never existed anywhere in the Americas before the arrival of Columbus and western Europeans in the late fifteenth century. In time, however, scientific discoveries showed that species of horses, asses, elephants, and other animals had once been present in North America, although dating to an earlier period than that covered in the Book of Mormon.[1] Encouraged by such discoveries, the present authors and some other specialists reasoned that future research and investigation would show that some of these species survived into historical times consistent with the account in the Book of Mormon.

It can no longer be argued that there were no horses, asses, or elephants in the Americas. The issue has shifted to *when* such animals became extinct. As we approach the end of the second century since the publication of the Book of Mormon, the skeptical reader is more likely to claim that these animals disappeared before the advent of modern humans or long before the time covered by the Nephite record. Some

1. Fred James Pack, "Revelation Ante-dating Scientific Discovery: An Instance," *Improvement Era* 10 (February 1907): 241–47; (June 1907): 595–97; B. H. Roberts, *New Witnesses for God* (Salt Lake City: Deseret News Press, 1909), 3:534–43; Franklin S. Harris, *The Book of Mormon: Message and Evidences* (Salt Lake City: Deseret News Press, 1953), 70–94.

Latter-day Saints are challenged by what they consider a lack of evidence supporting the historicity of the animals mentioned in the Book of Mormon. People of faith, however, are not alone in their challenges. Secular scholars have their own difficulties interpreting the past. An understanding of some of these challenges and the nature of the tools and evidence needed to address such questions can provide a helpful perspective to those who may be troubled by this issue.

In this article, we address factors that provide important perspectives on animals mentioned in the Book of Mormon.[2] For many Latter-day Saints, the subject may be of peripheral interest. For others, these matters may be a challenge. The truth of the scriptural text, whose primary purpose is to testify of God's dealings with an ancient group of his covenant people, is first and foremost a matter of faith. However, this should not stop scholars from seeking all available truths that can be derived from this sacred text. B. H. Roberts wrote, "Secondary evidences in support of truth, like secondary causes in natural phenomena [science], may be of first rate importance and mighty factors in the achievement of God's purposes."[3]

Discussing the animals mentioned in the Book of Mormon requires a review of a variety of disciplines, including archaeology, geography, biology, paleontology (including extinctions), geology, taphonomy, and more. A number of authors have presented hypotheses relating to where the Book of Mormon history took place, so we will touch on this topic only lightly. Relevant points discussed in this paper include the limited scope of Book of Mormon lands, their possible Mesoamerican location, the issue of domestication, the cultural naming of animals, and some of the challenges relating to questions of extinction and the nature of faunal remains from the past. Specific information on animals named in the Book of Mormon text will be addressed later.

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2. The authors have benefited greatly from the pioneering research and publications of John L. Sorenson on this subject, which represent the essential starting place for those who approach this subject. See John L. Sorenson, *An Ancient American Setting for the Book of Mormon* (Salt Lake City: Deseret Book, 1985), 288–99; John L. Sorenson, *Animals in the Book of Mormon: An Annotated Bibliography* (Provo, Utah: FARMS, 1992); and John L. Sorenson, *Mormon's Codex: An Ancient American Book* (Salt Lake City: Deseret Book; Provo, Utah: Neal A. Maxwell Institute for Religious Scholarship, 2013), 309–21.

3. Roberts, *New Witnesses for God,* 2:viii.

Book of Mormon Lands

One important topic bearing upon the issue of animals in the Book of Mormon is the location of the lands described in the text. In our view, an ancient Mesoamerican setting is best supported by the information given in the Book of Mormon. The evidence for this conclusion, as has been addressed by many scholars, includes the limited geography of events and travel described in the text and a historical chronology consistent with the archaeological record of the region.[4] Cultural evidence for an ancient Mesoamerican setting includes proof of a sophisticated tradition of writing in a variety of media,[5] a complex society with large populations, many large and complex buildings and fortifications, warfare, a high degree of art, a good understanding of astronomy, highly accurate calendar systems, an advanced knowledge of agriculture and husbandry, and sophisticated cement technologies introduced over two thousand years ago. These combined characteristics of advanced civilization are not known anywhere else in North America, north of Mesoamerica.[6]

Additional convergences are found in the Book of Mormon account, including the destruction in 3 Nephi 8–10, which is consistent with volcanic events accompanied by earthquakes.[7] Middle America is one of the most volcanically active regions in the world.[8] Also, gold and silver are two precious metals mentioned as being abundant in Book of Mormon lands (1 Ne. 18:25; Hel. 6:9; Ether 9:17; 10:23). Both gold and

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4. J. A. Washburn, *An Approach to the Study of Book of Mormon Geography* (American Fork, Utah: Alpine Publishing, 1939); John L. Sorenson, *Mormon's Map* (Provo, Utah: FARMS, 2000); John E. Clark, "Revisiting 'A Key for Evaluating Nephite Geographies,'" *Mormon Studies Review* 23, no. 1 (2011): 13–43; Matthew Roper, "Plausibility, Probability, and the Cumorah Question," *The Religious Educator* 10 (2009): 135–58; Sorenson, *Mormon's Codex,* 119–43. For archaeological correlations, see Sorenson, *Mormon's Codex,* 499–707; and John E. Clark, "Archaeological Trends and Book of Mormon Origins," *BYU Studies* 44, no. 4 (2005): 89–91.

5. Sorenson, *Mormon's Codex*, 184–232.

6. Sorenson, *Mormon's Codex*, 265–495.

7. Bart J. Kowalis, "'In the Thirty and Fourth Year': A Geologist's View of the Great Destruction in 3 Nephi," *BYU Studies* 37, no. 3 (1997–1998): 136–90; Wade E. Miller, *Creation of the Earth for Man* (Laguna Niguel, Calif.: KCT & Associates, 2010); Jerry D. Grover, *Geology and the Book of Mormon* (Vineyard, Utah: By the author, 2014).

8. Robert H. Dott and Roger L. Batten, *Evolution of the Earth* (New York: McGraw-Hill, 1988), 4.

silver are plentiful in Mesoamerica. "Fine pearls" are mentioned as an important luxury item (4 Ne. 1:24). While pearl-bearing oysters and other clams occur in both fresh and salt waters the world over, the most precious pearls come from tropical to subtropical seas. The "fine" pearls are known to be abundant off the coasts of southern Mexico and were prized by Mesoamerican peoples from preclassic times.[9] Descriptions of climate and its implications in the Book of Mormon text suggest that warm and mild conditions were typical (Alma 51:33). There is no mention of snow and ice in the land of promise, and the single reference to hail is atypical (Mosiah 12:6). While not proof of warm to semitropical climate, this combination of factors is suggestive of them. These and other factors seem to point toward a pre-Columbian Mesoamerican setting for the Book of Mormon.

Domestication

Scientifically, *domestication* is the process of changing an animal genetically through selective breeding to benefit humans. *Taming* is the process whereby an animal simply becomes accustomed to humans. Most mammals (as well as some other animals) can be tamed if raised by humans from birth. However, relatively few can be truly domesticated.[10]

A majority of animals mentioned in the Book of Mormon are domestic, which makes sense because they are the ones most useful to humans. When domesticated animals are mentioned, they are usually associated with the Nephites. However, the Lamanites did at least maintain flocks, presumably of sheep (Alma 17:25), and had horses (Alma 18:9). The Jaredites were the earliest peoples mentioned in the Book of Mormon to have domesticated animals in what is now America. They brought the most useful ones from the Old World in their barges. Although no specific

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9. Michael D. Coe, "Archaeological Synthesis of Southern Veracruz and Tabasco," in *Handbook of Middle American Indians,* ed. Gordon S. Wiley (Austin: University of Texas Press, 1965), 3:697; Alfonso Caso, "Lapidary Work, Goldwork, and Copper Work from Oaxaca," in *Handbook of Middle American Indians: Volumes 2 and 3, Archaeology of Southern Mesoamerica,* ed. Gordon R. Willey (Austin: University of Texas Press, 1965), 915.

10. For several attempts to grapple with these definitions, see Eugenia Shanklin, "Sustenance and Symbol: Anthropological Studies of Domesticated Animals," *Annual Review of Anthropology* 14 (1985): 380–81; Charles A. Reed, "Wild Animals Ain't So Wild: Domesticating Them Not So Difficult," *Expedition* 28, no. 2 (1986): 8–15; and Nerissa Russell, "The Wild Side of Animal Domestication," *Society and Animals* 10, no. 3 (2002): 285–302.

animals are listed, the text mentions "flocks and herds," which most likely included sheep and goats (Ether 6:4). In addition to sheep and goats, the Jaredite record later mentions cattle, oxen, cows, horses, and asses (Ether 9:18–19), presenting the possibility that these animals were brought along too. What we don't know is the kinds of animals they found native in the New World, with the probable exceptions of the elephant and the so-called curelom and cumom. Some of these animals could well have been domesticated, which is suggested by the text's indication that they were "useful unto man" (Ether 9:19).

There is no mention in the Nephite record of animals being brought to America by Lehi and his group, although they might have done so. The account states, however, that they found animals upon their arrival in the promised land. The ones mentioned are the cow, ox, ass, horse, goat, and wild goat. It is further noted that "there were beasts in the forests of every kind" (1 Ne. 18:25). Based on animals now living in North America (including Mesoamerica), there would have been many, many other kinds of mammals present when both the Jaredites and the Nephites arrived. North America, for example, has 474 indigenous species of mammals,[11] and Mesoamerica has a large majority of these species within its borders. Therefore, the Book of Mormon account of the kinds of animals brought to or found in the land of promise is extremely incomplete.

All the animals except the "wild goat" in both the Jaredite and the Nephite records could have been domesticated. One problematic animal, though, is the elephant (Ether 9:19). It is probable the elephant in the Book of Mormon refers to the mammoth. The earliest descriptions of the mammoth in scientific literature refer to it as an elephant—which indeed it is.[12] Although mammoths generally were considered to have been extinct for ten thousand years, new discoveries show that they

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11. Robert J. Baker and others, "Revised Checklist of North American Mammals," *Texas Tech University, Occasional Papers* 229 (2003): 1–22.

12. For example, David R. Yesner, Douglas W. Veltre, Kristine J. Crossen, and Russell W. Graham, "5,700-Year-Old Mammoth Remains from Qagnax Cave, Pribilof Islands, Alaska," in *The World of Elephants: Short Papers and Abstracts of the 2nd International Congress,* ed. L. D. Agenbroad and R. L. Symington, Mammoth Site Scientific Papers vol. 4, 2d ed. (Hot Springs, S.D.: Mammoth Site of Hot Springs, South Dakota, 2005), 206–10; Henry F. Osborn, *Proboscidea: A Monograph of the Discovery, Evolution, Migration and Extinction of the Mastodonts and Elephants of the World, Volume 1, Moeritherioidea, Deinotherioidea, Mastodontoidea* (New York: American Museum Press, 1936), 32–33.

lived on in North America much later.[13] As we will explain later, extinction dates for species do not represent their latest existence on earth. We believe that the "elephants" cited in the Jaredite record were accurately identified. The most widespread and abundant North American mammoth was *Mammuthus columbi*. In all probability, this was the elephant referred to in Ether 9:19. This particular mammoth shows a very close relationship to the Indian (or Asian) elephant, *Elephas maximus* (the circus elephant). These two proboscideans have a closer relationship to one another than either has to the African elephant, *Loxodonta africana*. The Indian elephant is easily tamed and trained (but not actually domesticated), while the African elephant is not. Therefore, it seems reasonable to assume that *Mammuthus columbi* could also be tamed and made useful to a human colony. Archaeological evidence shows the Indian elephant was tamed back to at least 2500 BC in the Indus Valley.[14] Coincidentally, this is the approximate time when the Jaredites arrived in North America. If these people traveled through Asia, as thought by Hugh Nibley,[15] then Jared and his group possibly observed men working elephants. They would have seen how useful these large mammals were.

Cross-Cultural Naming Challenges

When discussing Book of Mormon animals, we need to consider that the Lehite, Mulekite, and Jaredite migrants may have applied Old World terms to New World species. Many migrant peoples through time have applied familiar names to animals on lands where they immigrated. This system, of course, applies to plants as well as to animals. As far back as 1885, Edward Vining wrote of the "natural tendency of a man who arrives in a new country to assimilate the animals which he finds there to those which he sees in his native land."[16] In the context of the

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13. J. M. Enk and others, "Phylogeographic Anaylsis of the Mid-Holocene Mammoth from Qagnax Cave, St. Paul Island, Alaska," *Palaeogeography, Palaeoclimatology, Palaeoecology* 273 (2009): 184–90.

14. S. S. Bist and others, "The Domesticated Asian Elephant in India," in *Giants on Our Hands: Proceedings of the International Workshop on the Domesticated Asian Elephant,* ed. I. Baker and M. Kashio (Bankok: Food and Agriculture Organization of the United Nations, 2001), 129–48.

15. Hugh Nibley, *Lehi in the Desert; The World of the Jaredites; There Were Jaredites,* The Collected Works of Hugh Nibley, vol. 5 (Salt Lake City: Deseret Book; Provo, Utah: Foundation for Ancient Research and Mormon Studies, 1988), 194–204.

16. Edward P. Vining, *An Inglorious Columbus* (New York: Appleton, 1885), 115.

Book of Mormon, the naming of animals could have been a result of cross-cultural interaction rather than a feature of Joseph Smith's translation of the text. What would Nephi have called a peccary or a bison if he sighted one? What word would he have chosen to write on the plates? What we learn from cross-cultural encounters with strange or unfamiliar animals suggests that the answer may not always be clear. An example is when Europeans first began coming to the West Indies. "It should be mentioned," wrote Henry B. Nicholson, "that at this early period, before the newcomers became better acquainted with the resources of the 'Indies,' many European terms were applied to things which had no exact counterpart in the Old World."[17] Some called native American turkeys "peacocks,"[18] peccaries have often been called "hogs" or "pigs,"[19] and alpacas have been called "sheep."[20]

Sometimes the uniqueness of an animal poses even greater difficulties for description. One early account describes tapirs found in the jungles of Central and South America as "beasts that be as big as an ox or a cow and be of great color."[21] Another early explorer, in describing tapirs, indicated, "They are as big as small cows, and have no horns."[22] Yet another person called the tapir "a species of buffalo of the size and somewhat looking like an ass."[23] A description of a tapir seen in Chiapas, Mexico, stated that "without doubt it is an elephant."[24] The latter description refers to the tapir having a proboscis, albeit a very short one.

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17. Henry B. Nicholson, "Montezuma's Zoo," *Pacific Discovery* 8, no. 4 (1955): 5.

18. Wilma George, "Sources and Background to Discoveries of New Animals in the Sixteenth and Seventeenth Centuries," *History of Science* 18 (June 1980): 90.

19. Lyle K. Sowls, *The Peccaries* (Tucson: University of Arizona Press, 1984), 1–3, 8.

20. Joseph de Acosta, *The Natural and Moral History of the Indies,* trans. Edward Grimston, ed. Clements R. Markham, 2 vols. (1604; London: Hakluyt Society, 1880), 1:277.

21. George, "Sources and Background to Discoveries of New Animals," 83.

22. Garcilaso de la Vega, El Inca, *Royal Commentaries of the Incas and General History of Peru,* trans. Harold V. Livermore (Austin: University of Texas Press, 1987), vol. 1, book 8, part 1, ch. 18, p. 518–19.

23. Pedro Francisco Javier de Charlevoix, *Historia del Paraguay*, trans. P. Pablo Hernández (1766; Madrid: Librería General de Victoriano Suárez, 1910), 51.

24. Francisco Ximenéz, *Historia Natural del Reino de Guatemala*, quoted in Carlos Navarrete, "El hombre Danta en una pintura de la costa de Chiapas: una aportación a la iconografía del Preclásico Superior," in *Homenaje a Roman Piña Chan* (Mexico: Universidad Nacional Autonoma de Mexico, 1987), 240.

Extinction of Animals and the Record of Past Life

Extinction is a topic that the scientific literature has dealt with extensively. Of specific interest here are the widespread extinctions that occurred at the close of the Pleistocene epoch (or Ice Age), especially throughout North America.[25] The mammoth (elephant), horse, and ass are animals listed in the Book of Mormon that presumably became extinct in North America at the close of the Pleistocene, about ten thousand years ago. Cureloms and cumoms mentioned in the book of Ether (9:19) probably represent extinct animals too. This seems likely, since Joseph Smith apparently wasn't able to relate them with any living animals. He seems to have simply transliterated the words on the gold plates.

Though figures vary among researchers, the total number of plant and animal species living today is probably no more than 1 percent of all that ever lived on earth.[26] This means that about 99 percent of all species that ever lived on earth are now extinct. Sometimes extinctions affect a single species, but more often they affect many because life forms are interconnected. In the history of the earth, there have been times when mass extinctions occurred over a relatively short period of time.[27] Dinosaurs have often been used as a classic example of this. Extinctions are a natural process in the history of the earth. Since conditions are ever changing on earth, life forms are forced to adapt or else die out (become extinct). The dying out of the mammoth, horse, and ass in North America is only a small part of the mass extinction that occurred at the end of the Pleistocene, which affected mostly large mammals.[28] It is this extinction that is most relevant to the present article.

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25. For example, Paul S. Martin and H. E. Wright, eds., *Pleistocene Extinctions: The Search for a Cause* (New Haven: Yale University Press, 1967); Paul S. Martin, *Twilight of the Mammoths: Ice Age Extinctions and the Rewilding of America* (Berkeley: University of California Press, 2005), 1–2; and Gary Haynes, ed., *American Megafaunal Extinctions at the End of the Pleistocene* (New York: Springer Publications, 2009).

26. Robert M. May, John H. Lawton, and Nigel E. Stork, "Assessing Extinction Rates," in *Extinction Rates,* ed. John H. Lawton and Robert M. May (New York: Oxford University Press, 1995), 2.

27. For example, see Stephen K. Donovan, ed., *Mass Extinctions: Processes and Evidence* (New York: Columbia University Press, 1989); Helen Thompson, "How Long Does Mass Extinction Take," Smithsonian.com, February 18, 2014, https://www.smithsonianmag.com/science-nature/how-long-mass-extinction-180949711/; and Donald R. Prothero and Robert H. Dott, *Evolution of the Earth,* 6th ed. (New York: McGraw-Hill, 2002), 507.

28. Anthony D. Barnosky, "The Late Pleistocene Event as a Paradigm for Widespread Mammal Extinction," in Donovan, *Mass Extinctions,* 236.

What causes organisms (plant and animal) to become extinct? Basically, it is a change in the environment, usually sudden in the geologic sense, to which organisms cannot adjust. These events might be climatic changes, changes in worldwide sea level, volcanic activity, atmospheric changes, bolide impacts, new and more competitive species arriving in the area, or a disease for which the organism has no defense. In recent times, humanity has caused the extinction of many organisms. Such animals include the passenger pigeon, the dodo (a bird), the quagga (a type of zebra), and the Tasmanian "tiger" (or Tasmanian "wolf"). While some Pleistocene extinctions were possibly (or even probably) caused by humans (this is still a hotly debated topic), most extinctions apparently were the result of environmental factors such as those named above.

The fact that the mammoth (elephant), horse, and ass were supposed to have been extinct in North America before Book of Mormon time has caused many to doubt, if not disbelieve, the book's authenticity and divine origin. It is therefore vital to have a clear understanding of when these animals actually became extinct. Obtaining an exact date for the last surviving member of any extinct species would be next to impossible—winning the lottery would be thousands of times more likely. As one team of scientists has recently observed, "The youngest reliably dated macrofossil (usually a bone or tooth) of an extinct species is commonly taken to represent the approximate time of its disappearance. In practice, however, there is a very low probability of discovering fossil remains of the last members of any species, so ages for extinction based on dated macrofossil finds will likely be older than the true ages."[29] Only a minuscule number of animals that have lived on earth have become fossilized or preserved. And even though an animal might have been abundant in an area in the past, its remains (including fossils) could well go undetected or no longer exist. The fossil record clearly shows that extinction is fact; but extinctions are not limited to the distant past. Numerous extinctions have occurred in modern times as well and are continuing.

Populations of animals (or plants) could have lived for prolonged periods and yet provide little or no evidence of their existence. A classic example of this is the coelacanth. This rare fish can reach lengths over six feet and weigh nearly two hundred pounds. It was once considered

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29. James Haile and others, "Ancient DNA Reveals Late Survival of Mammoth and Horse in Interior Alaska," *Proceedings of the National Academy of Sciences* 106 (December 29, 2009): 22352.

to have become extinct over sixty-five million years ago. Then, in 1938, it was found living in the ocean off the coast of eastern Africa.[30] Recently, this fish has also been found in the seas of Indonesia.

Twenty-five years ago, archaeologists announced the discovery of woolly mammoth remains on Wrangle Island in the Siberian arctic dated as late as 2000 BC. "Hardly anyone has doubted that mammoths had become extinct everywhere by around 9,500 years before present," noted these archaeologists in one report. These new discoveries "force this view to be revised."[31] On St. Paul's Island in Alaska, additional remains of the same species have subsequently been found that have been dated to 5,700 years before present,[32] and on the Alaskan mainland, remains were found that date to 7,600 years before present.[33]

Given these fairly recent discoveries, it is certainly possible, as one researcher insists, that many important species could well have been allowed (albeit unknowingly) to slip into extinction without ever becoming known to science. And certain "officially" extinct species that may have persisted in small numbers within remote, rarely visited localities could have died out by now.[34]

Therefore, it is certainly possible for a species to live on a few thousands of years after its last recorded appearance. This undoubtedly has happened in the case of Pleistocene vertebrates, whose last occurrence dates have become more recent in the scientific literature.[35] The extinctions of these vertebrates likely took thousands of years and were the

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30. Edwin H. Colbert and Michael Morales, *Colbert's Evolution of the Vertebrates* (New York: Wiley-Liss Publishers, 1991), 67.

31. S. L. Vartanyan, V. E. Garutt, and A. V. Sher, "Holocene Dwarf Mammoths from Wrangle Island in the Siberian Arctic," *Nature* 362 (March 25, 1993): 337; Veronica Nystrom and others, "Temporal Genetic Change in the Last Remaining Population of Woolly Mammoth," *Proceedings of the Royal Society B: Biological Sciences* (March 31, 2010): 2331–37.

32. Douglas W. Veltre and others, "Patterns of Faunal Extinction and Paleoclimatic Chanage from Mid-Holocene Mammoth and Polar Bear Remains, Pribilof Islands, Alaska," *Quarternary Research* 70 (July 2008): 40–50.

33. Haile and others, "Ancient DNA Reveals Late Survival," 22352–57.

34. See Karl P. N. Shuker, *The Lost Ark: New and Rediscovered Animals of the 20th Century* (London: Blandford Publishing, 1993), 11.

35. For example, see Jonathan Adams, *Species Richness: Patterns in the Diversity of Life* (New York: Springer Publications, 2009), 14–15; R. D. E. MacPhee, "Insulae infortunatae: Establishing a Chronolgoy for Late Quaternary Mammal Extinctions in the West Indies," in *American Megafaunal Extinctions at the End of the Pleistocene,* ed. Gary Haynes (New York: Springer Publications, 2009), 186; and Samuel T. Turvey, "In the Shadow of the Megafauna: Prehistoric

result of unfavorable environmental conditions that had developed for certain species. This extinction undoubtedly occurred at the close of the Pleistocene epoch (Ice Age), when much of the world's climate changed in a relatively short period of time. Climate and environment changes would have caused Pleistocene mammals to move into more restricted areas where they could still survive. As favorable areas continued to shrink and food supplies lessened, the populations of a given species would have also decreased. Finally, a point would be reached where the breeding population would become too small to sustain itself for long. The species would then become extinct. As numbers within a species dwindled over a prolonged period, the number of potential fossils would also diminish, making them increasingly difficult to find and identify. One reason why scientists are discovering extinct animals from more recent dates is that more and more are searching for them. Mammals other than the mammoth and horse in North America now have more recent last-occurrence dates. For example, the mastodon was considered to be extinct at the end of the Pleistocene, about ten thousand years ago. But this presumed last-occurrence date had to be revised with more recent finds. The remains of a mastodon, for instance, were discovered in Utah and dated at 7,090 years before the present.[36]

One question of concern to scholars is what the known collection of faunal remains reveals in terms of what once existed. This record of past life is of immeasurable value to our knowledge, but it is also incomplete and we often encounter a discrepancy between historical accounts and the archaeological record. Hamblin and others have observed, for example, that the Huns of central Asia and eastern Europe reportedly had hundreds of thousands of horses, yet remains of these horses are exceptionally rare given what we would expect.[37] "The presence of horses among the Huns is not at issue," explains Lindner. "The crux of the problem is the presence of *large numbers* of horses, numbers suitable for sustaining a nomadic life and ensuring the mobility, speed and range of

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Mammal and Bird Extinctions across the Holocene," in *Holocene Extinctions,* ed. Samuel T. Turvey (Oxford: Oxford University Press, 2009), 19–20.

36. Wade E. Miller, "*Mammut Americanum,* Utah's First Record of the American Mastodon," *Journal of Paleontology* 61 (January 1987): 168–83.

37. Sándor Bökönyi, *History of Domestic Mammals in Central and Eastern Europe*, trans. Lili Halápy (Budapest: Akadémiai Hiadó, 1974), 267; William J. Hamblin, "Basic Methodological Problems with the Anti-Mormon Approach to the Geography and Archaeology of the Book of Mormon," *Journal of Book of Mormon Studies* 2, no. 1 (1993): 194.

a nomadic horde."[38] Obviously, few Hun horse remains that could be identified by archaeologists were preserved. While the Book of Mormon mentions horses, nothing in the text indicates that their importance approached anywhere near that of horses in Hun society. So, given the rarity of Hun horse remains, we should not be disturbed if so far we do not have incontrovertable evidence of Nephite horses. However, some possibilites exist. Archaeologists were earlier convinced that camels were not present in Egypt during the time of Abraham; however, it was later found that they were indeed continually present from prehistoric times to the present. Remains of the tapir (a relative of the horse and rhinoceros) were among the famous Pleistocene deposits discovered at Rancho La Brea in Los Angeles, California. However, only three small foot bones attest to its presence there.[39] It was just fortuitous that these bones were found among the more than one million fossils collected in the area. Otherwise the existence of this animal there would have remained unknown. Albarella writes about the discrepancy between historical accounts of medieval European domesticates and the archaeological record of such animals. It is "difficult to understand why some animals that are frequently mentioned by the documents turn up so rarely on archaeological sites." We have historical records that indicate particular animals were there, but their remains, for whatever reason, are far less abundant than we would expect; hence, "how unwise it would be to rely just on the archaeological evidence and how essential it is to consider these data along with the historical evidence."[40] Latter-day Saints hold that the Book of Mormon is an authentic, albeit limited, historical account of pre-Columbian groups of people. Like other historical accounts, it provides additional insight that may not be available in our current archaeological inventory.

Most ancient animals and plants are known only through their fossils. Although fossils number in the many trillions, the percentage of organisms that have become fossilized is minute—probably much less than 0.1 percent. Therefore, most ancient animal remains have not survived into modern times and are not available for study. In the case of

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38. Rudi Paul Lindner, "Nomadism, Horses, and Huns," *Past and Present* 92 (August 1981): 13, emphasis added.

39. John Harris and George Jefferson, "Treasures of the Tar Pits," *Natural History Museum of Los Angeles County, Science Series* 31 (1985): 87.

40. Umberto Albarella, "'The Mystery of Animal Husbandry': Medieval Animals and the Problem of Integrating Historical and Archaeological Evidence," *Antiquity* 73 (1999): 873.

animal remains at archaeological sites, Reitz and Wing observe, "The remains of all animals used by people living at the site will not be recovered from the site, because either their remains were discarded beyond the excavated portion of the site or their remains did not survive deposition."[41] Another challenge has to do with the lack of bone and tooth preservation, resulting from many factors, including how animals were butchered and cooked (if eaten) and the physical and chemical properties of the bones and terrain upon which they were discarded.[42] Terry O'Connor has observed that the bones and teeth that survived to become part of the archaeological record are only a tiny proportion of the original sample.[43] One authority on the Olmec of southern Mexico, whose culture once thrived more than three thousand years ago, thinks it probable that the Olmec domesticated dogs, turkeys, and other animals, "but the destruction of any sort of bone remains, both human and animal, by the dampness and the acidity of the soil keeps us from being certain of this."[44] Archaeologist Michael Coe lamented, "We never did find an Olmec burial at San Lorenzo. Given the terrible conditions of bone preservation in the acid soils of the Olmec heartland, it is likely that surviving skeletons would have been few and far between," though he was unsure if this was due to the destruction of human remains at the site or their deposition elsewhere.[45] Simon Davis writes:

> A long chain of events occurs between the original collection and slaughter of animals in antiquity, their incorporation within an archaeological site, their ending up on the faunal analyst's workbench, and their final publication. One sometimes wonders whether there is any similarity between a published bone report and the animals exploited by ancient humans. In an ideal situation the data and conclusions contained in the final faunal report would reveal something about the original population of animals exploited by man. Sadly, this is rare.[46]

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41. Elizabeth J. Reitz and Elizabeth S. Wing, *Zooarchaeology,* 2d ed. (Cambridge: Cambridge University Press, 2008), 118.

42. Raymond E. Chaplin, *The Study of Animal Bones from Archaeological Sites* (London: Seminar Press, 1971), 14–19.

43. Terry O'Connor, *The Archaeology of Animal Bones* (Thrupp, Eng.: Sutton Publishing, 2000), 28.

44. Jacques Soustelle, *The Olmecs: The Oldest Civilization in Mexico,* trans. Helen R. Lane (Norman: University of Oklahoma Press, 1985), 23.

45. Michael D. Coe and Richard A. Diehl, *In the Land of the Olmec: Volume 1, The Archaeology of San Lorenzo Tenochtitlán* (Austin: University of Texas Press, 1980), 392.

46. Simon J. M. Davis, *The Archaeology of Animals* (New Haven: Yale University Press, 1987), 23.

One of the goals of the paleontologist (or archaeologist) is to obtain accurate dates for the artifacts or fossils uncovered. Arguably, one of the most precise methods of obtaining dates for artifacts from the past seventy thousand or so years is carbon-14 (C-14), or radiocarbon, dating; however, for various reasons, many if not most of the bones and teeth tested by one of the authors (Miller) lack sufficient collagen (an animal protein useful in C-14 dating) for this process.[47] So it is indeed fortunate when a date for a given sample yields usable results.

The Book of Mormon includes animals that possibly became extinct in North America. Those specifically named include the elephant (mammoth), horse, and ass. While the horse and ass belong to the same biologic genus, *Equus,* they are separate species. Both are known to have been native to North America during the Pleistocene epoch and earlier. There are records of extinct animals in North America being associated with humans.[48] However, the dates of these associations either predate Book of Mormon peoples or else are not known. So, why do none of these dates correspond to the time Jaredites and Nephites inhabited North America? As discussed above, species on their way to extinction continue to live on, but in greatly reduced numbers, beyond their last *recorded* date of existence. The problem is finding specimens from immediately prior to their extinction. This is a serious problem because at times when fewer and fewer animals of a given species were alive, their remains become ever more difficult to find. At the same time, the area(s) where they still survived would almost always become more restricted. And if these areas were in highlands, the problem is exacerbated. Highland (mountainous) areas undergo erosion, decreasing the chance of remains being preserved in them. Mesoamerica consists of many highland areas. Additionally, this area is mostly humid, especially in its southern extent, with subtropical to tropical conditions. In areas such as this, animal and plant remains quickly decompose and are destroyed without leaving a trace. Even if an organism is buried before it decomposes, the commonly acidic soils continue the rapid process of

47. O'Connor, *Archaeology of Animal Bones,* 24–25.

48. For examples, see Joaquin Arroyo-Cabrales and Ticul Alvarez, "A Preliminary Report of the Late Quaternary Mammal Fauna from Loltún Cave, Yucatán, Mexico," in *Ice Age Cave Faunas of North America,* ed. Blaine W. Schubert, Jim I. Mead, and Russell William Graham (Bloomington: Indiana University Press, 2003), 262–72; and Richard S. MacNeish and Antoinette Nelken-Terner, "The Preceramic of Mesoamerica," *Journal of Field Archaeology* 10 (1983): 71–84.

decomposition. Also, with the generally abundant vegetation in such a region, very limited areas of exposed ground exist where bones or teeth might be observed. Because of this combination of factors, a significant record of past life in Mesoamerica would be very difficult to uncover. As archaeologists as well as paleontologists have discovered, most animal remains are not preserved and are lost for all time.[49] The best opportunity to find remains appears to be in caves. Some caves in the Yucatan, for instance, have yielded human artifacts associated with an extinct horse.[50] Verification of more associations of Book of Mormon peoples and animals may be possible at some future date.

Indirect Mention of Animals in the Book of Mormon

Animals are mentioned in the Book of Mormon in different contexts. On the one hand, they are directly cited as having an interaction with Jaredites, Nephites, or Lamanites, or else this interaction was implied. On the other hand, indirect references to given animals are also made. Examples of this include: "they shall be driven before like a dumb ass" (Mosiah 12:5,) and "what shepherd is there among you having many *sheep* doth not watch over them, that the *wolves* enter not and devour his flock?" (Alma 5:59). In order to make sense of this second sentence, one must have some understanding of sheep or sheeplike animals and wolves or wolflike predators. Helaman 7:19 includes this phrase: "he shall scatter you forth that ye shall become meat for dogs and wild beasts." These "dogs" and "wild beasts" are not specified. In Mosiah 8:21, Limhi likens the Lord's people to "a wild flock which . . . are devoured by the beasts of the forest." In this instance, "beasts" seems to refer to one or more types of carnivore. In 2 Nephi 5:24, Nephi states that the Lamanites "did seek in the wilderness for beasts of prey." The beasts here could well have referred to the jaguar or cougar, or possibly the bear.

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49. Elizabeth J. Reitz and Elizabeth S. Wing, *Zooarchaeology* (Cambridge: Cambridge University Press, 2008), 117–52; O'Connor, *Archaeology of Animal Bones*, 19–28; Chaplin *Study of Animal Bones*, 14–19.

50. For example, see Joaquin Arroyo-Cabrales and Oscar Polaco, "Caves and the Pleistocene Vertebrate Paleontology of Mexico," in Schubert, Mead, and Graham, *Ice Age Cave Faunas of North America*, 273–91; Peter J. Schmidt, "La entrada del hombre a la península de Yucatán," in *Origenes del hombre Amerícano,* comp. Alba González Jácome (México: Seminario Secretaría de Educación Pública, 1988), 245–61; Clayton E. Ray, "Pre-Columbian Horses from Yucatan," *Journal of Mammalogy* 38 (1957): 27; and Robert T. Hatt, "Faunal and Archaeological Researches in Yucatan Caves," *Cranbrook Institute of Science* 33 (1953): 1–42.

Mosiah 20:10 states that the people of Limhi "fought like lions." These statements indicate that the people at this time were aware of lions or at least lionlike animals. The mountain lion is and was common throughout North and South America, and the jaguar was well known in Mesoamerica. Spanish chroniclers such as Bernal Diaz del Castillo and Diego Duran designated both of these predators by the name "leones," or lions, in language that mirrors Book of Mormon usage: "They came to meet us *like* fierce lions," and "Great bands . . . attacked us fiercely, like brave lions."[51] Other examples might also be given. The point is that the animals mentioned in this metaphorical manner must have been familiar to those who were hearing the preaching or reading the record. In other words, these were animals that most likely lived in the area and interacted with the peoples there. This same inference has often been made with animals given by name in the Bible.

Direct Mention of Animals in the Book of Mormon

The mammals spoken of in the book of Ether are cattle, oxen, cows, sheep, swine, goats, horses, asses, elephants, cureloms, and cumoms (9:18–19). Those listed in 1 Nephi, which were already present in the promised land when the Lehites first arrived, are cow, ox, ass, horse, goat, and wild goat. Both lists of animals are obviously incomplete. Regardless of the location of Book of Mormon lands, there had to be far more kinds of animals there than those specifically listed in the text. Perhaps the record keepers, especially Mormon and Moroni, chose to directly reference only the animals they thought important or useful. Ether 10:26 states that the Jaredites "did make all manner of tools with which they did work their beasts." This suggests that the Jaredites were able to work some of their animals with plows or other such contrivances to grow crops. Verse 25 of the same chapter also states, "And they did make all manner of tools to till the earth, both to plow and to sow, to reap and to hoe, and also to thrash." What animals did the term "beasts" have reference to in verse 26? Based on those listed in Ether 9:18–19, they might include oxen and cows, the horses and asses, elephants, and probably cureloms and cumoms. These latter two animals,

51. Bernal Diaz, *The Conquest of New Spain,* trans. J. M. Cohen (London: Penguin Books, 1963), 327, 305, 395. For additional examples, see Fray Diego Duran, *The History of the Indies of New Spain,* trans. Doris Heyden (Norman: University of Oklahoma Press, 1994), 426. "Throughout his manuscript Duran mentions leones and tigres when he means jaguars, ocelots, pumas, wildcats, and mountain lions." Duran, *History of the Indies,* 207 n. 6.

along with the elephant, were deemed especially useful, and it is implied that they were even more useful than horses. The elephant, for example, is currently used in Southeast Asia for logging and as a beast of burden, and in Thailand, the elephant has been used since ancient times to plow paddy fields.

In the records of the Nephites and Jaredites, it is acknowledged that there were other animals of use to humans, though they are not mentioned directly. In Ether 9:18, the comment is made, "and also many other kinds of animals which were useful for the food of man." And 1 Nephi 18:25 informs us, "and all manner of wild animals, which were for the use of men." In each record, we see that there were many unnamed useful animals. No mention is made of the kinds of animals that were not useful.

Discussion of Specific Animals in the Book of Mormon

Certainly, problems exist in correctly identifying the animals listed in both the Jaredite and Nephite records. John Sorenson felt that some of the animals mentioned in the Book of Mormon might not be what we think. But he did say, "Present knowledge of the species in Mesoamerica indicates there were enough of the right sorts of animals in that setting that all twelve of the Book of Mormon's beasts can be plausibly accounted for."[52]

It is unfortunate that the record of Ether does not give us more information on the specific kinds of animals the Jaredites brought over on the barges with them. We are only introduced to some types of animals after the Jaredites had lived in America for a long period of time, and some of these might well be animals that were native to the promised land. All we know for certain about the transported types is given in the statement that the Jaredites "also [took] food for their flocks and herds, and whatsoever beast or animal or fowl that they should carry with them" (Ether 6:4). We do know that the number of the vessels used to transport the people along with their belongings, food, and animals was eight (Ether 3:1). The size of the barges is unknown, other than that they were said to be the length of a tree (Ether 2:17).

Determining which animals the Jaredites brought with them from the Old World and which ones they found living in America presents some complex problems. Comparing animal names in the Jaredite record with usage in the Bible can be helpful. Sheep, goats, swine, and even cattle,

52. Sorenson, *Ancient American Setting,* 291.

horses, and asses could all have conceivably been brought with them in the barges. Conversely, all these types of animals could have been found by the Jaredites upon their arrival in America. The term "flocks" used in Ether (6:4) probably referred to sheep and goats. These Jaredite flocks could also refer to types of birds like geese, though this seems less likely. "Flocks," as used in the Old Testament, does not include birds as the term does now, and the Book of Mormon seems to distinguish "beasts" from "fowl" (Ether 2:2; 6:4; Alma 34:10). The term "herds" probably included just cattle. While this term could mean horses and asses, it doesn't seem to fit with Old Testament usage. In addition to "flocks" and "herds," the statement is made, "and whatsoever beast or animal or fowl that they should carry with them." Swine were probably among these animals (see Ether 9:18) and could have been brought over with the Jaredites. Although we don't know the sizes and numbers of the animals involved, "herds" has a certain connotation. If cattle, horses, and asses are included in the term, what numbers could be carried? Surely enough to ensure that breeding populations could be established and maintained once in the promised land. This certainly would mean more than one male and female of each species. A few of each sex would have been wise. Concerning the larger animal species, probably younger individuals were chosen in order to conserve limited space. Younger animals would also require less food. With the above factors in mind, cattle, sheep, goats, swine, asses, and horses could all have conceivably been brought over on the barges. While very unlikely, it might have been possible to even bring over very young elephants. Their size and food requirements are what make this occurrence so unlikely. Whether any of the animals discovered by the Nephites (1 Ne. 18:25) were descendants of those known to the Jaredites is unknown.

Both paleontologists and archaeologists have found and are finding more associations of animals with humans in early cultures. Most of these animals are extant species. However, there are instances of extinct animals being associated with pre-Columbian humans in America. These finds are increasing as more field studies take place.[53]

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53. For example, see Martin, *Twilight of the Mammoths,* 250; Arroyo-Cabrales and Alvarez, "Preliminary Report of the Late Quaternary Mammal Fauna," 262–72; Mario Pichardo, "Redating Iztapan and Valsequillo, Mexico," *Radiocarbon* 42 (2000): 305–10; Mario Pichardo, "Valsequillo biostratigraphy III: Equid Ecospecies in Paleoindian Sites," *Anthropologischer Anzeiger Jahrgang* 56 (2000): 275–98; Sorenson, *Mormon's Codex,* 313–14; Schmidt, "La

Cows, Oxen, and Cattle

Cows and oxen are mentioned among both the Jaredites and the people of Lehi (1 Ne. 18:25; Ether 9:18). These animals could be the ones we envision with these names today, or the names could possibly apply to closely related forms of these animals. The terms "cow" and "ox" might refer to distinct species. As Sorenson noted, some early Spanish explorers in America called the bison or American buffalo *vaca,* which means "cow" in Spanish.[54] Hernando De Soto, Francisco Coronado, Cabeza de Vaca, and their contemporary Spanish explorers referred to American bison as "cattle," "cows," and "bulls."[55] In Finland and Sweden, even reindeer have been called "cow" and "ox" in the past. The word translated as "wild ox" in the King James Version of Deuteronomy 14:5 has been interpreted by some translators as gazelle, antelope, or some other species of deer.[56] In any event, good evidence exists for separate types of bovids being present in ancient America. Different kinds of these animals may have been brought over by the Jaredites. However, in the book of Ether (9:18), it is simply stated long after they were in the New World that they had "all manner of cattle, of oxen, and cows." The text does not say if these were Old World species introduced by the Jaredites or if these were native to the land of promise. Much later, as Lehi and his group journeyed in the wilderness, they encountered "both the cow and the ox" among the beasts of the forests (1 Ne. 18:25). Again, it is possible these terms refer to the American bison, which apparently survived

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entrada del hombre a la Peninsula de Yucatán," 245–61; and Miller, *"Mammut americanum,"* 168–83.

54. Sorenson, *Ancient American Setting*, 294; Sorenson, *Mormon's Codex*, 315.

55. Enrique Pupo-Walker, ed., *Castaways: The Narrative of Alvar Núñez Cabeza de Vaca*, trans. Frances M. López-Morillas (Berkeley: University of California Press, 1993), 63, 101; Lawrence A. Clayton, Vernon James Knight Jr., and Edward C. Moore, eds., *The De Soto Chronicles: The Expedition of Hernando de Soto to North America in 1539–1543,* 2 vols. (Tuscaloosa: University of Alabama Press, 1993), 1:241, 304; Gloria A. Young and Michael P. Hoffman, eds., *The Expedition of Hernando de Soto West of the Mississippi, 1541–1543: Proceedings of the De Soto Symposia 1988 and 1990* (Fayetteville: University of Arkansas Press, 1993), 117–18, 127–28; Pedro Casteñeda, *The Journey of Coronado* (Ann Arbor, Mich.: University Microfilms, 1966), 41, 140–41, 177; Richard Flint, *Great Cruelties Have Been Reported: The 1544 Investigation of the Coronado Expedition* (Albuquerque: University of New Mexico Press, 2002), 147.

56. Edward R. Hope, "Animals in the Old Testament—Anybody's Guess?" *Bible Translator* 42 (January 1991): 128, 132.

Figure 1. Wild cattle include living and extinct species of bison as well as other extinct but closely related types. Shown here are two extinct species, *Bison latifrons* (left) and *Bison antiquus* (right). Illustration courtesy of the George C. Page Museum in Los Angeles, California.

throughout various regions of Mexico and as far south as Nicaragua until fairly recent times.[57]

Different species of bovids are and have been native to the New World. The bison (often misnamed buffalo) is one, for which there are different species (fig. 1). Also, although now extinct, the shrub-ox and southern woodland muskox could have survived well past the end of the Pleistocene. Remains of the shrub-ox were found in a cave in Mexico and assigned to the late Pleistocene, though they have not been subject

57. Manuel Maldonado-Koerdell, "The Status of Ethnozoologic Studies in Meso-America," *XXXV Congreso Internacional de Americanistas: Mexico* (México: Editorial Libros de México, 1962), 3:133. See also Howel Williams, *Geologic Observations on the Ancient Human Footprints near Managua, Nicaragua* (Washington, D.C.: Carnegie Institution of Washington, 1952), 28; Doris Stone, *Pre-Columbian Man Finds Central America* (Cambridge: Peabody Museum Press, 1972), 21–22; Alan L. Bryan, "New Light on Ancient Nicarauguan Footprints," *Archaeology* 26 (April 1973): 147.

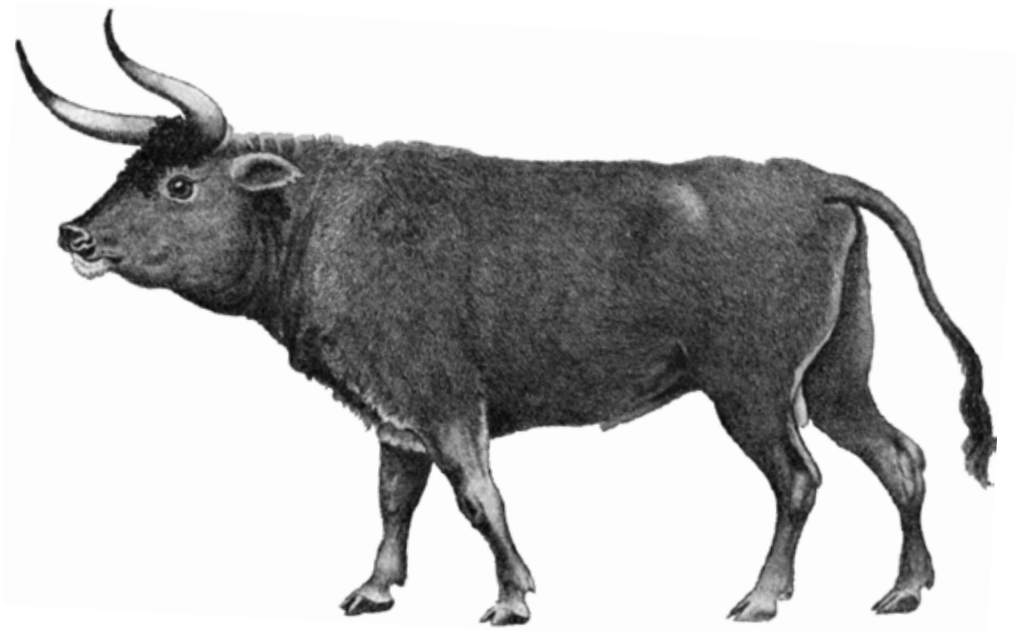

Figure 2. *Bos taurus* is a basic type that represents cattle in general and is apparently the species from which most of our modern cattle descended. Its remains have been identified from a number of archaeological sites, including some from the Yucatan Peninsula. Illustration courtesy of Wikimedia Commons.

to radiocarbon dating.[58] One of the authors (Miller) has examined the skull of this oxlike animal from southern Mexico and determined that this species may have survived into Book of Mormon times.[59] When first described by paleontologists, these animals were placed in the same genus (*Bos*) as modern cattle. Current practices show that the American bison can be semidomesticated. Certainly, it is conceivable that both the woodland muskox and shrub-ox were capable of domestication as well. This is substantiated by some living northern muskoxen that have been semidomesticated.

Bones of domesticated cattle (*Bos taurus,* fig. 2) have also reportedly been found in different caves in the Yucatan Peninsula of Mexico.[60] In one instance, these bones were found with those of an extinct horse, *Equus conversidens.* It is especially interesting that along with these cow and horse remains, human artifacts were found in association with

58. Arroyo-Cabrales and Polaco, "Caves and the Pleistocene Vertebrate Paleontology of Mexico," 286–87.

59. Oscar Carranza-Castañeda and Wade E. Miller, "Rediscovered Type Specimens and Other Important Published Pleistocene Mammalian Fossils from Central Mexico," *Journal of Vertebrate Paleontology* 7 (September 1987): 339–41. Bison remains were also discussed.

60. Hatt, "Faunal and Archaeological Researches in Yucatan Caves," 1–42.

them. This indicates that domesticated cattle and horses coexisted with humans in pre-Columbian time.[61]

Swine

Swine are mentioned among those animals known to the Jaredites that were "useful for the food of man" (Ether 9:18). All references to swine in connection with the Nephites are negative and proverbial, which indicates that they were known to them but were considered unclean or unfit for eating, at least in times when the Nephites were keeping the law of Moses (3 Ne. 7:8; 13:6). They may also have been familiar with swine through their contacts with the Lamanites and other indigenous peoples who raised and kept them. No evidence shows that Old World pigs (true swine) were present in the Americas before the time of Columbus. If we assume swine were brought over by the Jaredites, we still do not know how long they might have survived before becoming extinct. If they existed in limited numbers in a restricted region, any evidence of them might not have been detected yet. The widespread and intense battles between different Jaredite factions could have been instrumental in the swine's demise in Mesoamerica.

Another reasonable possibility is that references to "swine" do not denote an Old World species at all, but rather American peccaries.[62] While not a true pig, the peccary (fig. 3), known throughout much of Mesoamerica and South America, is most definitely a piglike beast and is closely related to it. The early Spanish who encountered them called them "pigs." In regions of Mesoamerica where peccaries are found today, they are almost always called "wild pigs," "wild hogs," or their equivalents in Spanish.[63] "The peccary," argues Lyle Sowls, "if properly treated, could perhaps become a domesticated animal."[64] Brian Dillon has recently summarized evidence that the Maya may have captured and

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61. Arroyo-Cabrales and Polaco, "Caves and the Pleistocene Vertebrate Paleontology of Mexico," 273–91.

62. Sorenson, *Mormon's Codex,* 319–20.

63. Lyle K. Sowls, *The Peccaries* (Tuscon: University of Arizona Press, 1984), 1–8, 105. Latcham notes that South American peccaries, which were called *puerco del monte* (mountain pigs) were according to some chroniclers "raised" in Peru and appear to have been tamed and kept by the Guarani. See Richard E. Latcham, *Los animales domésticos de la América precolombina* (Santiago: Imprenta Cervantes, 1922), 150–54.

64. Sowls, *Peccaries*, 105.

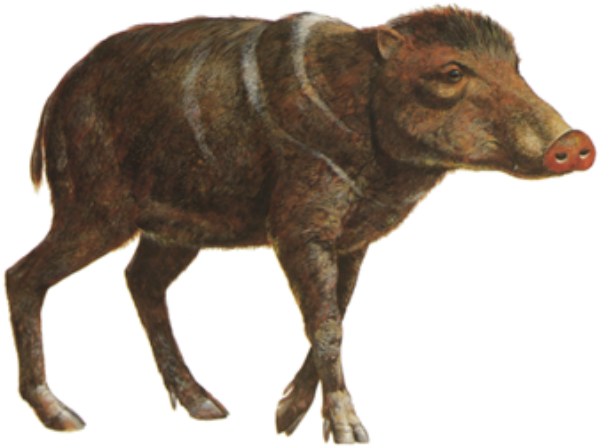

Figure 3. *Platygonus* is an example of an extinct peccary that might have been present when humans first came to Mesoamerica. It was somewhat larger than the peccaries that live in the region today. It can be seen that both types are very piglike, and they both could easily be called a pig. Illustration courtesy of the George C. Page Museum in Los Angeles, California.

tamed peccaries and concludes that it is "probable" that "the modern Maya pattern of peccary taming owes much to Precolumbian tradition."[65]

Presently, two distinct species of peccary live in Mesoamerica: the collared peccary (*Pecari tajacu*) and the white-lipped peccary (*Tayassu pecari*), both of which can be found in the tropical regions of southeastern Veracruz.[66] The Jaredites, who presumably established settlements in Mesoamerica, no doubt would have encountered them. The peccary was hunted and eaten as early as Olmec times. Remains of these animals have been found associated with humans for several thousands of years. There is a Paleo-Indian bone carving in the shape of a peccary, made from an extinct camel sacrum. A picture of this bone is shown in Evans's work.[67] The bone of this extinct camel came from deposits in central Mexico and indicates ancient interaction between this extinct animal and pre-Columbian natives. Remains of the pre-Columbian peccary have been found in Loltún Cave in the Yucatan[68] and in several other caves in the region containing human artifacts.[69] There is no question that peccaries and humans shared this area since prehistoric times.

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65. Brian D. Dillon, "Meatless Maya? Ethnoarchaeological Implications for Ancient Subsistence," *Journal of New World Archaeology* 7 (1988): 65.

66. A. Starker Leopold, *Wildlife of Mexico: The Game Birds and Mammals* (Los Angeles: University of California Press, 1959), 493–500.

67. Susan Toby Evans, *Ancient Mexico and Central America: Archaeology and Culture History* (London: Thames and Hudson, 2004), 70.

68. Arroyo-Cabrales and Alvarez, "Preliminary Report of the Late Quaternary Mammal Fauna," 266.

69. Hatt, *Faunal and Archaeological Researches in Yucatan Caves,* 1–42.

Sheep and Goats

Sheep and goats are very closely related animals and can be confused with each other.[70] As we have discussed, problems *sometimes* arise in understanding exactly how we should interpret references to Book of Mormon animals. It might not be wise to take all those named at face value, though most could well be the animals we think they are. Sheep mentioned in the Book of Mormon were probably like sheep in the Bible. Of course, many different species of sheep exist worldwide. The Jaredite record lists "sheep" by name (Ether 9:18). The Nephite record does not. However, it seems likely that the Nephites raised these animals. Whenever "flocks" are mentioned (for example, Enos 1:21 and Alma 17:27), it is generally understood that these are flocks of sheep. References to sheep among the people of Lehi appear in a metaphorical context too (for example, Alma 5:38; Hel. 15:13; and 3 Ne. 15:17).

In addition to Old World sheep, apparently brought to the New World by the Jaredites, there are sheep native to America. The most common type is the mountain sheep, *Ovis canadensis.* Their current geographic range extends south only to northern Mexico. However, their past range was more extensive before human settlements expanded.[71] Mountain sheep are animals that can be tamed or at least semidomesticated. According to Geist, "It is hard to imagine a wild animal more readily tamed than mountain sheep."[72] Sorenson noted the apparent recovery of sheep wool from a pre-Columbian burial site near Puebla (southeast of Mexico City).[73] Petroglyphs from Mexico and the southwestern United States show many prehistoric depictions of sheep. Sheep would have been useful to Book of Mormon peoples for both food and clothing.

Goats are mentioned among the animals once had by the Jaredites (Ether 9:18). Later, after their arrival in the land of promise, Lehi's family encountered "the goat and the wild goat" as they traveled in the wilderness in the land southward (1 Ne. 18:25). Sometime after the death of his father, Jacob, Enos wrote that the Nephites raised "flocks of herds, and flocks of all manner of cattle of every kind, and goats, and wild goats"

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70. Valerius Geist, *Mountain Sheep: A Study in Behavior and Evolution* (Chicago: University of Chicago Press, 1971), 1–7.

71. E. Raymond Hall and Keith R. Kelson, *The Mammals of North America* (New York: Ronald Press, 1959), 1031–32.

72. Geist, *Mountain Sheep,* 41.

73. Sorenson, *Ancient American Setting,* 296–97.

(Enos 1:21). The text gives no indication that the Lehites brought goats with them to the land of promise; however, it is possible that the Jaredites included goats among the flocks and herds they brought with them over the sea (Ether 6:4). If so, it is possible that some of those encountered later by Lehi's people had descended from goats brought by the Jaredites. Goats would have been a useful animal to both the Jaredites and Nephites, just as they were for humans throughout the ages in the Old World. Evidence of goats associated with pre-Columbian humans has also been found in Yucatan caves.[74] It is not clear, however, whether this evidence is from a wild or a domesticated type of goat.

Mention of the "wild goat" may at first seem peculiar. What animal could this refer to? Biblical animals that could be eaten under the law of Moses included the "goat" and the "wild goat" (Deut. 14:4–5). In postbiblical Jewish literature, some writers distinguished between wild and domestic animals such as goats. Both were considered clean and could be eaten, but only the domestic variety was thought acceptable for sacrifice.[75] The variety that lived in the wild was hunted, while the tame animal was raised in flocks by the community. This literature, however, dates to centuries after the texts of the Hebrew Bible were first written and to a time after the destruction of the temple when the practice of animal sacrifice had been discontinued. We do not know if this later distinction between tame and wild goats was applied in earlier times. Another possibility is that when Lehi's group arrived in the land of promise, they encountered two different animals, one perhaps with long horns and one with shorter ones. Both of them were probably of comparable size to Old World goats. These might have been identified as "wild goats" and "goats," respectively, simply because the terms fit the vocabulary of migrating Book of Mormon peoples. A third option is that "goat" and "wild goat" referred to a domesticated and a wild variety of a single species (whether an actual goat or not). In this case, the Lehites' encounter with the domesticated animal would imply that the land, at the time of their arrival, was already populated by other indigenous groups (including Jaredite survivors who had previously tamed, husbanded, or domesticated the animal in question).

The only native wild goat in North America is the mountain goat, *Oreamnos americanus*. Its geographic range, though, currently only

74. Hatt, "Faunal and Archaeological Researches in Yucatan Caves," 29.

75. Jehuda Feliks, "Animals of the Bible and Talmud," in *Encyclopaedia Judaica*, 2d ed., 22 vols. (New York: Macmillian, 2007), 2:167.

extends south from southwest Alaska to the northwest United States. Even with a possible extended range for this animal during Book of Mormon time, it is extremely unlikely it got as far south as Mesoamerica. A closely related but extinct species is *Oreamnos harringtoni*. This goat did have a much more southerly distribution, extending into Mexico. While this goat might have survived long past the terminal Pleistocene along with other animals, there is not sufficient evidence yet for this.

Figure 4. The *Mazama americana,* or the red brocket deer, is a common mammal found in Mesoamerica. This animal could be easily confused with a goat. Its single "horn" on each side of the head is really an antler. Antlers are shed each year, while horns are not. Photo courtesy of Wikimedia Commons.

As indicated above, an animal name in the Book of Mormon could actually refer to a somewhat different animal but with a similar appearance. Diego de Landa wrote, "There is a certain kind of little wild goats, small and very active and of darkish color."[76] "There are wild goats which the Indians call *yuc*," according to the *Relación de Yucatan*. "They have only two horns like goats and are not as large as deer."[77] Fray Alonso Ponce also reported that there were "great numbers of deer, and small goats" in the same region.[78] These descriptions were applied by the early Spanish friars to the red brocket deer, *Mazama americana* (fig. 4). Unlike other deer, it has but a single goatlike horn—which is really an antler that is shed and regrown annually like those of other cervids.[79] In the Yucatan today, there is also a closely related gray brocket (*Mazama gouazoubria pandora*), which is smaller in size, lacks facial marks, and is gray to brown in color.[80]

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76. Alfred M. Tozzer, trans., *Landa's relación de las cosas de Yucatan* (Cambridge: Harvard University Peabody Museum, 1941), 203–4.

77. See Tozzer, *Landa's relación de las cosas de Yucatan*, 204 n. 1134.

78. Ernest Noyes, ed. and trans., *Fray Alonso Ponce in Yucatan, 1588,* Middle American Research Series Publication 4 (New Orleans: Department of Middle American Research, Tulane University, 1932), 307.

79. Sorenson, *Ancient American Setting*, 299.

80. Victoria Schlesinger, *Animals and Plants of the Ancient Maya* (Austin: University of Texas Press, 2001), 178–79.

Another possibility for the wild goat is the American pronghorn, indigenous to North America. It has one horn (single in females but bifurcated in males). Its scientific name, *Antilocapra,* means "antelope-goat." The pronghorn was and is abundant in much of western North America, with its present range extending into Mexico.[81] Historically, its range extended to just north of Mexico City.[82] A related genus, *Capromeryx,* had a geographic range farther south, well into central Mexico. While extinct, evidence of it appears in the latest Pleistocene sediments, and it could certainly have coexisted with man. This antilocaprid is smaller than the extant form of pronghorn but is more goatlike in appearance. If known to the Jaredites in the land northward, the pronghorn might well have been considered a goat. Since this animal was not known in the Old World, it is likely, when Book of Mormon peoples encountered it, they would have named it after a similar-looking Old World animal.

The Horse and the Ass

Like sheep and goats, the horse and ass are very closely related mammals. This can be seen in their biological classification, both belonging to the genus *Equus*. Equid fossils are among the most common and diverse of large vertebrates from the Pleistocene in North America, including Mesoamerica (fig. 5). One of the authors (Miller) has done many years of research in Mexico. This research has confirmed that equid and mammoth fossils are the most abundant types of vertebrate fossils from the late Pleistocene. Horses first came into being in North America and from there spread to the rest of the world through natural dispersals. The fossil history of the horse (and ass) shows that this animal was most numerous and varied in North America. It has not been satisfactorily explained why, after so much success here, they likely became extinct. After being reintroduced, horses did well in a feral state. Although it is commonly held that both the horse and ass became extinct in the Americas at the close of the Pleistocene (about ten thousand years ago), a growing body of evidence shows that at least some survived on this continent for much longer.

Some researchers have suggested that references to horses in the Book of Mormon could refer to other animals in the land of promise that had characteristics that in certain ways resembled those of the horse or the

81. Hall and Kelson, *The Mammals of North America,* 1022–23.

82. "Pronghorn, *Antilocapra americana*," San Diego Zoo Global, May 2009, http://library.sandiegozoo.org/factsheets/pronghorn/pronghorn.htm.

Figure 5. Horses were extremely abundant in all of North America prior to the close of the Pleistocene epoch, about ten thousand years ago. Photo courtesy of Wikimedia Commons.

ass.[83] Though this is possible, we believe it is most likely that the horse mentioned in the Book of Mormon was the horse as we know it. However, this does not mean that horses survived everywhere in the Americas or that they were numerous. There is a strong case for the survival of the horse well past the close of the Pleistocene epoch in the limited regions occupied by Book of Mormon peoples in the Formative Mesoamerican period. Therefore, the horses referenced in the Book of Mormon text seem plausible, although it is interesting to note that horses are not mentioned in the Book of Mormon after the time of Christ (3 Ne. 6:1). Horses possibly existed among the Nephites but were not mentioned later in the limited commentary of 3 Nephi; the subsequent disasters associated with the death of Christ (3 Ne. 8–10), coupled with wars and famines of later years (Alma 45:11; Mor. 2:8), may have led to their final extinction. If there were limited numbers of horses and asses in Nephite or Lamanite cultures, it would not be surprising that evidence for them could be difficult to find. The horse and the ass, along with other animals, dispersed more than once between Asia and North America via Beringia (a large, late Pleistocene land bridge that joined Asia with Alaska). The Beringia land bridge formed and reformed throughout much of the Pleistocene

83. Sorenson, *Ancient American Setting,* 295–96. Sorenson did not exclude the possibility of a late survival of the horse but offered the association with deer as a secondary alternative. One of the writers of this article (Roper) once suggested a possible correlation between the Mesoamerican Baird's tapir and the ass. Daniel C. Peterson and Matthew Roper, "*Ein Heldenleben?* On Thomas Stuart Ferguson as an Elias for Cultural Mormons," *FARMS Review* 16, no. 1 (2004): 202–4. The present article reflects his current view.

epoch as sea levels fell and rose. Because of this land bridge, the two continents shared some mammal species.[84] Some of these species adapted to their new environments, resulting in new species. The horse was one of these animals so affected. Similarity between new and old species of horses has caused and still does cause confusion as to which species existed at different time periods.[85] For instance, horses reintroduced by the Spaniards would be difficult if not impossible to distinguish from native forms based on discovered bones and teeth. If the Jaredites did bring horses to America from Asia, it is unlikely that they could be distinguished from those that came through natural dispersals. According to Azzaroli, a noted expert on Pleistocene horses, *Equus ferus* (a modern caballine horse) was widespread in the Pleistocene of Eurasia and well represented in North America during the latest Pleistocene.[86]

It seems reasonable to assume that the Jaredites had domesticated horses. Certainly, horses were present among the Nephites and Lamanites (Enos 1:21; Alma 18:9). Their domestication by these peoples should not be surprising. The horse has been domesticated by various peoples for millennia, and new evidences keep pushing the date back. Outram and others, based on discoveries in eastern Europe and central Asia, placed this date to about 3500 BC,[87] which well predates the Jaredite record. An even earlier date was suggested by Achilli and others based on DNA.[88] If, as Nibley argued, the Jaredites journeyed through central Asia, this data could be relevant.[89] They surely would have seen the value of horses as they came across peoples using them. Whether they obtained horses along the way and brought these with them is not important. As noted above, horses native to America were most likely in existence then.

Regarding horses, a concept discussed earlier cannot be overstated: extinctions take time. Too often, nonspecialists have the impression

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84. See Prothero and Dott, *Evolution of the Earth*, 528–29.

85. Wade E. Miller and others, "Preliminary Report of Pleistocene Mammals from the State of Coahuila, Mexico," *Natural History Museum of Los Angeles County Science Series* 41 (2008): 346.

86. Augusto Azzaroli, "The Genus *Equus* in North America: The Pleistocene Species," *Palaeontographia Italica* 85 (1998): 1–60.

87. Alan K. Outram and others, "The Earliest Horse Harnessing and Milking," *Science* 323 (2009): 1332–35.

88. Alessandro Achilli and others, "Mitochondrial Genomes from Modern Horses Reveal the Major Haplogroups That Underwent Domestication," *Proceedings of the National Academy of Sciences of the United States of America* 109, no. 7 (2012): 2449–54.

89. Nibley, *Lehi in the Desert,* 183–98.

that extinctions occur very suddenly. Almost always, however, the extinction of organisms takes place over thousands to hundreds of thousands of years. Some plants and animals thought to be extinct turn out to still be living even millions of years later. Until the past few decades, almost all researchers on the subject believed that the majority of North America's large mammals became extinct at the end of the Pleistocene. This, of course, excludes modern species of the bison, elk, moose, and bear. New finds, however, show that proboscideans and horses, thought to have become extinct at the end of the Pleistocene, actually lived on far past the ten-thousand-year limit that earlier scholars had placed on them. In the past few decades, an ever-increasing body of evidence shows that some of these species survived much longer. It should be kept in mind, though, that these animals were restricted to various refugia. In time, as the refugia disappeared, the animal finally became extinct. As noted above, the woolly mammoth, thought to have been extinct by the close of the Pleistocene, survived much longer on Wrangle Island, northwest of Alaska. Radiocarbon dates reveal that this animal was still living until approximately 2000 BC.[90] Proboscideans and horses also survived past the terminal Pleistocene much farther south in North America, extending into Mesoamerica. Of course, their populations were ever dwindling.

One reason more is not known about the horse and other extinct animals in Mesoamerica is that their remains are much less likely to be preserved there than in more arid environments and also less likely to be found even when they are preserved. In general, as noted above, organisms do not preserve well in subtropical and tropical environments because of a high rate of decay. Even bone decomposes very quickly. Another problem is that in these environments thick vegetation usually covers sediments that might contain fossils, making the fossils extremely difficult to find when they do exist. One exception is caves. The caves found in the Yucatan Peninsula, for instance, have produced some rare and important finds. Both extinct and extant faunas have been discovered in these caves along with human artifacts.[91]

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90. K. A. Arslanov and others, "Consensus Dating of Mammoth Remains from Wrangle Island," *Radiocarbon* 40 (1997): 289–94; S. L. Vartanyan and others, "Radiocarbon Dating Evidence for Mammoths on Wrangle Island, Arctic Ocean, until 2000 BC," *Radiocarbon* 37 (1995): 1–6.

91. Arroyo-Cabrales and Alvarez, "Preliminary Report of the Late Quaternary Mammal Fauna," 263–64.

Reliable evidences for ages of post-Pleistocene to pre-Columbian horses in America are admittedly few. Nevertheless, more continue to be discovered over time. Archaeologists in Alaska recently discovered horse remains with DNA material that dated to 7,600 years before present, showing that "small populations of these megafaunal species persisted well into the Holocene [the current geological epoch] in northwestern North America."[92] Horse teeth, which remain undated, discovered in a cave in the Yucatan, were said by Clayton Ray to be pre-Columbian in age. These teeth were reported to be part of a large collection made near Mayan ruins at Mayapan. Additional extinct horse remains from another cave were identified as *Equus conversidens* and were found associated with pot shards and other artifacts of man.[93] At Loltún Cave in Yucatan, according to an article by Velázquez-Valadez, "a good number of bone instruments was found directly associated with remains of Pleistocene megafauna, principally the horse (*Equus conversidens*) and animals now extinct." An age of 1805 BC (± 150 years) was given in this article.[94] Other caves in Mexico have also yielded horse remains. At Cueva de Lara (Actun Lara), archaeologists found the bones of cow (*Bos taurus*) and other living animals from the region in association with the extinct horse (*Equus conversidens*). Researchers need to pursue further work and, where possible, obtain carbon-dating results for faunal remains, at these and other sites, since it is possible "that the sediments are from the Holocene and that the Pleistocene horse survived into historic time, as has been suggested from remains found in Loltún Cave and other sites in the Yucatán Peninsula."[95] Some of the radiocarbon ages given above demonstrate that the horse existed in North America during the time of both the Jaredites and the Nephites. Additional evidences for the late survival of the horse has been presented by Daniel Johnson, who showed the presence of horses with pre-Columbian humans in Mesoamerica.[96]

There are a few post-Pleistocene, pre-Columbian dates for horses that have come to light in the past several years. A recent discovery in southern California serves as an example. Philip Ireland reported,

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92. Haile, "Ancient DNA Reveals Late Survival of Mammoth and Horse in Interior Alaska," 22356.

93. Ray, "Pre-columbian Horses from Yucatan," 278.

94. R. Velázquez-Valadez, "Recent Discoveries in Caves of Loltún, Yucatán, Mexico," *Mexicon* (1980): 54.

95. Arroyo-Cabralles and Polaco, "Caves and the Pleistocene Vertebrate Paleontology," 283.

96. Daniel Johnson, "'Hard' Evidence of Ancient American Horses," *BYU Studies Quarterly* 54, no. 3 (2015): 149–79.

"Archaeologists working against the clock in Carlsbad have unearthed another nearly intact skeleton of a horse that may have lived and died 50 years before the Spanish began their conquest of California." This article further reported that remains of another horse and a burro (ass) were buried at the same level.[97] Archaeologist John Sorenson relayed two radiocarbon dates—2600 and 200 BC—for horses from Beringia.[98] In an unpublished article, three other pre-Columbian dates were given for horses. One was based on remains found in a cave near El Paso, Texas, and the date was determined to be between 6020 and 5890 BC. Another radiocarbon date was based on evidence from a cave in Colorado, identified as between AD 1260 and 1400. A third date, based on horse bone from a cave in the Yucatan, is between AD 1230 and 1300.[99] If these last ages and the one from Carlsbad, California, prove valid, they provide evidence that some horses still survived in western North America at the time Spaniards first reintroduced them in 1493.

Recently, one of the authors (Miller) received results from C-14 dating of horse fossils. This material came from his field research in Mexico. A date of 2,540 years before the present was provided by the Radiocarbon Laboratory at the University of Arizona. This would place the horse in Mexico during the time of the Nephites.

How many evidences it will take to convince the major body of scientists, especially paleontologists and archaeologists, to accept this new paradigm is unknown. However, there are more horse specimens from Mesoamerica for which the current authors are seeking additional radiocarbon ages. There is a need for more researchers to pursue work

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97. Philip Ireland, "Centuries-old Bones of Horses Unearthed in Carlsbad [CA]," *San Diego Union-Tribune,* July 17, 2005, http://www.sandiegouniontribune.com/sdut-centuries-old-bones-of-horses-unearthed-in-2005jul17-story.html.

98. Personal communication, John Sorenson to Wade E. Miller, 2007.

99. This was a report submitted to the Foundation for Ancient Research and Mormon Studies (FARMS) by Steven E. Jones and Wade E. Miller: "State-of-the-art Physical Analysis of Archaeological Finds and Historical Artifacts: Pre-Columbian Horses in the Americas, July 30, 2004," unpublished. For several years, FARMS provided partial funding for this project. According to the report, forty-nine samples were obtained and tested. Of these, eighteen resulted in radiocarbon dates, while thirty-one samples had insufficient collagen in the bone to permit dating. Of the eighteen successful dates, twelve were found to be post-Columbian, three dated to the last Ice Age. The remaining three yielded dates that were post-Pleistocene and pre-Columbian: Pratt Cave, Texas, 6020–5890 BC; Wolf Spider Cave, Colorado, AD 1260–1400; and Cozumel Island, Mexico, AD 1230–1300. There is some uncertainty as to whether the last sample was horse or cow.

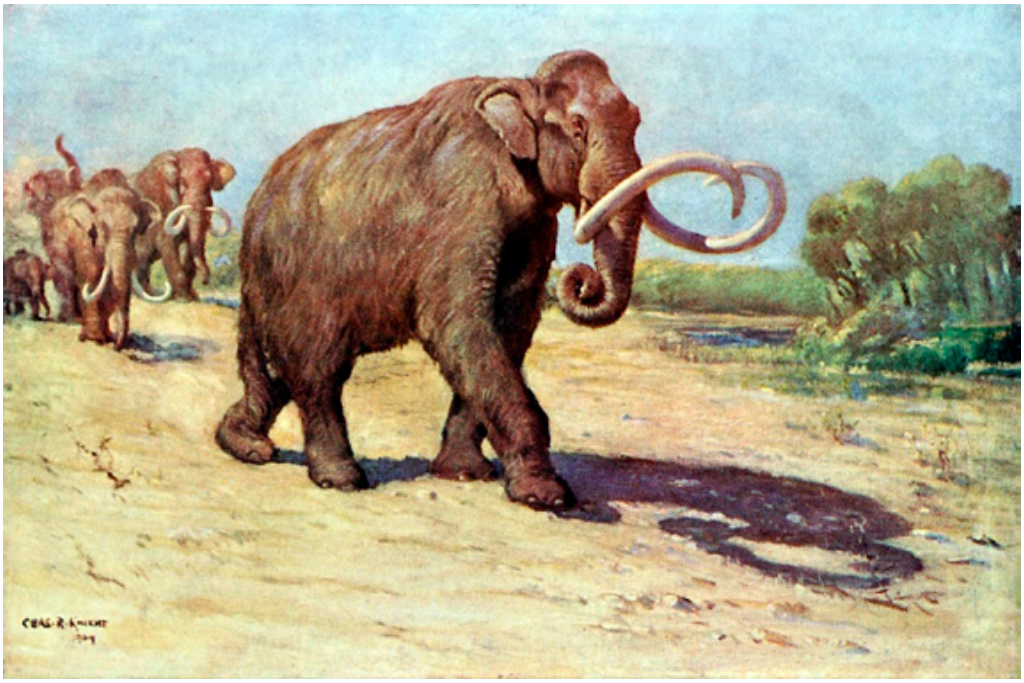

Figure 6. This illustration of a late Pleistocene scene in North America shows a small herd of Columbian mammoths, as drawn by Charles R. Knight, famous painter of prehistoric animals. Illustration courtesy of Wikimedia Commons.

on obtaining Holocene ages for equid specimens. A problem is that C-14 dating is expensive. Unless there is a very good reason to obtain this data, important specimens will probably continue to be overlooked.

Elephants, Cureloms, and Cumoms

The only references to elephants, cureloms, and cumoms in the Book of Mormon occur at an early point in Jaredite history (Ether 9:19). There are no subsequent references to these animals in the text, which could point to their extinction not long afterward. There is no indication that the people of Lehi were acquainted with these animals.

The most likely candidate for the Jaredite elephant is the Columbian mammoth (fig. 6), *Mammuthus columbi*. It was a true elephant, and its range extended over most of North America, including Mesoamerica. Although its fossils are found throughout northern Mesoamerica and are numerous,[100] the mammoth never did range as far south as South America. Many people think of the woolly mammoth, *Mammuthus*

100. Miller and others, "Preliminary Report of Pleistocene Mammals from the State of Coahuila, Mexico," 344–46.

primigenius, when they think of mammoths, but this species was limited to the northern areas of North America and Eurasia.

Evidence for the late survival of the elephant can be found in Native North American myths and traditions. Some of these may be rooted in Amerindian discoveries of the bones of extinct fauna, while other myths could be founded on actual encounters with living species that had notable elephant-like characteristics. Indigenous people along the northern coast of the Gulf of Mexico have traditions of giant beasts with long noses that could trample people and uproot trees.[101] Similar traditions have been documented for Native American groups from Canada to the Gulf of Mexico, persuading some scholars that these stories are based upon a core memory of actual historical encounters with elephant-like species that may have survived in the region as late as three thousand years ago. Based upon such traditions and other evidences, Ludwell Johnson concluded, "There can no longer be any reasonable doubt that man and elephant coexisted in America."[102]

Evidence of human and mammoth association have been found at a number of Mesoamerican localities.[103] Paul S. Martin reported that spear points have been associated with fossil mammoths at a number of sites, some still embedded in bones. Mammoth kill sites are known from Mesoamerica.[104] Martin also reported a spear shaft straightener made from a mammoth bone.[105] Several petroglyphs in Mesoamerica dating to ancient times depict elephant-like animals.

Along with a number of large mammals, mammoths were thought to have become extinct about ten thousand years ago. It is now known that the mammoth survived for a few thousand years longer. Mead and Meltzer provided an age of 4,885 years before the present for one

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101. John R. Swanton, *Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico* (Washington, D.C.: Government Printing Office, 1911), 355.

102. Ludwell H. Johnson, "Men and Elephants in America," *Scientific Monthly* 75 (1952): 216.

103. Joaquín Arroyo-Cabrales, Oscar J. Polaco, and Eileen Johnson, "A Preliminary View of the Coexistence of Mammoth and Early Peoples in México," *Quaternary International* (January 2006): 81–82.

104. Martin, *Twilight of the Mammoths,* 150.

105. Martin, *Twilight of the Mammoths*, 150–51; see also Mario Pichardo, "Valsequillo Biostratigraphy IV: Proboscidean Ecospecies in Paleoindian Sites," *Anthropologischer Anzeiger Jahrgang* 59 (March 2001): 41–60; Richard S. MacNeish and Antoinette Nelken-Terner, "The Preceramic of Mesoamerica," *Journal of Field Archaeology* 10 (1983): 71–84.

dated mammoth specimen.[106] The late Larry Agenbroad, a specialist on the mammoth, published a 2005 survey in which he states that more than two thousand mammoth localities have been reported for North America. Of these, less than 10 percent have been radiocarbon dated; but among those that have been dated, twenty sites are less than ten thousand years old. Two of these twenty sites yielded ages on the order of seven thousand years before the present, or about 5000 BC. These data, he notes, point to "the possibility that post-extinction, refugial populations [of mammoth] may have existed" in various regions of North America.[107]

These dates are recent enough to place the elephant in the time of the Jaredites. A date for a mammoth in northern North America was cited at 3,700 years before the present. An Alaskan mammoth was dated at 5,720 years ago.[108] As more mammoth (elephant) finds are made, even younger dates will no doubt arise. Generally, when animal species' populations decrease, they survive longer in southern refugia. Small populations of mammoths could have survived in Mesoamerica well past the close of the Pleistocene. The fact that known dates of mammoths in Mesoamerica are numerous up to the end of this epoch lends support to this view.

Of all the animals named in the Book of Mormon, cureloms and cumoms have to be the most peculiar and mysterious. While all the other animals are familiar to us, these two definitely are not. Apparently cureloms and cumoms were animals not known to Joseph Smith either. Quite possibly, these are extinct forms. Although we do not have all the details regarding Joseph Smith's translating procedures, he most likely transliterated certain words—those with which he was unfamiliar. He seemingly did this with "cureloms" and "cumoms." What could these two animals have been? They had to be animals that lived in Book of Mormon lands, ostensibly in Mesoamerica, and during the time the Jaredites lived there. LDS archaeologist John Sorenson was of the opinion

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106. Jim I. Mead and David J. Meltzer, "North American Late Quaternary Extinctions and the Radiocarbon Record," in *Quaternary Extinctions: A Prehistoric Revolution,* ed. Paul S. Martin and Richard G. Klein (Tucson: University of Arizona Press, 1984), 440–50.

107. Larry D. Agenbroad, "North American Proboscideans: Mammoths: The State of Knowledge, 2003," *Quarternary International* 126–28 (2005): 84.

108. David R. Yesner and others, "5,700-Year-Old Mammoth Remains from Qagnax Cave, Pribilof Islands, Alaska," in Agenbroad and Symington, *World of Elephants,* 200–204.

that cureloms and cumoms were probably large animals.[109] This seems reasonable, since in Ether 9:18–19 they are grouped with the elephant and designated as being especially useful. This suggests they likely were beasts of burden. Using limited criteria, we will try to narrow the search for identification to the most probable animals.

One relatively large animal currently living in Mesoamerica (and also now living in South America and Southeast Asia), but doubtfully known to Joseph Smith, is the tapir. In the past, this animal had a much greater northward geographic range in North America. It lived all throughout Mexico and north well into the United States. At least one species of Pleistocene tapir somewhat exceeded the living form in size. Currently, a large tapir can grow to six hundred pounds or more and reach a height of three and one-half feet. The problem with this animal qualifying as a curelom or cumom is its usefulness. They are not noted as an especially good food item and, more importantly, are not easily tamed for use.

Another animal to consider is the American pronghorn (often mistakenly called an antelope). Its current geographic range is from Canada to central Mexico. They are occasionally tamed and sometimes even semidomesticated.[110] However, even if they were tamed, it is hard to imagine them being used for any serious type of work. There is apparently no record to support this. These animals, including extinct species, are deer-sized animals. Though known to live in northern Mexico, they apparently do not inhabit Mesoamerica proper. Rather, they tend to inhabit the plains.

The edentates, or xenarthrans as they are known scientifically, are a relatively diverse group of New World mammals. With the exception of the armadillo, which ranges into the southwestern United States, these animals presently live from Mesoamerica to South America. Anteaters and tree sloths belong to this group. All these animals are ones with which Joseph Smith would probably have had no acquaintance. While existing forms are all relatively small, many extinct species were large. The largest ground sloths, for example, reached eighteen feet in length and approached the size of a small adult elephant. Some of these ground sloths lived in Mesoamerica to the end of the Pleistocene and probably longer. In several localities, ground sloth hair and dung are abundant in caves, some with associated human artifacts. Additionally, ground sloth

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109. Sorenson, "Animals in the Book of Mormon," 41.

110. John Caton, *The Antelope and Deer of America* (New York: Forest and Stream, 1877), 51–56.

Figure 7. Two extinct species of llama (a type of camel) are shown here. Either could conceivably be a curelom or cumom. Both are known from Mesoamerica and probably existed when humans came into this region. Illustration courtesy of the George C. Page Museum in Los Angeles, California.

skin and nail materials have been found.[111] Even if these mammals had lived long enough to have been known by Jaredites, their role as a curelom or cumom is highly unlikely. Based on brain size (determined from endocranial dimensions of the skull), ground sloths would not likely have been sufficiently intelligent to train for work. Also, based on their foot structure, they walked on the back of their "hands" and "feet." The movement of these large beasts must have been very slow and awkward. With these factors in mind, it is difficult to see how they could have been useful animals to man.

So, what other Mesoamerican animals are left as candidates for the curelom or cumom? One good candidate, in our opinion, is a member of the camel family. The present New World members of this family are the llamas (fig. 7). We think it extremely doubtful that Joseph Smith

111. H. Gregory McDonald, "Sloth Remains from North American Caves, and Associated Karst Features," in Schubert, Mead, and Graham, *Ice Age Cave Faunas of North America,* 1–16.

would have known much about these animals in the early 1800s. In fact, knowledge of llamas was not widespread among the general public in North America until later in the 1800s. Would a llama, either an existing or recently extinct species, have been an "especially useful" animal to the Jaredites (Ether 9:19)? Quite likely they would have been. One of the authors (Miller) has done extensive paleontological field work in Mexico and has noted a number of sites with a joint occurrence of giant llamas and mammoths. This might explain why elephants were listed with cureloms and cumoms in the book of Ether (9:19).

Although llamas are no longer native to North America, extinct species were. And like other large mammals thought to be extinct by the close of the Pleistocene epoch, some probably lived on much longer. As evidence suggesting this proposition, an undated skull of a llama from a lava tube in Utah was recovered with dried muscle tissue intact and an oily residue in the bone.[112] This animal certainly survived the late Pleistocene extinction event. Several archaeological sites, including some in Mesoamerica, have yielded evidence of co-occurrences of llamas and man.[113] Dates recorded in North America showing the late survival of extinct species include 3,800,[114] 8,527, possibly 3,000,[115] 7,432,[116] and 7,400 to 8,200 years ago.[117] Petroglyphs in the American Southwest also show very llama-like animals. One of the authors (Miller) saw the figure of a llama carved in a stela from an archaeological site in central Mexico. Again, it should be emphasized that the last recorded date for an extinct animal does not mean it vanished from earth at that time. Undoubtedly, small populations survived for at least hundreds if not

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112. Alfred S. Romer, "A Fresh Skull of an Extinct American Camel," *Journal of Geology* 37 (1929): 261–67.

113. Arroyo-Cabrales and Polaco, "Caves and the Pleistocene Vertebrate Paleontology of Mexico," 273–91; Schmidt, "La entrada del hombre a la Península de Yucatán," 245–61; Cynthia Irwin-Williams, "Associations of Early Man with Horse, Camel and Mastodon at Hueyatlaco, Valsequillo" (Puebla, Mexico), in *Pleistocene Extinctions: The Search for a Cause,* ed. Paul S. Martin and Herbert Edgar Wright (New Haven: Yale University Press, 1967), 337–47.

114. Arroyo-Cabrales and Alvarez, "Preliminary Report of the Late Quaternary Mammal Fauna," 255–66.

115. Mead and Meltzer, "North American Late Quaternary Extinctions," 440–45.

116. George C. Frison and others, "Paleo-Indian Procurement of *Camelops* on the Northwestern Plains," *Quaternary Research* 10 (1978): 385–400.

117. Jim J. Hester, "Late Pleistocene Extinction and Radiocarbon Dating," *American Antiquity* 26 (1960): 58–77.

thousands of years after the current extinction date. Sorenson noted several examples of camelid-like figurines, which suggests a knowledge of such animals could have extended into Central America and Mesoamerica.[118] The first of these is a Costa Rican effigy vessel, dating between 300 BC and AD 300, which depicts an animal with a large bowl on its back. The animal resembles a llama.[119] The second is a stone figurine from Chiapas, Mexico, of an animal with a long, extended neck carrying what appears to be a large basket, which apparently dates to the post-Classic period. This latter figure could possibly represent a dog or a deer, but the extended neck is suggestive of a camelid.[120] These examples could indicate a knowledge of South American camelids among pre-Columbian peoples or perhaps the late survival of some form of camelid in these regions.

Some of the extinct llamas were considerably larger than living forms. One type stood seven feet tall at the shoulder, and another species six feet. Not only is there good evidence that American llamas and humans coexisted, but also that these animals could be domesticated. Anthropologist Ricardo Latcham stated that New World camelids (the llamas) were domesticated in pre-Columbian times.[121] Archaeologist Jane Wheeler claimed that the domestication of the llama in South America goes back several thousand years.[122] This would include the time of the Jaredites in America. As far as being an especially useful animal, consider how useful humankind has found the llama. As stated by one source, "It is easy to realize the importance of the llama to the Indian, as he utilizes it almost 100 percent, from its smallest hairs to its most insignificant droppings. Jerked llama meat nourishes the Indian; its woven fleece keeps him warm; its hide is made into the crude sandals with which he is shod; its tallow is used in making candles; braided, the long hairs serve him as rope; and the excrement, dried, constitutes a fuel."[123] Additionally, the

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118. Sorenson, *Ancient American Setting,* 295.

119. Michael J. Snarskis, "Stratigraphic Excavations in the Eastern Lowlands of Costa Rica," *American Antiquity* 41, no. 3 (1976): 348, 350, fig. 6.

120. Franz Termer, "Antigüedades de 'La Violeta,' Tapachula, Chiapas," *Estudious de cultura Maya* 4 (1964): 90–91, fig. 8.

121. Latcham, *Los animales domésticos de la América precolombiana,* 7–8.

122. Jane Wheeler, "Evolution and Origin of the Domestic Camelids," *Rocky Mountain Llama and Alpaca Association ILR Report* 8 (2003): 1–14.

123. Ernest P. Walker and others, *Mammals of the World,* 2d ed., rev. and ed. John L. Paradiso (Baltimore: Johns Hopkins Press, 1968), 1377.

Figure 8. *Cuvieronius,* or gomphothere, is also a good candidate for a curelom or a cumom. It has been associated with man in Mesoamerica. Illustration courtesy of Wikimedia Commons.

llama makes an excellent beast of burden, and its pelt is used for blankets and outerwear. It has also been shown that llamas are good at guarding flocks. All these factors make the llama an extremely useful animal for humans. This would have been especially true with the larger size of the extinct llamas. It seems to us that this animal could well be either the curelom or cumom mentioned in the book of Ether.

If the llama in fact represents a curelom or cumom, what could the other one be? Again, it has to be an animal that lived in the right place at the right time. And it also must be an animal especially useful to humans. Although now extinct, two viable candidates are related to the elephant. They belong to the same group (order Proboscidea). The two species superficially look quite similar but have long, separate histories. One is a gomphothere with the genus name of *Cuvieronius* (fig. 8), and the other is named *Mammut,* the American mastodon (fig. 9). Like the elephant, both the gomphothere and the mastodon are very large animals having tusks and a proboscis, or trunk. Both were intelligent animals, based on the size and configuration of their braincases as determined from fossils. Consequently, they were likely capable of being tamed and trained, but probably not domesticated. One or even both of these could qualify as a curelom or cumom. This is a distinct possibility. But if the llama is one of these animals, then we would probably need to choose between the gomphothere and the mastodon for the other. This is not an easy choice to make. However, there is a possibility, with such similarity in appearance, that these animals might have been called by the same name (curelom *or* cumom). As an example among living proboscideans, both the Asian and African forms go by the same general name, "elephant," despite belonging to two separate genera.

The gomphothere and the mastodon coexisted into the late Pleistocene in Mesoamerica, with the former being more common in the southern part of this land and the latter in the more northern part. In

Figure 9. The American mastodon (*Mammut americanum*) is a distant "cousin" of the mammoth, since both proboscideans have long, separate histories. Because of its clear association with humans in Mesoamerica, it is a candidate for either a curelom or a cumom. Illustration courtesy of Wikimedia Commons.

fact, the gomphothere is fairly well known in South America, where there is no record of the mastodon. Not as much is known about the age and distribution of the gomphothere in North America, however.[124] The American mastodon has several dates placing its terminal existence well past the close of the Pleistocene.[125] There is also evidence of some associations with this animal and humans.

Regarding the usefulness of either the American mastodon or the gomphothere, both would have made a good beast of burden that could move large objects. They possibly rivaled the elephant (mammoth) in

124. Marisol Montellano-Ballesteros, "New *Cuvieronius* Finds from the Pleistocene of Central Mexico," *Journal of Paleontology* 76 (2002): 578–83.

125. Pichardo, "Vasequillo Biostratigraphy IV," 41–60; Oscar J. Polaco and others, "The American Mastodon: *Mammut americanum in Mexico*," in *The World of Elephants: Proceedings of the 1st International Congress, Rome, Italy (2001)*, ed. G. Cavarretta, P. Gioia, M. Mussi, and M. R. Palombo (Rome: Consiglio Nazionale delle Ricerche, 2001), 237–42; Miller, "*Mammut Americanum*, Utah's First Record of the American Mastodon," 168–83; Mead and Meltzer, "North American Late Quaternary Extinctions," 440–45.

this role. While the mastodon was shorter, it was also stockier. Other potential uses for either proboscidean would be similar to the elephant as well: meat for food, leather for footwear or outerwear, tallow from fat for candles, droppings for fuel, ivory for tools and objects of art, along with other possible utilizations. That the elephant and mastodon were used for food has been shown by various prehistoric kill sites. At one such site, a projectile point was found embedded in a mastodon rib.[126]

Though it may never be known which animals are the ones designated as cureloms and cumoms by the Jaredites, we have listed some likely candidates. That humans in pre-Columbian times were associated with extinct llamas, elephants, mastodons, and gomphotheres is a matter of record. That the non-elephants in this group could represent a curelom or cumom is a distinct possibility.

Summary

We again emphasize that the Book of Mormon is primarily meant to provide another testament of Christ and to proclaim his doctrines. Additionally, though, there is a significant amount of information provided about what the peoples in this book did and the environment in which they lived, including some of the animals with which they interacted, which gives us a deeper look into their lives.

Various lines of evidence based on geography, geology, archaeology, climate, and more point to an area in Mesoamerica as the place where Book of Mormon events occurred. The fossils known from the area are also compatible with this view. Doubts regarding the historicity of the Book of Mormon, however, have arisen for many since horses, elephants, and other animals listed in the Book of Mormon were thought to be extinct in North America long before the record was written. Continuing research, on the other hand, shows that in fact many of these animals may have lived into Book of Mormon times. During the past century, a number of animals and plants once thought to have become extinct much earlier in time lived hundreds, thousands, and even millions of years later. Populations of organisms in decline, for several reasons, leave a diminishing fossil record. These population declines were occurring, for example, immediately prior to the time of Book of

126. Carl E. Gustafson, Delbert Gilbow, and Richard D. Daugherty, "The Manis Mastodon Site: Early Man on the Olympic Peninsula," *Canadian Journal of Archaeology* 3 (1979): 157.

Mormon events, and it became pronounced with large mammals, especially during the terminal Pleistocene (Ice Age) and Holocene (current geological epoch). Even so, fossils of horses, elephants, mastodons, and other animals that may relate to the Book of Mormon have been uncovered in Mesoamerica and may date to the time period covered in that. We conclude that once all the facts are known, the scientific record will not conflict with the scriptural one.

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