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Appendix A: Impact of Fossils

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Abstract: Miller gives a short discussion about the importance and impact of fossils in science, especially in helping to change previously held views.

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Appendix A

Impact of Fossils

Thomas Jefferson is well known as one of the founding fathers of the United States of America. A man of many accomplishments, he is also renowned for his keen intellect. However, few people realize his role in paleontology. Jefferson was one of the earliest men of note in our nation to give a scientific paper about a fossil. His paper concerned bones of the now extinct giant ground sloth (discussed in Chapter 11 of this book), and was presented before the American Philosophical Society of Philadelphia. It was published by this society in 1799. While ground sloths were not understood for what they were at the time, or even that they were actually extinct, Jefferson requested that Lewis and Clark be on the lookout for such a living beast on their famous expedition. As president, Jefferson maintained a modest collection of fossils in the White House. His collection also included many teeth and bones of mastodons. Lewis and Clark were told to search for this animal too, as Jefferson thought that the mastodon might still be living as well.

It was not until the latter part of the 18th Century and early part of the 19th Century, that most scientists came to agree on what fossils actually represented. Earlier than this it was thought that they were just "freaks of nature" as they were commonly called. Moreover, a majority of scientists during this time, often known as natural philosophers, were deeply religious. It was argued among

them that to acknowledge fossils as extinct forms of life on earth, was to suggest that God was imperfect. The thinking was that if there were extinct life forms, then God's creations were not perfect, and therefore He could not be perfect either! This type of thinking of course was not just false, but it held back the progress of science. Only later in the 1800's were advances made in science relative to fossils and their true nature. They have conclusively been shown to represent ancient life on earth.

Many types of fossils have significantly helped to establish the earth's antiquity. They have also helped to date various geologic events such as when mountains and oceans formed. Fossils have given us a valuable window into the past, showing what types of life existed on earth, and when. Dinosaurs and other kinds of extinct organisms are only known from fossils. Fossil fuels are another very important aspect of past life on which we depend. They were certainly part of God's plan in providing for our needs.

My many years as a geologist/paleontologist have shown me that a number of unexpected finds of fossils in various rock layers, at different times, and in different parts of the world, have caused scientists to modify earlier held views. This is important because it relates to Book of Mormon animals and when they lived. There is no doubt, though, that many types of plants and animals that once lived on our earth are now extinct. Numerous examples could be provided. However, ones relating to Pleistocene (Ice Age) extinctions are those most relevant to animals mentioned in the Book of Mormon. It is important to keep in mind that when it comes to extinctions, new discoveries can change old beliefs.

Pleistocene extinctions are actually ones which are of importance regarding Book of Mormon peoples. This is because

certain animals mentioned in this Book, and thought to have been extinct long before the period of time represented, might actually have survived until Book of Mormon peoples arrived in America. For many, many years paleontologists have been convinced that most of America's large mammals (along with certain other life forms) became extinct 10,000 to 12,000 years ago. Examples include the mammoth, mastodon, camel, horse, giant ground sloth, saber-tooth cat, and giant lion to name but a few. However, as more and more fossils have been found and dated, it has become clear that some of these animals lived on much longer than had previously been thought. At first these more recent ages, ones showing some animals lived on much longer than expected, were considered erroneous. They did not fit the established pattern.

Fortunately, science is about continually questioning and testing, and accepting new ideas when there is good evidence for them. Now there are many dates that have been run on certain extinct animals. These dates show that they lived long after the end of the Pleistocene, and more and more scientists are accepting these dates. Some of the ages obtained are not yet published, including ones where I have had a part. One which I have published involves two partial mastodon skeletons that were collected in Utah. The Carbon-14 age obtained for these animals show them to be close to 7,000 years old (Miller, 1987, p. 180). It is one of the youngest ages ever recorded for the American mastodon. Young as these mastodon fossils are by geological standards, they certainly would not have represented the last two living ones in America. And this holds true for any extinct species of any age.

What happens as unfavorable environmental conditions persist for plants and animals is that their numbers dwindle. In the

case of Pleistocene mammals, changing conditions would cause them to seek areas still favorable to them, allowing them to survive there. As these areas became ever more restrictive, their numbers would continue to decrease. Finally a breeding population could no longer be maintained, and the species would then go extinct. Before extinction occurred, though, there would possibly be some individuals that might be fossilized. But the greatly reduced numbers of individuals would mean very few if any fossils would later be available for discovery[10]. They might go undetected for very long periods of time.

So it's certainly possible, even likely, that small populations of now extinct animals lived on for hundreds, or even thousands of years after the most recent fossil of their kind was dated. This helps explain why occasionally younger-aged fossils of a particular species are discovered. The fact that the last remaining animals of a given species would probably be living in a relatively small area (or areas) further diminishes the chance of finding their fossils. And finding a fossil that represents the last of its kind, would be millions of times less likely than winning the lottery! Nevertheless, with more and more searching for fossils, as is now going on at an accelerated rate, chances of finding rare fossils has improved. With this in mind, it should not be a surprise that Book of Mormon peoples could have known as well as tamed or domesticated now extinct animals.

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[10] Examples of this situation occur at the famous Rancho La Brea Tar Pits in Los Angeles, California. I have studied many of the fossils from this site off and on for over 40 years. Although more than one million bones have been recovered from Rancho La Brea, only three are known from a single tapir. Just 12 bones represent a species of llama. Obviously these animals were not common to the immediate area, but nevertheless the evidence does show their presence there. If these few bones had not been found, it would have been thought that the tapir and llama did not exist here.