

The Bow and Arrow in the Book of Mormon

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The distinctive characteristic of missile weapons used in combat is that a warrior throws or propels them to injure enemies at a distance.¹ The great variety of missiles invented during the thousands of years of recorded warfare can be divided into four major technological categories, according to the means of propulsion. The simplest, including javelins and stones, is propelled by unaided human muscles. The second technological category – which uses mechanical devices to multiply, store, and transfer limited human energy, giving missiles greater range and power – includes bows and slings. Beginning in China in the late twelfth century and reaching Western Europe by the fourteenth century, the development of gunpowder as a missile propellant created the third category. In the twentieth century, liquid fuels and engines have led to the development of aircraft and modern ballistic missiles, the fourth category. Before gunpowder weapons, all missiles had fundamental limitations on range and effectiveness due to the lack of energy sources other than human muscles and simple mechanical power. The Book of Mormon mentions only early forms of pregunpowder missile weapons.

The major military advantage of missile weapons is that they allow a soldier to injure his enemy from a distance, thereby leaving the soldier relatively safe from counterattacks with melee weapons. But missile weapons also have some significant disadvantages. First, a missile weapon can be used only once: when a javelin or arrow has been cast, it generally cannot be used again. (Of course, a soldier may carry more than one javelin or arrow.) Second, control over a missile weapon tends to be limited; once a soldier casts a missile, he has no further control over the direction it will take. Third, missile weapons are essentially ineffective as melee weapons. A man armed with only a bow cannot easily defend himself against a man with a sword or spear.

A missile weapon's relative effectiveness depends mainly on the weight, speed, and accuracy of the missile; the size and shape of the projectile point; and the strength of the target's armor protection. This statement is based on the assumption that all other variables are equal. Many additional variables can change the relative effectiveness of missiles. These include climatic factors (wind speed and direction, precipitation, and limited visibility due to walls, trees, fog, or dust), mobility (whether the target or the missile shooter are moving or stationary), the relative elevation of target and shooter, and the relative strength and skill of the shooter. With all other variables being equal, the missile with the highest ratio of weight, speed, and accuracy will be the most deadly.

Because of certain principles of aerodynamics, missiles tend to take two major shapes, spherical or cylindrical. There are some specialized exceptions to this general rule, such as certain types of throwing knives, boomerangs, and the discus, but these weapons are not mentioned in the Book of Mormon and have no direct bearing on this discussion. Spherical missiles generally tend toward the shape of a ball, varying mainly in size and weight. In the Book of Mormon, the only spherical-type missile is the stone. Cylindrical missiles come in a much wider variety. Arrows, javelins, and darts are the cylindrical missiles found in the Book of Mormon. This paper will limit discussion to the bow and arrow, leaving other Book of Mormon missile weapons for future study.

Background on Bows and Arrows

Because some parts of the following analysis of bows and arrows in the Book of Mormon involve a somewhat technical discussion, I will begin with a brief overview of the nature of bows, arrows, and archery.² At its most basic level, the bow consists of a wooden staff to which a string or cord is attached at both ends. When a soldier draws the string, the two ends of the staff are pulled backwards; when the soldier releases the string, the staff springs

back into its original position, swiftly pulling the string forward. Thus the available energy of human muscle power is first multiplied and stored in the bow and string and then released much more quickly and with more precision than is possible with the human hand and arm alone.

Bows have been made in many different shapes and sizes, from many materials, and with many methods of manufacture and use. The two major bow classifications are based on the method of manufacture: the *self bow* is made from a single piece of wood, and the *composite bow* is composed of many different materials (several types of wood, horn, and sinew) glued together and laminated.

Within these two categories are many specific types of bows, varying widely in relative efficiency. Variations in the bow size, composition materials, the skill of the craftsman, methods of construction, and method of use can all produce significant variation in a bow's relative efficiency. For example, if a bowstring weighs half of an ounce and an arrow one ounce, the string absorbs only about one seventh of the arm's energy. But if the string weighs three ounces and the arrow one ounce (as was the case in ancient Egyptian bows), the string absorbs about one half of the energy produced by drawing and releasing the string. In other words, all other things being equal, the first bow with the light bowstring will be almost twice as efficient (in range and penetrating power) as the second.³ String and arrow weight are only two of many possible variables that determine the relative efficiency of bows.

Arrows are a special type of missile designed to be propelled by bows. Because of the limits on the size of a bow that can be easily handled by a man, arrows are necessarily much smaller and lighter than the traditional javelin.⁴ Most arrows range in length from two to three feet and in weight from about one-half to two-and-a-half ounces.⁵ Bows thus fire a missile (arrow) that is lighter than a javelin and would do proportionally less damage to the target were it not for two additional factors. First, bows can propel light arrows at much higher velocities than human arms can propel javelins. This increased velocity gives the arrow additional power on impact, counteracting the javelin's greater weight. Second, efficient bows and arrows have much greater ranges than the javelin. Whereas the range of javelins tends to be under fifty yards, the English longbow achieved a maximum range of about 250-350 yards. Flight arrows (special lightweight arrows designed for distance shooting) shot from composite bows have flown up to 972 yards, the norm being about 300-400 yards.⁶

A final fundamental problem in ancient missile technology is that, to maximize penetration and damage to a target, a missile needs a pointed projectile head. The simplest form of projectile head is the sharpened end of the arrow. Various characteristics of arrow aerodynamics necessitate the use of fletching (that is, feathers attached to the bottom of the arrow shaft to help keep the arrow on a level flight path). Arrows without fletching can only be fired at very short ranges, since their flight path becomes increasingly inaccurate at longer ranges.⁷

Far from being simple weapons, bows and arrows are highly complex tools, with many different forms, qualities, and characteristics. Changes in particular characteristics create corresponding changes in the relative effectiveness of the bow and arrow as a weapon. The next section of this paper examines the question of the specific characteristics of the archery described in the Book of Mormon.

Bows and Arrows in the Book of Mormon

After the sword, the bow is the second most frequently mentioned weapon in the Book of Mormon. Bows are mentioned twenty-two times, arrows twenty-six. In fourteen cases the bow and arrow are mentioned together; in eight cases, the bow is mentioned alone; in twelve, the arrow alone. In most cases, the bow is simply mentioned as

a weapon with no additional details.⁸ However, several significant incidents give some indication of the nature and use of the Book of Mormon bow.

The most detailed description comes in 1 Nephi 16. Here Nephi describes the difficulties that his family had in getting food in the wilderness of Arabia. Nephi and his brothers used their bows to hunt animals, but eventually Nephi's fine steel bow broke, and his brothers' bows lost their "springs." Nephi then made a new bow and arrow from some wood in the region, and, with the help of directions from the Liahona, he managed to obtain additional food (see 1 Nephi 16:14-15, 18, 21, 23, 30-31).

In this passage the Book of Mormon suggests five significant characteristics concerning Near Eastern archery in the early sixth century B.C.:

1. There were "steel" bows.
2. Such steel bows could break.
3. Bows could lose their "springs."
4. Bows and arrows could be made from wood.
5. Nephi knew how to make bows and arrows.

Unfortunately, the Book of Mormon provides less detailed information about the nature and use of bows and arrows by the peoples of early Mesoamerica.⁹ Chronologically, the bow was used from the time Lehi and his family left Jerusalem (ca. 587 B.C.) until the final battles in which the Nephite culture was destroyed (ca. 385 A.D.).¹⁰ Bows were used by both Nephite and Lamanite cultural groups but are not mentioned as having been used by the Jaredite culture (for Lamanites, see Mosiah 10:8; Helaman 1:14; for Nephites, see Alma 2:12; Mosiah 9:16). As in most ancient societies, Book of Mormon peoples used bows for both hunting and warfare (for hunting, see 1 Nephi 16; Alma 17:7, ca. 80 B.C.; most other instances refer to warfare).

From two major incidents in the Book of Mormon, we can infer some details about the use of bows and arrows in Pre-Classic Mesoamerica. The first incident, occurring in Alma chapters 49-50 (ca. 72 B.C.), is the most detailed Book of Mormon passage describing archery in warfare. During the great wars in the first century B.C., the Nephites, under Moroni, "had dug up a ridge of earth round about" the city of Ammonihah, "which was so high that the Lamanites could not cast their stones and their arrows at them" (Alma 49:4). The Nephites expanded this system of fortifications to protect their cities from Lamanite incursions (see Alma 48:8; 49:13-20; 50:1-6, 10). If the Lamanites attempted to assault a city, the Nephites planned to "destroy all such as should attempt to climb up to enter the fort by any other way, by casting over stones and arrows at them" (Alma 49:19). Such fortifications, "which never had been known among the children of Lehi" (Alma 49:8), confounded the Lamanite strategy, forcing them to retreat into the wilderness (see Alma 49:12).

In assaulting these fortifications the Lamanites attempted a primitive form of siegecraft, trying to "dig down their [the Nephites'] banks of earth," but they were "swept off by the stones and arrows which were thrown at them" (Alma 49:22). The only Nephites who were injured (about fifty) were those who defended the "pass," or gateway of these fortifications, "who had been exposed to the arrows of the Lamanites through the pass" (Alma 49:24). However, the Nephites had been "shielded by their shields, and their breastplates, and their head-plates, insomuch

that their wounds were upon their legs, many of which were very severe” (Alma 49:24). Later the Nephites constructed timber walls, towers, and pickets to strengthen the fortifications, so “that the stones and the arrows of the Lamanites could not hurt them” (Alma 50:4).

This passage provides us with the following important facts concerning archery in the Book of Mormon:

1. Both Nephites and Lamanites were armed with bows and arrows.
2. A large mound of earth negated the effectiveness of Lamanite archery to the extent that no Nephites were killed by Lamanite arrows.
3. In the same battle, Nephite archers, shooting from the top of the earthen fortifications, were quite effective against the Lamanites, managing to kill more than a thousand of them (see Alma 49:19, 22-23).
4. Nephite fortifications are said to have been effective against both arrows and stones (see Alma 49:2, 4; 50:4), implying to me that the stones and arrows had essentially the same range, or that the stone throwers were uniformly at closer range than the archers. However, there is no evidence in the Book of Mormon for this type of special regimentation according to weapons. The text does not say whether the stones were thrown or cast from slings.
5. Lamanite archery was not effective enough to wound Nephites when they wore armor, but could cause “very severe” (Alma 49:24) wounds on unarmored legs.
6. It may be significant that the bow is never mentioned in this passage, only arrows. Some possible implications of this fact are discussed below.

The second major incident involving archery (ca. 6 B.C.) occurred when Samuel the Lamanite was attacked with arrows while preaching from the city walls of Zarahemla. This incident adds no details but confirms the general Book of Mormon archery characteristics derived from Alma 49-50. Samuel stood on the wall of Zarahemla, prophesying of the coming of Christ. His words angered some listeners, who “cast stones” and “shot arrows at him” (Helaman 16:2). However, “the Spirit of the Lord” protected Samuel so that the arrows and stones did not harm him (Helaman 16:2, 6). Although the archery’s ineffectiveness in this incident is directly attributed to the Lord’s miraculous intervention, tactically, the situation mirrors that in the siege of Ammonihah described above. Nephite and Lamanite archery does not seem to have had enough range or penetrating power to severely injure people standing on a high wall. Note also that, as in Alma 49, no bows are mentioned in this incident.

Jarom 1:8 (ca. 400 B.C.) provides another characteristic of Book of Mormon archery. It mentions the “sharp pointed arrow,” providing the only specific information about arrows in the Book of Mormon. This passage may imply the use of some type of arrowhead on the arrows, for an arrow can only be “sharp” if it has an edged side to the projectile point.

Finally, the Book of Mormon also refers in two verses to quivers (pouches or boxes designed for carrying arrows or javelins). The first verse, 1 Nephi 21:2, is a quotation from Isaiah 49:2, and thus concerns Near Eastern archery. The second, Jarom 1:8 (ca. 400 B.C.) tells us that the Nephites made “weapons of war — yea, the sharp pointed arrow, and the quiver, and the dart, and the javelin.” Neither passage gives any additional details about Book of Mormon archery, but they do represent another aspect of military missile use.

This section has summarized all the information concerning the characteristics of archery found in the Book of Mormon. The following section examines the relation of these characteristics to archaeological and historical knowledge of how archery was practiced in the Near East in the early sixth century B.C. and in Pre-Classic Mesoamerica.

Bows and Archery in the Near East in the Sixth Century B.C.

The fundamental technology for the bow was developed by at least early Neolithic times, and all literate civilizations of the Near East had been acquainted with the bow for several millennia before Lehi was born.¹¹ The Bible mentions the bow extensively, and anyone who has even briefly examined Egyptian history will be familiar with the many stunning scenes of Pharaohs shooting their bows from their chariots.¹² How do the details about archery as described in the Book of Mormon correspond with the evidence of Near Eastern archery in the sixth century B.C.? I previously discussed the five major assertions the Book of Mormon made concerning Near Eastern archery. I will now examine each of these points in detail.

Characteristic One

There were "steel" bows. Several civilizations have made solid steel bows in the past. Many examples of steel bows are preserved in museums in India.¹³ Steel bows were also manufactured in medieval Europe but were usually used as crossbows because of the great strength needed to bend them.¹⁴ However, the earliest examples of pure steel weapons date from the early fourteenth-century-A.D. I am unaware of any evidence of pure steel bows from earlier times. How, then, could Nephi have had a steel bow in the sixth century B.C.?

To answer this question, one must examine the translations of the King James Version of the Bible (KJV) in which the phrase "steel bow" is used (2 Samuel 22:35; Psalm 18:34; Job 20:24). In each reference the phrase has been incorrectly translated and should really read "bronze" (Heb. *nechushah*) bow. From archaeological remains, it is clear that the Hebrew "bronze bow" was not made entirely of bronze but was a term that, as Roland de Vaux notes, "refers to the metal coverings of certain bows."¹⁵ Nephi's "steel bow" could thus likely be Joseph Smith's Jacobean English translation for an original Hebrew "bronze bow," referring to an ordinary wooden weapon decorated or reinforced in certain parts (usually the upper limb, nock, and grip) with bronze. This explanation is supported by the fact that Nephi's "steel" bow is said to have broken, a good indication that Nephi was not referring to a pure steel bow of the fourteenth-century-A.D. type, which would be essentially impossible to break by human muscle power alone.

Characteristic Two

Such "steel" bows could break. Obviously both self bows and composite bows can break under a number of circumstances.¹⁶ However, composite bows have a specific structural problem that leaves them susceptible to changes in temperature and climate, which may cause the bow to warp and break. Taybugha, a fourteenth-century Arab master-archer, advised that "an archer should never neglect his bow for a single moment, and in extremes of temperature he should inspect it day and night, hour by hour" ¹⁷ (see fig. 1). Such care in protecting a composite bow from warping is necessary because "the neck has a natural tendency to lateral displacement.... Should side-warping of this kind not be detected and the bow be drawn the defective limb will be subjected to a most severe twisting strain and possibly break."¹⁸ Thus, if Nephi's bow were of the composite type, his move from the more

temperate climate of Palestine to the dry heat of the Arabian peninsula could have contributed to the risk that his bow might warp and break.¹⁹

Characteristic Three

Bows could lose their “springs.” Bows are delicate weapons that need special care and constant attention. Both medieval and modern archers recognized this fact.²⁰ To lose its “spring” probably means that the bow had lost some of its elasticity and thereby its strength and efficiency. Longman describes this problem: “All bows will lose both cast [range] and strength if shot with many days running, and they will not readily recover if overshot.... Even in one day a bow will sometimes go down one or two pounds, ... hot weather especially affecting them.”²¹ Most likely, this is precisely what happened to the bows of Nephi’s brothers. The change in climate, the hot weather, and continual hunting progressively weakened the elasticity and draw weight (“springs”) of their bows to the point that the bows had insufficient range and penetrating power for effective hunting.

Characteristic Four

Bows and arrows could be made from wood. Making bows from wood is such a widespread phenomenon in history that the question need not be dealt with in detail.²² However, one point worth examining is the question of wood sources for the bow Nephi made in Arabia.

In the latter Middle Ages, composite bows became the predominant type of bow throughout the Near East. However, Arab scholars of archery preserved traditions of an earlier self bow that Arab bedouins made from a single piece of wood.²³ One medieval Arab toxophilite wrote, “The bows of the Hijazi [west Arabian] Arabs are also of three kinds. One is made of a single stave (*qadib*); another is made of a stave or two staves divided lengthwise; and the third is backed, or reinforced (*mu^ᶜaqqaba*). All these three kinds are made of the *nab’*, *shawhat*, and *shiryan* wood. The method is that of shaving the wood down.... The bow which is made of a single stave is called *qadib*.”²⁴ The Hijaz is the western coast of central Arabia, the region through which Lehi’s party is usually thought to have traveled.²⁵ Another source states specifically that this single-stave *qadib* bow was “the bow used among the [Arab] bedouins.”²⁶ Thus single-stave bows could be made of several types of wood found in Arabia. Arrows were also made of many different materials, wood and reed being the most common. Taybugha wrote, “The best arrows ... should be roundly hewn (and) be of hard solid wood.”²⁷

Characteristic Five

Nephi knew how to make bows and arrows. Would an ordinary citizen of the ancient Near East have been able to make a bow from materials available in the Arabian wilderness? By at least as early as the fourteenth century B.C., Near Eastern bow-making technology had become a highly developed and complex skill. The staff bow had been known in Egypt since at least early dynastic times. The Hyksos invaders apparently introduced the composite bow to Egypt in the sixteenth century B.C. We have good evidence of the bowyer’s skill in fourteenth-century Egypt both from tomb illustrations and from surviving examples of bows found in Tutankhamun’s tomb.²⁸ McLeod provides the following description of making the simplest Egyptian single-stave self bow. Manufacturing the more complex composite bow was much more difficult.

(1) A billet of the appropriate length was cut off at both ends.

(2) It was roughly dressed with a small adze, which left facets along the stave.

(3) Near the tip, the stave was cored with several transverse grooves on one side.

(4) The tip was bent at the grooves. In other societies, the usual way of achieving this has been to saturate the wood with steam, which makes it soft and pliable.

(5) It was presumably clamped in a frame of the proper shape and left to dry.

(6) A notch was cut on the back at the tip to lodge the string.

(7) The stave was roughly smoothed with a coarse abrasive.

(8) The stave was finished with a polishing block of fine sandstone.²⁹

Evidence from Egyptian tombs that show the bow-manufacturing method confirms this procedure's complexity. This Egyptian evidence depicts a process involving many different craftsmen, tools, and materials.³⁰ Nephi most likely did not have the time, materials, or knowledge to go through this entire process.

However, the above eight steps are necessary only if one wishes to produce an efficient and beautiful war bow. Much simpler processes existed for making inexpensive, less efficient bows that were still useful for some forms of hunting. The Lacandon Maya Indians of southeastern Mexico follow one such method:

The Lacandon man cuts a long square piece from a felled tree and then smooths it into an elliptical shape by scraping it across a machete.... [He] gradually works the wood into a rough bow 1.65 meters long.... After shaping the wood in this fashion, he heats the bow over an open fire for up to half an hour. This step hardens the bow.... [The] Lacandon [then] polishes it with a large whetstone ... until the wood surface is completely smooth and regular.... The entire process ... takes approximately three days.³¹

The question of the relative strength and efficiency of bows as described in the Book of Mormon will be discussed in detail later.

Though similar to the complex Egyptian method described above, the Lacandon Mayan process is much simpler, takes less time, and can be done by a single man. Many other primitive peoples followed similar simple processes in making bows. The Arab bedouin self bows were also made by "shaving down the wood."³² The method of hunting with weak self bows is not to attempt to kill an animal outright with the arrow, but to wound the animal and track it relentlessly until it collapses from exhaustion and loss of blood.

Manufacturing efficient arrows is also very difficult and time consuming. Arrows must be cut from a straight, clean piece of well-seasoned wood; they must be rounded; and they must be perfectly straight. Mounting must be prepared for an arrowhead (which also must be procured or made) and for the fletching (feathers).³³ The Book of Mormon states that Nephi "did make out of wood a bow, and out of a straight stick, an arrow" (1 Nephi 16:23). The text here clearly implies that Nephi made only one arrow for his bow at that time. The difficulty and time required to make arrows seems to have limited the number that Nephi could make.³⁴

Thus, although manufacturing both bows and arrows was a complex art, one man on short notice could make an inferior quality weapon with short range and minimal penetrating power. In fact, the bows and arrows most primitive peoples use tend to be weak. In Africa, Central and South America, parts of Asia, and the Pacific Islands, the bow tends to be an inferior weapon that, although used in warfare, is not the preferred combat weapon.³⁵ Evidence discussed in the next section suggests that the bow-making technology of the New World was of this primitive, weak, and inefficient type.

One may conclude, then, that the Book of Mormon's five characteristics about Near Eastern archery in the sixth century B.C. accurately reflect the textual, artistic, and archaeological evidence of the period. The next section will examine a comparison of the descriptions of archery in the Book of Mormon with the evidence of archery in Pre-Classic Mesoamerica.

The Bow in Mesoamerica

Book of Mormon critics have maintained that the bow was not used in Mesoamerica before the Middle Classic period (after 500 A.D.), several centuries after the earliest mention of the weapon in the Book of Mormon. These critics consider the mention of the bow in the Book of Mormon as a significant historical anachronism.³⁶

Although it may be true that the bow was not used by every culture or tribe in Pre-Classic Mesoamerica, recent archaeological work and reinterpretation provides good evidence of, as Tolstoy writes, "the limited use of the bow and arrow in central Mexico since early agricultural times"³⁷ (that is, since well before 600 B.C.). Professor Tolstoy writes:

THE PROBLEM OF THE BOW AND ARROW IN CENTRAL MEXICO. Vaillant (1931, pp. 301-02),³⁸ on the basis of point weight distributions and analogies with the Southwestern United States, has argued for the presence of the bow and arrow in the Preclassic of the valley [of central Mexico]. Linne (1934, pp. 147-48)³⁹ feels that the lighter points at Teotihuacan were used to tip arrows. Kidder (1947, pp. 12-4),⁴⁰ departing from similar assumptions of relation of weight and size to function, concludes that arrowpoints were more frequent early than late in the Valley of Mexico sequence.⁴¹ Suhm and Krieger (1954, p. 529)⁴² add the implicit criterion of thinness to those of weight and size. To judge from all of these criteria, most of the small but relatively thick points of the valley Preclassic need not have been mounted on arrows. This still leaves the Bassett, Perdiz, and Fresco types of the Preclassic, the Hayes, Bonham, and Gary Small types of the Classic, and the Harrell points of the Aztec times as *prima facie* evidence of the limited use of the bow and arrow in central Mexico since early agricultural times.... The occurrence of a type as unusual and distinctive as the Bassett would seem even here to favor the bow-and-arrow hypothesis.⁴³

Recent excavations at Tehuacan Valley confirm that the bow was used as early as the time of Christ.⁴⁴ Whether or not the bow and arrow existed in Mesoamerica during Book of Mormon times is an important and controversial topic. I will therefore examine the evidence for the bow in some detail.

The question of the bow and arrow in early Mesoamerica (or any other culture) revolves around the methodology for interpreting textual and archaeological remains. Three main types of evidence would indicate that the bow and arrow were known to a given civilization: first, literary or inscriptional evidence mentioning the words "bow" or

“arrow”; second, artistic evidence depicting bows; and third, the archaeological remains of actual bows or arrows. If evidence of the bow in *any* of these three categories is found at a given site, it is basically certain that the people of that culture knew of the bow and arrow.

Written Evidence

The first form of evidence consists of inscriptions or literary references to archery. Although there can be problems with semantics and dating that might cloud the issue, the mention of a bow or arrow in a literary text is generally accepted as evidence of that weapon's existence. As far as I am aware, Pre-Classic inscriptions in Mesoamerica, which are limited both in number and in topics discussed, do not mention the bow. However, there are not enough extant Pre-Classic inscriptions for us to conclude that a particular item did not exist simply because the known and translated inscriptions do not happen to mention it. Furthermore, since many Mesoamerican hieroglyphic signs have not been fully interpreted, the word for bow may be one of the many glyphs for which the meaning is still unknown.⁴⁵ Other than the Book of Mormon, no strictly literary (as opposed to inscriptional) records from the Pre-Classic period exist.

Artistic Evidence

Artistic evidence from the Pre-Classic period is also limited. Nonetheless, there is an important example of a Pre-Classic graffiti from El Corral (south Mexico, second century A.D.) that has been interpreted as representing a man using a bow (see fig. 2).⁴⁶

Here there arises a methodological problem of negative evidence. If the bow was indeed used by Pre-Classic Mesoamericans as I claim, why do we not find extensive artistic evidence of the bow? The answer to this question comprises three aspects. First, the bow-using peoples may have used essentially nonrepresentational art forms. The early Israelites themselves represent the most obvious example of such a culture. Despite the clear use of the bow by the Israelites, there are no extant artistic representations of an Israelite using a bow. Second, although some people used the bow, not all ethnic groups used it, and the bow would thus not necessarily appear in the art of every culture, despite the existence of the weapon. Finally, Mesoamerican art was essentially ritual.⁴⁷ If the bow did not play a major *ritual* role in Mesoamerican society, it would not appear in ritual-oriented artwork. A well-known example of this phenomenon is the sword as the major ritual weapon of the medieval Western European tradition and its major ritual role in the Arthurian legendary cycle.

Archaeological Evidence

When we turn to archaeological evidence, we are dealing with a much more complex problem of interpretation. Through archaeology we attempt to find and identify (often two very different processes) remaining fragments of what once had been a bow or arrow. J. G. D. Clark provides three criteria, of which only one must be satisfied, to be certain of the existence of the bow from archaeological evidence alone: first, a recognizable part of a bow (i.e., the nock of the bow) must be found; second, a recognizable part of an arrow (i.e., nock of the arrow); or third, an artistic representation of a bow (as discussed above). Significantly, Clark maintains that when examining projectile points alone, there are no absolute criteria on which to judge whether a projectile point was used for an arrow, dart, or javelin.⁴⁸

Despite the fact that remains of wooden parts of bows or arrows can be expected to survive over 1,500 years only under unusual circumstances, several cane arrow shafts possibly dating from Book of Mormon times have recently

been identified. They date from the late Palo Blanco levels at Tehuacan (ca. 400-700 A.D.),⁴⁹ which would fit into the late Book of Mormon period. According to Clark, it is only from the nocks of bows or arrows (i.e., the wooden parts) that a bow's existence can be definitively shown. This leaves projectile points as the main form of evidence to prove the existence of missile weapons, which are often difficult to categorize and interpret. Thousands of such stone projectile points have been recovered from Mesoamerican archaeological digs dating from the Book of Mormon period, proving that some missile weapons were used in Pre-Classic Mesoamerica. But were these projectile points used on arrows, *atlatl* darts, javelins, or spears?

Determining the type of shaft to which a given projectile point was attached and the means of propulsion for that shaft is a very complicated process. Though the question of dating projectile points is often problematic, it will not be of great concern for my analysis. I assume here that the estimated dates of archaeological finds as determined by a combination of stratigraphical analysis, comparative pottery studies, carbon dating, and inscriptions are accurate. However, if the relative datings of some digs were successfully challenged, that could push the dates for some evidence of the bow in certain cultural zones back several centuries into Book of Mormon times. Furthermore, even some of the best-established dates may be accurate within only a century or two.

Archaeologists must guess the type of shaft and the means of throwing it, based on the size, thickness, weight, and shape of the projectile point. Of course, such reconstructions are not merely arbitrary guesses but are based on a careful comparative analysis of many identified projectiles with unidentified or questionable projectile points. Nonetheless, it must be emphasized that there are no absolute criteria to differentiate an arrow projectile point from a javelin or spear projectile point.

What are the main criteria archaeologists use to classify a projectile point as coming from an arrow, javelin, or spear? Size and weight are important factors, but are not necessarily definitive.⁵⁰ There are two main problems with this approach. First, discovered projectile points invariably provide a gradual gradation of size and weight, with no obvious or absolute points of differentiation. Second, through modern reconstructions and experimentation, Browne has demonstrated that projectile points ranging in length from 30-67 mm "could have been used on either an arrow or a fore-shafted spear" (see fig. 3).⁵¹ In other words, if judged by size and weight, most projectile points found in Mesoamerica could have been used on bows, javelins, or spears. Most scholars have wisely avoided these problems by classifying such finds as "projectile points," making no attempt to subdivide them according to the type of shaft to which they were attached.

Archaeologists are now concluding that the fundamental criteria for distinguishing arrowheads from javelin or spear points are not the size or weight of the projectile point, but rather the thickness and width of the base of the point where it would be hafted to the missile shaft.⁵² Points that exceed a certain (but not precisely defined) width or thickness are too large to have been attached to a relatively narrow arrow shaft (see fig. 4).

The problem of classifying arrowpoints is therefore an open question. Many existing projectile points could be reexamined and potentially reclassified as arrowpoints. With these considerations in mind, Tolstoy and other archaeologists have reevaluated the question of the bow and arrow and have concluded that the bow was in fact known in Mesoamerica by at least the first millennium B.C., precisely as described in the Book of Mormon.

But let us assume for the sake of argument that none of the projectile points that have been discovered were in fact attached to arrows. This assumption would still not be conclusive evidence that the bow and arrow were not used. All it indicates is that arrows did not have *stone* projectile points. Indeed, Mesoamericans are known to have

used bone and other material as projectile points for arrowheads. “[The Aztec] arrows, for want of Iron, were headed with Bones ground sharp, or Fish-Bones.”⁵³

Throughout the world, there are numerous other historical examples of arrows having sharpened wood, thorn, or bone tips for projectile points, which would leave only a few, if any, identifiable remains.⁵⁴ Such arrowheads were usually used when metal was rare, or when the cost of producing metal or stone arrowheads was excessive in relation to the missile’s relative effectiveness.

In summary, there is no inscriptional evidence relating to the use of bows in Mesoamerica. However, there are limited artistic representations of the use of the bow by at least the second century A.D. Furthermore, there are numerous stone projectile points that can be classified as arrowheads, and the current trend in scholarship is to reclassify such projectile points as arrowheads, thereby dating the use of the bow by Mesoamericans to at least the first millennium B.C. It is also possible that some Mesoamericans used arrows with nonstone projectile points. Thus there is no reason to maintain that the mention of the bow in the Book of Mormon is incompatible with the archaeological evidence from Mesoamerica.

I should emphasize one last point. The fact that the bow was known in Mesoamerica does not mean that all cultures in that region would have used the weapon or would have used it extensively in warfare. As Christian Feest puts it: “Since the bow undoubtedly represents the highest development of arms technology in the tribal world, it seems strange that it is not always employed as a weapon of war. In Polynesia bows and arrows were restricted to hunting; in parts of Melanesia the spear replaced the bow, and even the civilizations of Mexico and Peru preferred the spearthrower. Since there are no technical reasons for this, it is likely that the bow was less suited to the particular war tactics of these regions.”⁵⁵ One could add that although the bow was known throughout Africa, some African tribes preferred not to use it in warfare.

Thus, although the bow was clearly known in Mesoamerica in the Post-Classic period (after 900 A.D.), certain tribal or cultural groups, such as the Aztec and Classic Maya, chose not to use it extensively in warfare. The reasons for this choice probably include factors of technology (bows were weak and ineffective), culture (bows were not considered a noble weapon since you could kill an enemy without confronting him face to face), and tactics (bows did not fit well with standard military practices). But archaeological findings still suggest that the bow was known in Mesoamerica and was used by some cultural groups. The Nephites were one of these groups. The next section examines a possible reconstruction of the pattern of military bows used by Book of Mormon cultures.

Scenarios for Reconciliation

Because of the fragmentary and occasionally ambiguous nature of some of the evidence concerning Pre-Classic archery in Mesoamerica, there are several scenarios that can reconcile the description of bows and arrows in the Book of Mormon with the archaeological and artistic evidence from Mesoamerica, none of which is mutually exclusive.

Scenario One: The Weak Nephite Bow

The first scenario runs something like this. The Nephites arrived in Mesoamerica with relatively primitive bow technology. Neither Nephi nor any of his brothers were expert bowyers, and the bow technology they were able to pass on to their descendants did not represent the highest levels of sixth-century B.C. Near Eastern craftsmanship.

There are three specific corollaries to this general principle. First, either the Nephites did not transmit composite recurved bow technology to Mesoamerica or that technology was quickly lost. Second, the bow industry that ultimately became the standard Nephite bow technology was that of a relatively inefficient self bow. Third, the indigenous Mesoamerican missile technologies such as the *atlatl*, javelin, sling, and possibly the bow as well, could therefore compete effectively with Nephite bow technology so that Nephite bow industries did not ultimately displace indigenous weapon industries.⁵⁶

The combination of technology, environment, and the nature of the available materials of Mesoamerica were such that the bows the Book of Mormon peoples used remained on a relatively primitive level. Certainly there was little, if any, use of metal arrowheads. The theoretical absence of effective fletching and the basic weakness of bows would have limited both the range and accuracy of the weapon. The bow was therefore not adopted by all Mesoamerican ethnic groups. Furthermore, although the bow continued in use for several centuries among Book of Mormon peoples, it never replaced the javelin and *atlatl* as principal missile weapons among non-Nephite civilizations.

There are several historical examples where this same type of military situation developed. The closest known parallel comes from Mesoamerica itself. Although the original tribal Aztecs used the bow extensively before their migrations into central Mexico, they eventually adopted the Mesoamerican *atlatl* as their major missile weapon, conforming to the prevailing military and technological patterns of the indigenous cultures.⁵⁷ “The chief offensive arms [of the Aztecs] were wooden clubs, edged with sharp blades of obsidian, and the javelin, hurled by means of the *atlatl*. Bows and arrows were used, but the heavier javelins were preferred for the close fighting of Aztec warfare.”⁵⁸ Book of Mormon peoples or their descendants may have followed this same basic pattern, ultimately selecting the *atlatl* in preference to the bow as their major missile weapon. Likewise, despite the advanced military technology of the Romans, they consistently relied on auxiliaries and mercenaries to provide archers for their armies. “Archers [in Roman armies were] usually of Eastern origin.”⁵⁹ Many tribes in Africa, such as the Zulu, although they used the bow for hunting, never developed a tradition of military archery.⁶⁰

Scenario Two: The Atlatl as a “Bow”

A second possible scenario to be considered is that the writers of the Book of Mormon used the Hebrew (or Egyptian) word for *bow* to designate a new Mesoamerican weapon, the *atlatl*, for which neither Hebrew nor Egyptian has a term. The *atlatl* was a curved notched stick into which a javelin was laid that threw the javelin with increased force and range. The weapon was unknown in the Middle East in Nephi’s time, and neither Egyptian nor Hebrew has a term for such a weapon.

According to this scenario, when Lehi’s party arrived in America, they possessed rudimentary skills in bow and arrow making. Due to the ineffectiveness of the bows they could manufacture, the weapon was eventually discarded in favor of the more effective *atlatl*, which was adopted from the indigenous population of the region not related to Lehi. In the written language, however, the Hebrew (or Egyptian) word for *bow* was retained and transferred to the new Mesoamerican missile weapon. Thus in the writings on the gold plates, the word *bow* refers to the *atlatl*, and the word *arrow* to the dart or javelin thrown by the *atlatl*. Joseph Smith, however, translated the words according to their literal meaning.⁶¹

Throughout the history of the development of terminology for new weapons, it was not at all uncommon for weapons that were new to a given culture to be called by the name of an older, more familiar weapon. For our

purposes, the best example occurs with the terms used by the Spanish Conquistadores to describe Aztec weapons with which they were unfamiliar. The “Anonymous Conqueror” described *atlatls* as “spears which they throw with crossbows.”⁶² Other examples of this phenomenon are numerous. The Chinese, inventors of gunpowder weapons, called the earliest form of firearms “fire lance.”⁶³ The early terminology for firearms among the Europeans was *arquebus*, literally “thunder bow.” Among the Arabs, firearms were called *bunduq*, literally a type of pellet crossbow. Early rockets were known among the Arabs as “Chinese arrows.” Thus, for the Nephites to adapt their old military vocabulary to the new weapons of Mesoamerica is quite consistent with the linguistic patterns of other cultures.

Scenario Three: “Bows and Arrows” as a Literary Phrase

A third possible explanation for the appearance of the phrase “bows and arrows” is that the phrase was used as part of a stock weapons list and, as such, represented Mormon’s anachronistic literary terms rather than technical military terminology derived from the original texts he was abridging. According to this theory, when abridging and editing the original texts, Mormon used certain stock literary phrases to describe weapons and warfare that accurately described the situation of his day but may have been anachronistic or inaccurate when used for the weapons of earlier armies. Such anachronistic description of weapons and warfare is not at all uncommon for ancient writers who are attempting to describe warfare in periods prior to their own.⁶⁴

Here are the major examples of the repetitive nature of the Book of Mormon descriptions of weapons, which I will call “standard weapon lists”:

1. Mosiah 9:16 (ca. 180 B.C.): “I did arm them [the Nephites] with bows, and with arrows, with swords, and with cimeters, and with clubs, and with slings, and with all manner of weapons.”
2. Mosiah 10:8 (180 B.C.): “Men [Lamanites] armed with bows, and with arrows, and with swords, and with cimeters, and with stones, and with slings.”
3. Alma 2:12 (90 B.C.): “They [the Nephites] did arm themselves with swords, and with cimeters, and with bows, and with arrows, and with stones, and with slings, and with all manner of weapons of war.”
4. Alma 3:5 (90 B.C.): “Their [Lamanite] bows, and their arrows, and their stones, and their slings, and so forth.”
5. Alma 43:20 (70 B.C.): “They [the Lamanites] had only their swords and their cimeters, and their bows and their arrows, their stones and their slings.”
6. Helaman 1:14 (50 B.C.): “[The Lamanites had] armed them [an army of men] with swords, and with cimeters and with bows, and with arrows.”

The parallel phraseology of each of these passages, the listing of weapons in related pairs, the choices of weapons that are mentioned, and the general ordering of the weapons lend credence to the theory that these descriptions of weapons are meant to be literary devices rather than historical listings of actual weapons the warriors used in their respective periods (note also the use of “and so forth” in Alma 3:5). Thus one could compare our modern use of anachronistic sword imagery in literary descriptions of war — “saber rattling,” “man of the sword,” “swords into plowshares,” and so on — with the use of the stock phrases given above. As a general rule, one would not expect that descriptions given by three different authors covering over one hundred years, describing both Lamanite and Nephite weaponry, would use almost exactly the same phrases, even if the weaponry had changed relatively little.

One explanation that would account for this is that the editor Mormon rather than the individual authors of each book used the terms.⁶⁵

It is possible, if not likely, that some combination of all three of these scenarios actually occurred in Book of Mormon times. For instance, Book of Mormon cultures could have used the bow and arrow, but, because they were relatively weak and ineffective, the *atlatl* eventually either largely or completely replaced them as the primary military missile weapon while the original words for bow and arrow were retained and used as literary phrases in standard lists of weapons. At any rate, whichever one of these scenarios or a combination thereof (or some other plausible scenario) proves to be accurate, there is little difficulty in reconciling the descriptions of the use of bows and arrows in the Book of Mormon with the evidence of archery from the cultures of both the Middle East and Mesoamerica.

Appendix: Why Did Nephi Make a New Arrow?

David S. Fox has maintained that Nephi had to make a new arrow for his new wooden bow because the arrows used with his old steel bow would have been too heavy for a wooden bow.⁶⁶ Although the general principle he describes is accurate, I believe the issue is more complex than that.

In reality, nearly any arrow can be shot from any bow. The basic limiting factor is the length of the arrow versus the length of the bow — shooting short arrows from longbows is difficult. This is because a full draw on a longbow may make the distance between the fully drawn string and the handle of the bow longer than the length of the arrow. Short arrows can be shot from a longbow only if the string is not drawn back fully, which greatly reduces efficiency.

What Fox is really talking about is the relative efficiency of shooting arrows of different weights from different bows. A very heavy arrow shot from a bow with a light draw weight will have short range and weak penetrating power.⁶⁷ The accuracy and impact will be ineffective, but the arrow can be shot. Fox's discussion seems to be based on the assumption that Nephi's "steel bow" was of the late medieval steel type, while I have argued that in fact Nephi's steel bow must have been a metal-backed wood weapon that was common in the Near East of his day, which would not have shot an arrow substantially heavier than other bows.

Why then, did Nephi make a new arrow? There are two possible reasons. First, as arrows are continually shot in hunting they become lost or broken. He may simply have run out of arrows and needed a new one. Second, Nephi very likely owned a metal-backed recurved composite bow, as discussed previously. Recurved composite bows can achieve the same draw weight with a much smaller string and draw length than a longer bow. In other words, recurved composite bows shoot shorter arrows than longer bows. If Nephi's old bow was the recurved composite type, and his new one was a long staff bow (which is the simplest to make on short notice), he may have needed to make a longer arrow because of the longer string and draw length of his new bow.

Notes

1. I would like to thank the staff of F.A.R.M.S. for their assistance in this study.

2. Many works discuss the basic principles of archery. Details on bows and archery can be found in Robert Hardy, *The Longbow* (Cambridge: Cambridge University Press, 1976); John D. Latham and W. F. Paterson, *Saracen Archery* (London: Holland Press, 1970); Saxton T. Pope, *Bows and Arrows* (Berkeley: University of California Press, 1962); and Charles J. Longman and H. Walrond, *Archery* (New York: Frederick Ungar, 1967; reprint of 1894 ed.).

3. See P. H. Blyth, "Ballistic Properties in Ancient Egyptian Arrows," *Journal of the Society of Archer Antiquarians* 23 (1980): 38, who bases his analysis on C. N. Hickman, "Effect of String Weight on Arrow Velocity and Efficiency of Bows," *Ye Sylvan Archer* (April 1931): 45-46.

4. Bows can be designed to propel arrows as large or larger than normal javelins and spears. However, such bows are usually so huge that a single man cannot carry them, and they often require a great deal of energy (in the form of cranks) to draw the string. Such large bows and arrows are variously called catapults, ballistas, or crossbows. In the eastern Mediterranean world, craftsmen working for Dionysius of Syracuse in the early fourth century B.C. apparently invented the catapult. By 370 B.C. they were found in Greece, and they had reached Asia Minor by at least 340 B.C. (see Eric W. Marsden, *Greek and Roman Artillery: Historical Development* [Oxford: Clarendon, 1969], 48-56; and Werner Soedel and Vernard Foley, "Ancient Catapults," *Scientific American* 240/3 [March 1979]: 150-60). Similar weapons were introduced in China at about the same period (see Robert Temple, *The Genius of China* [New York: Simon and Schuster, 1987], 218-24). The Book of Mormon, however, does not seem to mention such devices, so they will not be considered further here.

5. There are many exceptions to this general rule. Arrows shot with an arrow guide can be as short as fifteen inches (see Latham and Paterson, *Saracen Archery*, 145-51, esp. 151), while some arrows are known to be as long as five feet (see George C. Stone, *A Glossary of the Construction, Decoration, and Use of Arms and Armor* [New York: Jack Brussel, 1961; reprint of 1934 ed.], 72). Nevertheless, the vast majority of arrows fall within the aforementioned limit.

6. On ranges for the English longbow, see Hardy, *The Longbow*, passim; for the composite bow, see Latham and Paterson, *Saracen Archery*, 109.

7. I would like to thank Paul E. Black for his assistance in principles of aerodynamics.

8. The following is a summary of references to bows and arrows in which the word is simply mentioned with no description of its use or effects. Other examples will be discussed in detail in the following text. Bows: Enos 1:20 (420 B.C.); Mosiah 9:16; 10:8 (180 B.C.); Alma 2:12; 3:5 (87 B.C.); Alma 43:20; 44:8 (74 B.C.); Helaman 1:14 (51 B.C.). Bows mentioned in quotations from the Old Testament: 2 Nephi 15:28 = Isaiah 5:28; 2 Nephi 17:24 = Isaiah 7:24; 2 Nephi 23:18 = Isaiah 13:18. Arrows: Mosiah 9:16; 10:8 (180 B.C.); Alma 2:12; 3:5 (87 B.C.), Alma 43:20 (74 B.C.); Helaman 1:14 (51 B.C.); Mormon 6:9 (385 A.D.). Arrows in quotations from the Old Testament: 2 Nephi 15:28 = Isaiah 5:28; 2 Nephi 17:24 = Isaiah 7:24.

9. I am here following the geographical theory that the core of Book of Mormon civilizations was in Mesoamerica (modern southern Mexico and Guatemala), as proposed by John L. Sorenson, *An Ancient American Setting for the Book of Mormon* (Salt Lake City: Deseret Book and F.A.R.M.S., 1985).

10. Chronologically ordered, the bow or arrow is mentioned in the following cases (all dates are approximate): 1 Nephi 16:14, 15, 18, 21, 23 (590 B.C.); Enos 1:20 (420 B.C.); Jarom 1:8 (400 B.C.); Mosiah 9:16; 10:8 (180 B.C.); Alma 2:12; 3:5; 17:7; 43:20; 44:8; 49:2, 4, 19, 22, 24; 50:4 (90-70 B.C.); Helaman 1:14 (51 B.C.); Helaman 16:2, 6 (6 B.C.); Mormon 6:9 (385 A.D.).

11. For details, see Gad Rausing, *The Bow: Some Notes on Its Origin and Development* (Acta Archaeologica Lundensia) no. 6 (Lund, Sweden: Gleerup, 1967); for a more general discussion, see Arthur Ferrill, *The Origins of War: From the Stone Age to Alexander the Great* (London: Thames and Hudson, 1985), 17-26, esp. 18-21.

12. Additional evidence and discussion of ancient Near Eastern bows and archery can be found in Yigael Yadin, *The Art of Warfare in Biblical Lands*, 2 vols. paginated sequentially (New York: McGraw-Hill, 1963), 295-96. Illustrations of archery from ancient artwork can be found on pp. 250, 252, 295-96, 299-300, 302-3, 314, 327, 334, 337-40, 346, 348-49, 358, 365-67, 383-93, 398, 401-3, 407-10, 416-25, 430-31, 434-35, 442-45, 449-53, 458, 460-64.
13. See Stone, *Glossary*, 134, and his fig. 171.4.
14. Ralph W. F. Payne-Gallwey, *The Crossbow: Mediaeval and Modern, Military and Sporting* (New York: Bramhall House, 1958), passim; Leonid Tarassuk and Claude Blair, eds., *The Complete Encyclopedia of Arms and Weapons* (New York: Bonanza Books, 1986), 146.
15. Roland de Vaux, *Ancient Israel*, 2 vols. (New York: McGraw-Hill, 1965), 1:243. A similar use of the word “steel bow” is found in the Hindu Agni Purana, edited in its final form in the eighth century A.D., but reflecting much earlier material. This work (chap. 245, vs. 4) mentions composite bows made of horn and wood, with other bows of gold, silver, copper, and steel, clearly referring to metal covering and decoration of bows (*Agni puranam*, tr. Manmatha Nath Dutt Shastri, 2 vols., 2nd ed. [Varanasi: Chowkhamba Sanskrit Series Office, 1967], 2:885).
16. Compare Longman and Walrond, *Archery*, 302, for a list of a number of common circumstances in which bows might break.
17. Taybugha, translated in Latham and Paterson, *Saracen Archery*, 94.
18. Latham and Paterson, *Saracen Archery*, 90-91, 99.
19. For an interesting review of some of the cultural implications of the incident of the breaking of Nephi’s bow, see Nahum Waldman, “The Breaking of the Bow,” *Jewish Quarterly Review* 69 (October 1978): 82-88, available as a F.A.R.M.S. reprint, 1978, with an introduction to and comparison with the Book of Mormon by Alan Goff and John W. Welch, “The Breaking of the Bow: A Suggested Ancient Near Eastern Symbolism in 1 Nephi 16.” For a general introduction to the importance of the bow as a symbol weapon of authority, see Hugh Nibley, “The Arrow, the Hunter, and the State,” *Western Political Quarterly* 2 (1949): 328-44.
20. For the medieval view, see Taybugha, translated in Latham and Paterson, *Saracen Archery*, 94; for the modern perspective, see Longman and Walrond, *Archery*, 300-303.
21. Longman and Walrond, 300.
22. *Ibid.*, 27-46, provides a discussion of many types of bows made from wood.
23. Taybugha, translated in Latham and Paterson, *Saracen Archery*, 6, with commentary on 10-11.
24. Anonymous, translated in Nabih Faris and Robert Elmer, *Arab Archery* (Princeton: Princeton University Press, 1945), 10-11.
25. Hugh Nibley, *Lehi in the Desert, The World of the Jaredites, There Were Jaredites*, vol. 5 in *The Collected Works of Hugh Nibley* (Salt Lake City: Deseret Book and F.A.R.M.S., 1988); Lynn and Hope Hilton, *In Search of Lehi’s Trail* (Salt Lake City: Deseret Book, 1976).

26. Ibn Qayyim al-Jawziya (died 1350 A.D.), *Al-Furusiyya* (Cairo: Dar al-Kutub al-'Almiyya, 1976), 103.
27. Taybugha, translated in Latham and Paterson, *Saracen Archery*, 24.
28. See especially Wallace McLeod, *Composite Bows from the Tomb of Tut'ankhamun*, Tut'ankhamun's Tomb Series, no. 3 (Oxford: Clarendon, 1970); and McLeod, "Were Egyptian Composite Bows Made in Asia?" 19-23.
29. Wallace McLeod, "Tutankhamun's Self Bows," *Journal of the Society of Archer Antiquarians* 24 (1981): 41.
30. Two examples of such tomb illustrations from the fifteenth century B.C., can be found in Wallace McLeod, "Were Egyptian Composite Bows made in Asia?" *Journal of the Society of Archer Antiquarians* 12 (1969): 19-23.
31. James D. Nations and John E. Clark, "The Bows and Arrows of the Lacandon Maya," *Archaeology* 36 (January/February 1983): 38.
32. Faris and Elmer, *Arab Archery*, 11; see also Longman and Walrond, *Archery*, 28-46.
33. Longman and Walrond, *Archery*, 304-5.
34. For a discussion of why Nephi made a new arrow for his new bow, see the appendix.
35. Longman and Walrond, *Archery*, 28-29.
36. Latayne C. Scott, *The Mormon Mirage: A Former Mormon Tells Why She Left the Church* (Grand Rapids, Michigan: Zondervan Publishing, 1979), 83.
37. Paul Tolstoy, "Utilitarian Artifacts of Central Mexico," *Archaeology of Northern Mesoamerica, Pt. 1*, ed. Gordon F. Ekholm and Ignacio Bernal, in Robert Wauchope, ed., *Handbook of Middle American Indians*, vol. 10 (Austin: University of Texas Press, 1971), 281- 83.
38. George C. Vaillant, *Excavations at Ticoman* (New York: American Museum of Natural History Anthropological Papers, 1931), vol. 32, pt. 1.
39. Sigvald Linne, *Archaeological Researches at Teotihuacan, Mexico* (Stockholm: Ethnographical Museum of Sweden, 1934) n.s., Publication 1.
40. Alfred V. Kidder, *The Artifacts of Uaxactun, Guatemala* (Washington, D.C.: Carnegie Institute of Washington, 1947), Publication 576.
41. Another way to express this idea is that the bow was more widely used during the period of the Book of Mormon than after it.
42. Dee Ann Suhm, A. D. Krieger, and Edward B. Jelks, "An Introductory Handbook of Texas Archaeology," *Bulletin of the Texas Archaeological Society* 2 (1954): 529.
43. Tolstoy, "Utilitarian Artifacts," 282-83.

44. R. S. MacNeish, A. Nelken-Terner, and I. W. Johnson, *The Prehistory of the Tehuacan Valley: Vol. 2: Nonceramic Artifacts* (Austin: University of Texas Press, 1968), 55.
45. J. Eric S. Thompson, *Maya Hieroglyphic Writing: An Introduction* (Norman, Oklahoma: University of Oklahoma Press, 1971), has been the standard text on the subject. However, there have been many recent developments in the study of the Mayan writing system. See now, David H. Kelley, *Deciphering the Maya Script* (Austin: University of Texas Press, 1976); and Linda Schele, *Notebook for Maya Hieroglyphic Writing* (Austin: Institute of Latin American Studies, University of Texas, 1986).
46. Tolstoy, "Utilitarian Artifacts," 280, fig. 3Q, with discussion on p. 283; cf. John L. Sorenson, "Digging into the Book of Mormon," *Ensign* 14 (September 1984): 34; and Florencia Muller, "Instrumenta y Armas," in *Teotihuacán: Onceava Mesa Redonda* (Mexico: Sociedad Mexicana de Antropología, 1966), 231.
47. Compare Linda Schele and Mary E. Miller, *The Blood of Kings: Dynasty and Ritual in Maya Art* (Fort Worth, Texas: Kimbell Art Museum, 1986), 41-44.
48. J. G. D. Clark, "Neolithic Bows from Somerset England, and the Prehistory of Archery in North-western Europe," *Proceedings of the Prehistoric Society* 29 (1963): 50-90.
49. MacNeish, *Nonceramic Artifacts*, 161.
50. Fenenga Franklin, "The Weights of Chipped Stone Points: A Clue to Their Function," *Southwestern Journal of Anthropology* 9 (1953): 309-23. I would like to thank John L. Sorenson for this reference.
51. Jim Browne, "Projectile Points," *American Antiquity* 5/3 (1940): 210.
52. T. M. Hamilton, *Native American Bows* (York, Pennsylvania: George Shumway, 1972), referenced in Christopher Bergman, "Palaeolithic Composite Points" *Journal of the Society of Archer Antiquarians* 27 (1984): 21; Tolstoy, "Utilitarian Artifacts," 281, referencing other studies.
53. Antonio de Solís y Rivadeneyra, quoted by Ross Hassig, *Aztec Warfare: Imperial Expansion and Political Control* (Norman, Oklahoma: University of Oklahoma Press, 1988), 15.
54. The *Rigveda* 6.75.15 (India, fifteenth to tenth centuries B.C.) mentions the use of an arrowhead of horn; Kautilya's *Artha-sastra*, book 2, ch. 18 (India, fourth century B.C.) mentions arrowheads of bone and wood; the *Mahabharata* (Dronaparva, 188.11) (India, third century B.C. to third century A.D.) also mentions bone arrowheads. All of these examples are concurrent with the use of metal arrowheads. In Africa, arrowheads of thorn and other materials were used along with iron arrowheads (see Abu Hamid al-Gharnati, *Tuhfat alalbab*, in J. F. P. Hopkins, tr., *Corpus of Early Arabic Sources for West African History* [Cambridge: Cambridge University Press, 1981], 133).
55. Christian Feest, *The Art of War* (London: Thames and Hudson, 1980), 66.
56. On the Aztec use of the *atlatl*, bow, and sling, see Hassig, *Aztec Warfare*, 75-81.
57. Jacques Soustelle, *The Daily Life of the Aztecs* (Harmondsworth: Penguin, 1964), 219-20, quoting Bernardino de Sahagún, *Historia general de las cosas de Nueva España*, 5 vols. (Mexico: Pedro Robredo, 1938), 3:118-19.

58. George C. Vaillant, *Aztecs of Mexico* (Harmondsworth: Penguin, 1950), 210.

59. Peter Connolly, *Greece and Rome at War* (Englewood Cliffs, New Jersey: Prentice-Hall, 1981), 239.

60. Alfred T. Bryant, *The Zulu People As They Were before the White Man Came* (New York: Negro Universities Press, 1970; reprint of 1948 ed.), 505.

61. There is some slight textual evidence from the Bible that this may indeed have been the case. In KJV Old Testament terminology, arrows are invariably “shot” at someone (see Robert Young, *Young’s Analytical Concordance to the Bible* [Nashville: Thomas Nelson, 1982], 881-82), while in the Book of Mormon, arrows are most often “cast” or “thrown,” which could imply an action different than the standard shooting of an arrow. Examples include “cast[ing] their stones and their arrows” (Alma 49:4), “casting over stones and arrows” (Alma 49:19), and “stones and arrows which were thrown at them” (Alma 49:22). On the other hand, the choice of words here is probably somewhat arbitrary, since Helaman 16:2 makes a clear distinction between throwing stones and shooting arrows when the Nephites “cast stones at him ... [and] shot arrows at him.” Furthermore, the Hebrew word for shooting arrows, *rama*, is also the standard word for throwing.

62. Hassig, *Aztec Warfare*, 123, quoting the Anonymous Conqueror.

63. Temple, *The Genius of China*, 241. The Chinese had invented the earliest type of “proto-gun” by about 905 A.D. For a detailed and technical description of gunpowder weapons among the Chinese, see Joseph Needham et al., Pt. 7, Sect. 30, “Military Technology, The Gunpowder Epic,” in *Science and Civilization in China: Vol. 5, Chemistry and Chemical Technology* (Cambridge: Cambridge University Press, 1986).

64. Widespread examples of literary works using weaponry of their own day in describing ancient warfare can be found in Homer’s *Iliad*, *Vergil’s Aeneid*, Firdawsi’s *Shah-nameh*, the Indian *Mahabharata*, Malory’s *Morte d’Arthur*, and so on.

65. An alternative explanation for the existence of such weapon lists is that they are the product of Joseph Smith’s translation efforts. However, such a theory suggests that Joseph had a much wider leeway in translating than is probable.

66. “Nephi’s Arrows,” F.A.R.M.S. *Update*, July 1984, with a brief synopsis in “Nephi’s Arrows Create Solid Bull’s-eye,” *Insights*, October 1984, 2.

67. See Taybugha, translated in Latham and Paterson, *Saracen Archery*, 24-33, for a medieval discussion of this question.